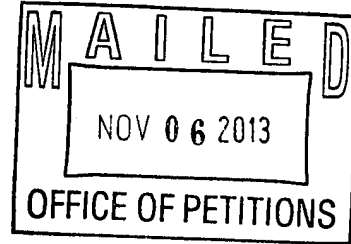




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United States Patent and Trademark Office
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Alexandria, VA 22313-1450
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**MAURIEL KAPOUYTIAN WOODS LLP
27 W. 24TH STREET
SUITE #302
NEW YORK NY 10010**



In re Patent No. 7,280,097 :
Issued: October 9, 2007 :
Application No. 11/249,009 : **NOTICE**
Filed: October 11, 2005 :
Attorney Docket No. 10046-2000400 :

This is a notice regarding your request for acceptance of a fee deficiency submission under 37 CFR 1.28 filed October 9, 2013.

On September 1, 1998, the Court of Appeals for the Federal Circuit held that 37 CFR 1.28(c) is the sole provision governing the time for correction of the erroneous payment of the issue fee as a small entity. **See DH Technology v. Synergystex International, Inc. 154 F.3d 1333, 47 USPQ2d 1865 (Fed. Cir. Sept. 1, 1998).**

The Office no longer investigates or rejects original or reissue applications under 37 CFR 1.56. **1098 Off. Gaz. Pat. Office 502 (January 3, 1989).** Therefore, nothing in this Notice is intended to imply that an investigation was done.

Your fee deficiency submission under 37 CFR 1.28 is hereby **ACCEPTED**.

This patent is no longer entitled to small entity status. Accordingly, all future fees paid in this patent must be paid at the large entity rate.

Telephone inquiries concerning this decision should be directed to the undersigned at (571) 272-7751.

/Joan Olszewski/
Joan Olszewski
Office of Petitions



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APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
11/249,009	10/11/2005	Elaine Chen	09096-8004.US00

CONFIRMATION NO. 9446

POWER OF ATTORNEY NOTICE

97075
Perkins Coie LLP - SDO General
PO Box 1247
Seattle, WA 98111-1247



Date Mailed: 10/17/2013

NOTICE REGARDING CHANGE OF POWER OF ATTORNEY

This is in response to the Power of Attorney filed 10/04/2013.

- The Power of Attorney to you in this application has been revoked by the assignee who has intervened as provided by 37 CFR 3.71. Future correspondence will be mailed to the new address of record(37 CFR 1.33).

/dtvernon/

Office of Data Management, Application Assistance Unit (571) 272-4000, or (571) 272-4200, or 1-888-786-0101



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
11/249,009	10/11/2005	Elaine Chen	

51417
Mauriel Kapouytian Woods LLP
27 W. 24th Street
Suite #302
New York, NY 10010

CONFIRMATION NO. 9446
POA ACCEPTANCE LETTER



Date Mailed: 10/17/2013

NOTICE OF ACCEPTANCE OF POWER OF ATTORNEY

This is in response to the Power of Attorney filed 10/04/2013.

The Power of Attorney in this application is accepted. Correspondence in this application will be mailed to the above address as provided by 37 CFR 1.33.

/dtvernon/

Office of Data Management, Application Assistance Unit (571) 272-4000, or (571) 272-4200, or 1-888-786-0101

Attorney Docket No.: 10046-2000400
(PATENT)

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

First Named Inventor: Bcth Marcus

Application No.: 11/249,009

Patent Number: 7,280,097

Filing Date: October 11, 2005

Issue Date: October 9, 2007

Title: HUMAN INTERFACE INPUT
ACCELERATION SYSTEM

FEE DEFICIENCY STATEMENT AND PAYMENT UNDER 37 C.F.R. 1.28

Mail Stop
Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450

Dear Sir:

Assignee has recently learned that the amount paid for the 3.5 year maintenance fee for the above-referenced patent may have been deficient. In an abundance of caution, this paper hereby requests the Director to charge payment to Deposit Account No. 50-4242 in the amount of \$1110.00, referencing docket number 10046-2000400. This payment amount is the difference between the amount paid and the current large entity fee amount for a 3.5 year maintenance fee. An itemization as required under 37 C.F.R. 1.28(c) is provided below.

Fee Type	Date Paid	Amount Paid	Current Large Entity Fee	Deficiency Amount
3.5 Year Maintenance Fee	March 10, 2011	\$490	\$1600	\$1110

10/11/2013 MBANGURA 00000068 504242 7280097
01 FC:1599 1110.00 DA

Application Serial No.: 11/249,009

Attorney Docket No.: 10046-2000400

The Director is also hereby authorized to charge any additional fees which may be required by this paper to Deposit Account No. 50-4242, referencing docket no. 10046-2000400.

Dated: October 9, 2013

Respectfully submitted,

By: /Michael Mauriel/ Reg. No. 44,226

Michael Mauriel
Registration No.: 44,226
Mauriel Kapouytian Woods LLP
27 West 24th Street, Suite 302
New York, New York 10010
(212) 529-5131
Attorney for Applicant



New York Office
27 W. 24th Street Suite 302
New York, New York 10010
Phone: 212-529-5131
Fax: 212-529-5132
Email: info-ny@mkwllp.com

California Office
1517 North Point Street # 454
San Francisco, California 94123
Phone: 415-992-3420
Fax: 415-992-3421
Email: info-ca@mkwllp.com

www.mkwllp.com

FAX COVER SHEET

DATE: October 9, 2013
TO: Maintenance Fee Branch
FAX: 571-273-6500
FROM: Michael Mauriel
RE: Fee Deficiency
US Patent Application No. 11/249, 009; Patent No. 7,280,097
PAGES: 3 (including cover)

Contents:

- 1. Fee Deficiency Statement and Payment under 37 C.F.R. 1.28

** Resending because only one page was transmitted according to our fax machine. Please DO NOT charge our Deposit Account twice for this filing.*

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

POWER OF ATTORNEY TO PROSECUTE APPLICATIONS BEFORE THE USPTO

I hereby revoke all previous powers of attorney given in the application identified in the attached statement under 37 CFR 3.73(b).

I hereby appoint:

Practitioners associated with the Customer Number: 51417

OR

Practitioner(s) named below (if more than ten patent practitioners are to be named, then a customer number must be used):

Name	Registration Number	Name	Registration Number

as attorney(s) or agent(s) to represent the undersigned before the United States Patent and Trademark Office (USPTO) in connection with any and all patent applications assigned only to the undersigned according to the USPTO assignment records or assignment documents attached to this form in accordance with 37 CFR 3.73(b).

Please change the correspondence address for the application identified in the attached statement under 37 CFR 3.73(b) to:

The address associated with Customer Number: 51417

OR

<input type="checkbox"/> Firm or Individual Name			
Address			
City	State	Zip	
Country			
Telephone	Email		

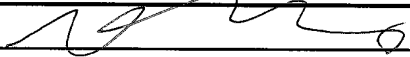
Assignee Name and Address:

Zeemote Technology Inc.
7F, No. 102, Sec. 4, Civic Blvd.
Daan District, Taipei, Taiwan, 106

A copy of this form, together with a statement under 37 CFR 3.73(b) (Form PTO/SB/96 or equivalent) is required to be filed in each application in which this form is used. The statement under 37 CFR 3.73(b) may be completed by one of the practitioners appointed in this form if the appointed practitioner is authorized to act on behalf of the assignee, and must identify the application in which this Power of Attorney is to be filed.

SIGNATURE of Assignee of Record

The individual whose signature and title is supplied below is authorized to act on behalf of the assignee

Signature		Date	Apr. 1st 2011
Name	Arron Fang	Telephone	
Title	President		

This collection of information is required by 37 CFR 1.31, 1.32 and 1.33. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 3 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

Electronic Acknowledgement Receipt

EFS ID:	17045821
Application Number:	11249009
International Application Number:	
Confirmation Number:	9446
Title of Invention:	HUMAN INTERFACE INPUT ACCELERATION SYSTEM
First Named Inventor/Applicant Name:	Elaine Chen
Customer Number:	97075
Filer:	Michael John Mauriel/Jasmine Habbas
Filer Authorized By:	Michael John Mauriel
Attorney Docket Number:	09096-8004.US00
Receipt Date:	04-OCT-2013
Filing Date:	11-OCT-2005
Time Stamp:	16:25:21
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no
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File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Change of Address	100462000400_Changeaddress.pdf	584812 <small>8ac1237e6c26425c88762e4ff06497b2e43427ab</small>	no	2

Warnings:

Information:

2	Assignee showing of ownership per 37 CFR 3.73.	100462000400_POAtrans.pdf	464826	no	3
			f9443e315b1b6013d49c3b9d93966d7ee1cfddae		

Warnings:

Information:

3	Power of Attorney	100462000400_POA.pdf	65072	no	1
			e2b7040ffa059dc4b67b89126c1d7e33aa09ee11		

Warnings:

Information:

Total Files Size (in bytes):			1114710		
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This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

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**CHANGE OF
CORRESPONDENCE ADDRESS
Patent**Address to:
Mail Stop Post Issue
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Patent Number	7,280,097
Issue Date	October 9, 2007
Application Number	11/249,009
Filing Date	October 11, 2005
First Named Inventor	Beth Marcus
Attorney Docket Number	10046-2000400

Please change the Correspondence Address for the above-identified patent to:



The address associated with Customer Number:

51417

OR **Firm or
Individual Name****Address****City****State****ZIP****Country****Telephone****Email**

This form cannot be used to change the data associated with a Customer Number. To change the data associated with an existing Customer Number use "Request for Customer Number Data Change" (PTO/SB/124).

This form will not affect any "fee address" provided for the above-identified patent. To change a "fee address" use the "Fee Address Indication Form" (PTO/SB/47).

I am the:



Patentee.



If the Patentee was not the applicant for patent (37 CFR 1.42), then a Statement under 37 CFR 3.73(c) (Form PTO/AIA/96 or equivalent) is enclosed or was filed on _____. See 37 CFR 3.71.

Attorney or agent of record. Registration Number 44226.Patent practitioner acting in a representative capacity whose correspondence address is the correspondence address of record. Notice has been given to the patentee or owner. Registration Number 44226.

Signature /Michael Mauriel/ Reg. No. 44,226

Typed or
Printed Name Michael Mauriel, Reg. No. 44,226

Date October 4, 2013

Telephone 212-529-5131

NOTE: This form must be signed in accordance with 37 CFR 1.33. See 37 CFR 1.4(d) for signature requirements and certifications. Submit multiple forms if more than one signature is required, see below*.



*Total of _____ forms are submitted.

This collection of information is required by 37 CFR 1.33. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 3 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Mail Stop Post Issue, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

Privacy Act Statement

The **Privacy Act of 1974 (P.L. 93-579)** requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether disclosure of these records is required by the Freedom of Information Act.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (*i.e.*, GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspection or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

STATEMENT UNDER 37 CFR 3.73(c)Applicant/Patent Owner: Beth Marcus; Elaine Chen; Rob Podoloff; Lorraine WheelerApplication No./Patent No.: 7,280,097 Filed/Issue Date: October 9, 2007Titled: HUMAN INTERFACE INPUT ACCELERATION SYSTEMZeemote Technology Inc., a corporation

(Name of Assignee)

(Type of Assignee, e.g., corporation, partnership, university, government agency, etc.)

states that, for the patent application/patent identified above, it is (choose **one** of options 1, 2, 3 or 4 below):

1. The assignee of the entire right, title, and interest.
2. An assignee of less than the entire right, title, and interest (check applicable box):
- The extent (by percentage) of its ownership interest is _____%. Additional Statement(s) by the owners holding the balance of the interest must be submitted to account for 100% of the ownership interest.
- There are unspecified percentages of ownership. The other parties, including inventors, who together own the entire right, title and interest are:

Additional Statement(s) by the owner(s) holding the balance of the interest must be submitted to account for the entire right, title, and interest.

3. The assignee of an undivided interest in the entirety (a complete assignment from one of the joint inventors was made). The other parties, including inventors, who together own the entire right, title, and interest are:

Additional Statement(s) by the owner(s) holding the balance of the interest must be submitted to account for the entire right, title, and interest.

4. The recipient, via a court proceeding or the like (e.g., bankruptcy, probate), of an undivided interest in the entirety (a complete transfer of ownership interest was made). The certified document(s) showing the transfer is attached.

The interest identified in option 1, 2 or 3 above (not option 4) is evidenced by either (choose **one** of options A or B below):

- A. An assignment from the inventor(s) of the patent application/patent identified above. The assignment was recorded in the United States Patent and Trademark Office at Reel _____, Frame _____, or for which a copy thereof is attached.
- B. A chain of title from the inventor(s), of the patent application/patent identified above, to the current assignee as follows:

1. From: Beth Marcus, Elaine Chen, Rob Podoloff, Lorraine Wheeler To: Zeetoo, Inc.The document was recorded in the United States Patent and Trademark Office at
Reel 017151, Frame 0097, or for which a copy thereof is attached.2. From: Zeetoo, Inc. To: Zeemote, Inc.The document was recorded in the United States Patent and Trademark Office at
Reel 021574, Frame 0047, or for which a copy thereof is attached.

[Page 1 of 2]

This collection of information is required by 37 CFR 3.73(b). The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

STATEMENT UNDER 37 CFR 3.73(c)

3. From: Zeemote, Inc. To: Fish & Richardson, P.C.

The document was recorded in the United States Patent and Trademark Office at
Reel 023472, Frame 0483, or for which a copy thereof is attached.

4. From: Zeemote, Inc. To: Zeemote, LLC

The document was recorded in the United States Patent and Trademark Office at
Reel 023905, Frame 0564, or for which a copy thereof is attached.

5. From: Fish & Richardson, P.C. To: Zeemote, Inc.

The document was recorded in the United States Patent and Trademark Office at
Reel 023768, Frame 0631, or for which a copy thereof is attached.

6. From: Zeemote, LLC To: Zeemote Technology Inc.

The document was recorded in the United States Patent and Trademark Office at
Reel 025137, Frame 0714, or for which a copy thereof is attached.

Additional documents in the chain of title are listed on a supplemental sheet(s).

As required by 37 CFR 3.73(c)(1)(i), the documentary evidence of the chain of title from the original owner to the assignee was, or concurrently is being, submitted for recordation pursuant to 37 CFR 3.11.

[NOTE: A separate copy (i.e., a true copy of the original assignment document(s)) must be submitted to Assignment Division in accordance with 37 CFR Part 3, to record the assignment in the records of the USPTO. See MPEP 302.08]

The undersigned (whose title is supplied below) is authorized to act on behalf of the assignee.

/Michael Mauriel/ Reg. No. 44,226

Signature

Michael Mauriel

Printed or Typed Name

October 4, 2013

Date

Attorney for Applicant; Reg. No. 44,226

Title or Registration Number

Privacy Act Statement

The **Privacy Act of 1974 (P.L. 93-579)** requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether disclosure of these records is required by the Freedom of Information Act.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (*i.e.*, GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspection or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
11/249,009	10/11/2005	Elaine Chen	19146-0005001

CONFIRMATION NO. 9446

POWER OF ATTORNEY NOTICE

20985
FISH & RICHARDSON P.C. (SD)
P.O. BOX 1022
MINNEAPOLIS, MN 55440-1022



Date Mailed: 03/02/2011

NOTICE REGARDING CHANGE OF POWER OF ATTORNEY

This is in response to the Power of Attorney filed 11/03/2010.

- The Power of Attorney to you in this application has been revoked by the assignee who has intervened as provided by 37 CFR 3.71. Future correspondence will be mailed to the new address of record(37 CFR 1.33).

/tmwilliams/

Office of Data Management, Application Assistance Unit (571) 272-4000, or (571) 272-4200, or 1-888-786-0101



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
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APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
11/249,009	10/11/2005	Elaine Chen	19146-0005001

CONFIRMATION NO. 9446

POA ACCEPTANCE LETTER

97075
Perkins Coie LLP
PO Box 1247
Seattle, WA 98111-1247



Date Mailed: 03/02/2011

NOTICE OF ACCEPTANCE OF POWER OF ATTORNEY

This is in response to the Power of Attorney filed 11/03/2010.

The Power of Attorney in this application is accepted. Correspondence in this application will be mailed to the above address as provided by 37 CFR 1.33.

/tmwilliams/

Office of Data Management, Application Assistance Unit (571) 272-4000, or (571) 272-4200, or 1-888-786-0101

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

15 STATEMENT UNDER 37 CFR 3.73(b)

Applicant/Patent Owner: Beth Marcus et al.

Application No./Patent No.: 7,280,097 Filed/Issue Date: October 9, 2007

Titled: HUMAN INTERFACE INPUT ACCELERATION SYSTEM

Zeemote Technology Inc., a Corporation
(Name of Assignee) (Type of Assignee, e.g., corporation, partnership, university, government agency, etc.)

states that it is:

- 1. the assignee of the entire right, title, and interest in;
- 2. an assignee of less than the entire right, title, and interest in
(The extent (by percentage) of its ownership interest is _____ %); or
- 3. an assignee of an undivided interest in the entirety of (a complete assignment from one of the joint inventors was made)

the patent application/patent identified above by virtue of either:

A. An assignment from the inventor(s) of the patent application/patent identified above. The assignment was recorded in the United States Patent and Trademark Office at Reel _____, Frame _____, or for which a copy thereof is attached.

OR

B. A chain of title from the inventor(s), of the patent application/patent identified above, to the current assignee as follows:

Beth MARCUS, Elaine CHEN,
Rob PODOLOFF,

- 1. From: Lorraine WHEELER To: Zeetoo, Inc.
The document was recorded in the United States Patent and Trademark Office at Reel 017151, Frame 0097, or for which a copy thereof is attached.
- 2. From: Zeetoo, Inc. To: Zeemote, Inc.
The document was recorded in the United States Patent and Trademark Office at Reel 021574, Frame 0047, or for which a copy thereof is attached.
- 3. From: Zeemote, Inc. To: Fish & Richardson, P.C.
The document was recorded in the United States Patent and Trademark Office at Reel 023472, Frame 0483, or for which a copy thereof is attached.

Additional documents in the chain of title are listed on a supplemental sheet(s).

As required by 37 CFR 3.73(b)(1)(i), the documentary evidence of the chain of title from the original owner to the assignee was, or concurrently is being, submitted for recordation pursuant to 37 CFR 3.11.

[NOTE: A separate copy (i.e., a true copy of the original assignment document(s)) must be submitted to Assignment Division in accordance with 37 CFR Part 3, to record the assignment in the records of the USPTO. See MPEP 302.08]

The undersigned (whose title is supplied below) is authorized to act on behalf of the assignee.

/Hwa C. Lee 59,747/
Signature

November 3, 2010
Date

Hwa Lee, Reg. No. 59,747
Printed or Typed Name

Attorney for Assignee
Title

STATEMENT UNDER 37 CFR 3.73(b) - Supplemental Sheet

Continuation of chain of title from the inventor(s) to the current assignee.

4. From: Fish & Richardson, P.C. To: Zeemote, Inc.
 The document was recorded in the United States Patent and Trademark Office at
 Reel 023768 , Frame 0631 , or for which a copy thereof is attached.
5. From: Zeemote, Inc. To: Zee Holding LLC
 The document was recorded in the United States Patent and Trademark Office at
 Reel 023778 , Frame 0132 , or for which a copy thereof is attached.
6. From: Zeemote, Inc. To: Zeemote LLC
 The document was recorded in the United States Patent and Trademark Office at
 Reel 023905 , Frame 0564 , or for which a copy thereof is attached.
7. From: Zeemote LLC To: Zeemote Technology Inc.
 The document was recorded in the United States Patent and Trademark Office at
 Reel 025137 , Frame 0714 , or for which a copy thereof is attached.
8. From: _____ To: _____
 The document was recorded in the United States Patent and Trademark Office at
 Reel _____ , Frame _____ , or for which a copy thereof is attached.
9. From: _____ To: _____
 The document was recorded in the United States Patent and Trademark Office at
 Reel _____ , Frame _____ , or for which a copy thereof is attached.

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POWER OF ATTORNEY TO PROSECUTE APPLICATIONS BEFORE THE USPTO

I hereby revoke all previous powers of attorney given in the application identified in the attached statement under 37 CFR 3.73(b).

I hereby appoint:

Practitioners associated with the Customer Number:

97075

OR

Practitioner(s) named below (if more than ten patent practitioners are to be named, then a customer number must be used):

Name	Registration Number	Name	Registration Number

as attorney(s) or agent(s) to represent the undersigned before the United States Patent and Trademark Office (USPTO) in connection with any and all patent applications assigned only to the undersigned according to the USPTO assignment records or assignment documents attached to this form in accordance with 37 CFR 3.73(b).

Please change the correspondence address for the application identified in the attached statement under 37 CFR 3.73(b) to:

The address associated with Customer Number:

97075

OR

<input type="checkbox"/> Firm or Individual Name			
Address			
City	State	Zip	
Country			
Telephone	Email		


Assignee Name and Address:

Zeemote Technology Inc.
 6F, No. 102, Sec. 4, Civic Blvd.
 Daan District, Taipei, Taiwan

A copy of this form, together with a statement under 37 CFR 3.73(b) (Form PTO/SB/96 or equivalent) is required to be filed in each application in which this form is used. The statement under 37 CFR 3.73(b) may be completed by one of the practitioners appointed in this form if the appointed practitioner is authorized to act on behalf of the assignee, and must identify the application in which this Power of Attorney is to be filed.

SIGNATURE of Assignee of Record

The individual whose signature and title is supplied below is authorized to act on behalf of the assignee.

Signature		Date	7/30/10
Name	Robert M. Pedoloff	Telephone	339-234-5740
Title	Chief Technical Officer		x 200

This collection of information is required by 37 CFR 1.31, 1.32 and 1.33. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 3 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1459, Alexandria, VA 22313-1459. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1459, Alexandria, VA 22313-1459.

If you need assistance in completing the form, call 1-800-PTO-3198 and select option 2.

Electronic Acknowledgement Receipt

EFS ID:	8759714
Application Number:	11249009
International Application Number:	
Confirmation Number:	9446
Title of Invention:	HUMAN INTERFACE INPUT ACCELERATION SYSTEM
First Named Inventor/Applicant Name:	Elaine Chen
Customer Number:	20985
Filer:	Hwa C. Lee/Dana Spear
Filer Authorized By:	Hwa C. Lee
Attorney Docket Number:	19146-0005001
Receipt Date:	03-NOV-2010
Filing Date:	11-OCT-2005
Time Stamp:	13:52:22
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no
------------------------	----

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Assignee showing of ownership per 37 CFR 3.73(b).	2010-11-03_POA.PDF	364978 <small>71cbe6b090afdc2e3b112caea8aad0b2e399b5e6</small>	no	3

Warnings:

Information:

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.



APPLICATION NO.	ISSUE DATE	PATENT NO.	ATTORNEY DOCKET NO.	CONFIRMATION NO.
11/249,009	10/09/2007	7280097	19146-005001	9446

20985 7590 09/19/2007
FISH & RICHARDSON, PC
P.O. BOX 1022
MINNEAPOLIS, MN 55440-1022

ISSUE NOTIFICATION

The projected patent number and issue date are specified above.

Determination of Patent Term Adjustment under 35 U.S.C. 154 (b) (application filed on or after May 29, 2000)

The Patent Term Adjustment is 0 day(s). Any patent to issue from the above-identified application will include an indication of the adjustment on the front page.

If a Continued Prosecution Application (CPA) was filed in the above-identified application, the filing date that determines Patent Term Adjustment is the filing date of the most recent CPA.

Applicant will be able to obtain more detailed information by accessing the Patent Application Information Retrieval (PAIR) WEB site (<http://pair.uspto.gov>).

Any questions regarding the Patent Term Extension or Adjustment determination should be directed to the Office of Patent Legal Administration at (571)-272-7702. Questions relating to issue and publication fee payments should be directed to the Customer Service Center of the Office of Patent Publication at (571)-272-4200.

APPLICANT(s) (Please see PAIR WEB site <http://pair.uspto.gov> for additional applicants):

Elaine Chen, Arlington, MA;
Rob Podoloff, Framingham, MA;
Lorraine Wheeler, Billerica, MA;
Beth Marcus, Bedford, MA;



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
11/249,009	10/11/2005	Elaine Chen	19146-005001	9446
20985	7590	08/24/2007	EXAMINER	
FISH & RICHARDSON, PC P.O. BOX 1022 MINNEAPOLIS, MN 55440-1022			OSORIO, RICARDO	
			ART UNIT	PAPER NUMBER
			2629	
			MAIL DATE	DELIVERY MODE
			08/24/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.



UNITED STATES DEPARTMENT OF COMMERCE

U.S. Patent and Trademark Office

Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450

APPLICATION NO./ CONTROL NO.	FILING DATE	FIRST NAMED INVENTOR / PATENT IN REEXAMINATION	ATTORNEY DOCKET NO.
11249009	10/11/05	CHEN ET AL.	19146-005001

FISH & RICHARDSON, PC
P.O. BOX 1022
MINNEAPOLIS, MN 55440-1022

EXAMINER

RICARDO L. OSORIO

ART UNIT	PAPER
----------	-------

2629


20070816

DATE MAILED:

Please find below and/or attached an Office communication concerning this application or proceeding.

Commissioner for Patents

Information Disclosure Statements filed on 5/17/2007 and 8/2/2007 have been accepted and considered by the examiner.


RICARDO OSORIO
PRIMARY EXAMINER

5/17/2007

Sheet 1 of 1

Substitute Form PTO-1449 (Modified) Information Disclosure Statement by Applicant (Use several sheets if necessary) (37 CFR §1.98(b))	U.S. Department of Commerce Patent and Trademark Office	Attorney's Docket No. 19146-005001	Application No. 11/249,009
	Applicant Beth Marcus, et al		
	Filing Date October 11, 2005		Group Art Unit 2629

U.S. Patent Documents							
Examiner Initial	Desig. ID	Document Number	Publication Date	Patentee	Class	Subclass	Filing Date If Appropriate
/R.O./	AA	2003/0083114	May 1, 2003	Lavin et al.			
	AB						
	AC						
	AD						
	AE						
	AF						
	AG						
	AH						
	AI						
	AJ						
	AK						

Foreign Patent Documents or Published Foreign Patent Applications								
Examiner Initial	Desig. ID	Document Number	Publication Date	Country or Patent Office	Class	Subclass	Translation	
							Yes	No
/R.O./	AL	EP1253547	Oct 30, 2002	EP				
/R.O./	AM	WO03/007117	Jan 23, 2003	WIPO				
/R.O./	AN	DE29823417	June 17, 1999	DE				X
/R.O./	AO	EP1376319	Jan 2, 2004	EP			Abstract only	
	AP							

Other Documents (include Author, Title, Date, and Place of Publication)		
Examiner Initial	Desig. ID	Document
/R.O./	AQ	"Developer's Guidelines Bluetooth™ HID remote control (K700, S700, V800 series)" Sony Ericsson, October, 2004
	AR	
	AS	
	AT	

Examiner Signature /Ricardo Osorio/ (08/16/2007)	Date Considered 08/16/2007
EXAMINER: Initials citation considered. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.	

Substitute Disclosure Form (PTO-1449)

8/2/2007

Substitute Form PTO-1449 (Modified) Information Disclosure Statement by Applicant (Use several sheets if necessary) (37 CFR §1.98(b))	U.S. Department of Commerce Patent and Trademark Office	Attorney's Docket No. 19146-005001	Application No. 11/249,009
	Applicant Beth Marcus, et al		
	Filing Date October 11, 2005	Group Art Unit 2629	

U.S. Patent Documents							
Examiner Initial	Desig. ID	Document Number	Publication Date	Patentee	Class	Subclass	Filing Date If Appropriate
/R.O./	AA	2004/0107303 A1	06/03/2004	MULLIGAN			
/R.O./	AB	2003/083114 A1	03/01/2003	LAVIN et al.			
/R.O./	AC	2003/095156 A1	05/22/2003	KLEIN et al.			

Foreign Patent Documents or Published Foreign Patent Applications								
Examiner Initial	Desig. ID	Document Number	Publication Date	Country or Patent Office	Class	Subclass	Translation	
							Yes	No
/R.O./	AD	WO 00/10077 A2	02/24/2000	WIPO				
/R.O./	AE	WO 92/15083 A	09/03/1992	WIPO				
/R.O./	AF	WO 04/019315 A1	03/04/2004	WIPO				
/R.O./	AG	WO 03/052948 A1	06/23/2003	WIPO				
/R.O./	AH	EP 1 376 319 A1	01/02/2004	Europe				

Other Documents (include Author, Title, Date, and Place of Publication)		
Examiner Initial	Desig. ID	Document

Examiner Signature /Ricardo Osorio/ (08/16/2007)	Date Considered 08/16/2007
EXAMINER: Initials citation considered. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.	

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AUG 17 2007

PART B - FEE(S) TRANSMITTAL

Complete and send this form, together with applicable fee(s), to: **Mail**

Mail Stop ISSUE FEE
Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450
(571) 273-2885

or **Fax**

INSTRUCTIONS: This form should be used for transmitting the ISSUE FEE and PUBLICATION FEE (if required). Blocks 1 through 4 should be completed where appropriate. All further correspondence including the Patent, advance orders and notification of maintenance fees will be mailed to the current correspondence address as indicated unless corrected below or directed otherwise in Block 1, by (a) specifying a new correspondence address; and/or (b) indicating a separate "FEE ADDRESS" for maintenance fee notifications.

CURRENT CORRESPONDENCE ADDRESS (Note: Legibly mark-up with any corrections or use Block 1)

20985 7590 05/17/07

Note: A certificate of mailing can only be used for domestic mailings of the Fee(s) Transmittal. This certificate cannot be used for any other accompanying papers. Each additional paper, such as an assignment or formal drawing, must have its own certificate of mailing or transmission.

Certificate of Mailing or Transmission
I hereby certify that this Fee(s) Transmittal is being deposited with the United States Postal Service with sufficient postage for first class mail in an envelope addressed to the Mail Stop ISSUE FEE address above, or being facsimile transmitted to the USPTO, on the date indicated below.

Julie H. Giordano (Depositor's name)
Julie H. Giordano (Signature)
August 17, 2007 (Date)

FISH & RICHARDSON P.C.
P.O. Box 1022
Minneapolis, MN 55440-1022

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
11/249,009	10/11/2005	Elaine Chen	19146-005001	9446

TITLE OF INVENTION: HUMAN INTERFACE INPUT ACCELERATION SYSTEM

APPLN. TYPE	SMALL ENTITY	ISSUE FEE	PUBLICATION FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	YES	Previously Paid	Previously Paid	\$0	08/17/2007

EXAMINER	ART UNIT	CLASS-SUBCLASS
OSORIO, RICARDO	2629	

1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363).
 Change of correspondence address (or Change of Correspondence Address form PTO/SB/122) attached.
 "Fee Address" indication (or "Fee Address" Indication form PTO/SB/47; Rev 03-02 or more recent) attached. Use of a Customer Number is required.

2. For printing on the patent front page, list (1) the names of up to 3 registered patent attorneys or agents OR, alternatively, (2) the name of a single firm (having as a member a registered attorney or agent) and the names of up to 2 registered patent attorneys or agents. If no name is listed, no name will be printed.

1. Fish & Richardson P.C.
- 2.
- 3.

3. ASSIGNEE NAME AND RESIDENCE DATA TO BE PRINTED ON THE PATENT (print or type)

PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. Inclusion of assignee data is only appropriate when an assignment has been previously submitted to the USPTO or is being submitted under separate cover. Completion of this form is NOT a substitute for filing an assignment.

(A) NAME OF ASSIGNEE

(B) RESIDENCE (CITY and STATE OR COUNTRY)

Zetec, Inc.

Bedford, MA

Please check the appropriate assignee category or categories (will not be printed on the patent): individual corporation or other private group entity government

4a. The following fee(s) are enclosed:

- Issue Fee
- Publication Fee (No small entity discount permitted)
- Advance Order - # of Copies

4b. Payment of Fee(s):

- A check in the amount of the fee(s) is enclosed.
- Payment by credit card. Form FIC-2038 is attached.
- The Director is hereby authorized to charge the required fee(s), or credit any overpayment, to Deposit Account Number 06-1050 (enclose an extra copy of this form). Applicant requests the previously paid Issue Fee and Publication Fee be applied.

5. Change in Entity Status (from status indicated above)

- a. Applicant claims SMALL ENTITY status. See 37 CFR 1.27.
- b. Applicant is no longer claiming SMALL ENTITY status. See 37 CFR 1.27(g)(2).

The Director of the USPTO is requested to apply the Issue Fee and Publication Fee (if any) or to re-apply any previously paid issue fee to the application identified above. NOTE: The Issue Fee and Publication Fee (if required) will not be accepted from anyone other than the applicant, a registered agent or, or the assignee or other party in interest as shown by the records of the United States Patent and Trademark Office.

(Authorized Signature)

Hwa C. Lee

(Date)

August 17, 2007

Typed or Printed Name

Hwa C. Lee

Registration No. 59,747

This collection of information is required by 37 CFR 1.311. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, Virginia 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, Virginia 22313-1450.

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TRANSMIT THIS FORM WITH FEE(S)

SUBSTITUTE FTOL-85 (Rev. 12/04) Approved for use through 04/30/2007.

OMB 0651-0033

U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

AUG 17 2007

Attorney's Docket No.: 19146-005001

OFFICIAL COMMUNICATION FACSIMILE:

OFFICIAL FAX NO: (571) 273-8300

Number of pages including this page 4

Applicant: Beth Marcus, et al
Serial No.: 11/249,009
Filed: October 11, 2005

Art Unit: 2629
Examiner: Ricardo Osorio
Conf. No.: 9446


Title: Human Interface Input Acceleration System

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

A Response to Notice of Allowance and Issue Fee Transmittal dated August 17, 2007 are attached.

Respectfully submitted,

Date: August 17, 2007



Hwe C. Lee
Reg. No. 59,747

Fish & Richardson P.C.
12390 El Camino Real
San Diego, California 92130
Telephone: (858) 678-5070
Fax: (858) 678-5099

HCU/jhg
10765062.doc

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Attorney's Docket No.: 19146-005001

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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

AUG 17 2007

Applicant:	Beth Marcus, et al	Art Unit:	2629
Serial No.:	11/249,009	Examiner:	Ricardo Osorio
Filed:	October 11, 2005	Confirmation No.:	9446
		Notice of Allowance Date:	February 21, 2007
Title:	HUMAN INTERFACE INPUT ACCELERATION SYSTEM		

MAIL STOP ISSUE FEE

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

RESPONSE TO NOTICE OF ALLOWANCE

In response to the Notice of Allowance mailed May 17, 2007, enclosed is a completed issue fee transmittal form PTOL-85b. The Issue Fee and Publication Fee were previously paid on April 25, 2007. Applicant requests that the fees previously paid be applied.

COMMENTS ON EXAMINER'S REASONS FOR ALLOWANCE

It is agreed that the limitations recited in the Examiner's Reasons for Allowance are not taught or suggested by the art of record, and that the allowed independent claims are distinguished from the cited prior art for at least the reasons stated in the Reasons for Allowance. Applicant does not concede that the stated reasons are the only grounds for patentability of the allowed claims, that the limitations excluded from the Reasons for Allowance are taught or suggested by the art of record, or that all of the limitations are necessary for patentability of the allowed claims or other claims directed to the disclosed subject matter. For example, other claims including different limitations are patentable over the cited prior art.

CERTIFICATE OF TRANSMISSION BY FACSIMILE

I hereby certify that this correspondence is being transmitted by facsimile to the Patent and Trademark Office on the date indicated below.

August 17, 2007
Date of Transmission

Julie H. Giordano
Signature

Julie H. Giordano
Typed or Printed Name of Person Signing Certificate

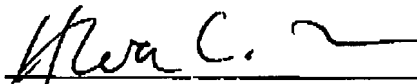
Applicant: Beth Marcus, et al
Serial No.: 11/249,009
Filed: October 11, 2005
Page: 2 of 2

Attorney's Docket No.: 19146-005001

No fees are believed due at this time. Please apply any additional charges or credits to our Deposit Account No. 06-1050.

Respectfully submitted,

Date: August 17, 2007



Hwa C. Lee
Reg. No. 59,747

Fish & Richardson P.C.
12390 El Camino Real
San Diego, California 92130
Telephone: (858) 678-5070
Facsimile: (858) 678-5099

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PART-B - FEE(S) TRANSMITTAL

Complete and send this form, together with applicable fee(s), to: **Mail**

Mail Stop ISSUE FEE
Commissioner for Patents
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(571) 273-2889

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CURRENT CORRESPONDENCE ADDRESS (Note: Legibly start-up with any correction or use Block 1)

20985 7590 05/17/07

Note: A certificate of mailing can only be used for domestic mailings of the Fee(s) Transmittal. This certificate cannot be used for any other accompanying papers. Each additional paper, such as an assignment or formal drawing, must have its own certificate of mailing or transmission.

Certificate of Mailing or Transmission
I hereby certify that this Fee(s) Transmittal is being deposited with the United States Postal Service with sufficient postage for first class mail in an envelope addressed to the Mail Stop ISSUE FEE address above, or being facsimile transmitted to the USPTO, on the date indicated below.

Julie H. Giordano (Depositor's name)

Julie H. Giordano (Signature)

August 17, 2007 (Date)

FISH & RICHARDSON P.C.
P.O. Box 1022
Minneapolis, MN 55440-1022

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
11/249,009	10/11/2005	Eliator Chen	10146-00501	9446

TITLE OF INVENTION: HUMAN INTERFACE INPUT ACCELERATION SYSTEM

APPL. TYPE	SMALL ENTITY	ISSUE FEE	PUBLICATION FEE	TOTAL FEE(S) DUE	DATE DUE
acaprofessional	YES	Previously Paid	Previously Paid	50	08/17/2007

EXAMINER	ART UNIT	CLASS-SUBCLASS
OSORIO, RICARDO	2629	

1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363).

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Adjustment date: 08/28/2007 SSANDAR1
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	Filing Date October 11, 2005		Group Art Unit 2629	

U.S. Patent Documents							
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	AD	WO 00/10077 A2	02/24/2000	WIPO				
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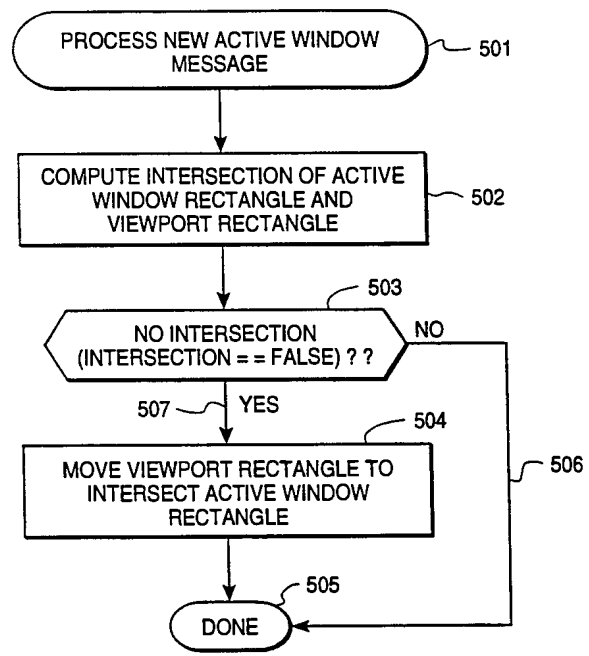
INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

<p>(51) International Patent Classification ⁷ : G06F 9/44, 3/033</p>	<p>A3</p>	<p>(11) International Publication Number: WO 00/10077 (43) International Publication Date: 24 February 2000 (24.02.00)</p>
<p>(21) International Application Number: PCT/US99/18072 (22) International Filing Date: 10 August 1999 (10.08.99) (30) Priority Data: 09/134,076 13 August 1998 (13.08.98) US (71) Applicant: SYMANTEC CORPORATION [US/US]; 10201 Torre Avenue, Cupertino, CA 95014-2132 (US). (72) Inventor: FAGIOLI, James, O.; 19 Mary Lu Drive, Holtsville, NY 11742 (US). (74) Agents: FLIESLER, Martin, C. et al.; Fliesler, Dubb, Meyer and Lovejoy LLP, Suite 400, Four Embarcadero Center, San Francisco, CA 94111-4156 (US).</p>	<p>(81) Designated States: CA, European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE). Published <i>With international search report.</i> (88) Date of publication of the international search report: 15 June 2000 (15.06.00)</p>	

(54) Title: METHODS AND APPARATUSES FOR TRACKING THE ACTIVE WINDOW OF A HOST COMPUTER IN A REMOTE COMPUTER DISPLAY WINDOW

(57) Abstract

A remote application on a remote computer interacts with a host application on a host computer so as to present in a remote application display window of the remote computer display a portion of the host computer screen image which intersects the foreground window of the host computer. A method performed by a remote application on a remote computer involves receiving a new active window message specifying an active window rectangle from the host application on the host computer, determining whether or not the moveable viewport rectangle (which defines the portion of the host computer display image to be displayed in the remote application display window of the remote computer display) intersects the active window rectangle, and moving the moveable viewport rectangle so as to intersect the active window rectangle if necessary. In the preferred embodiment, the new position of the moveable viewport rectangle is calculated so as to center the image of the host active window within the remote application display window if the active window rectangle's dimensions are less than the moveable viewport rectangle's dimensions; if the moveable viewport rectangle's dimensions are less than the active window rectangle's dimensions, then the new position of the moveable viewport rectangle is calculated so as to left and/or top align the moveable viewport rectangle and the active window rectangle. In the preferred embodiment, the moveable viewport rectangle is smoothly scrolled from its old position to its new position by accelerating the movement of the moveable viewport rectangle during the first half of the scroll, and decelerating the movement of the moveable viewport rectangle during the second half of the scroll.



*(Referred to in PCT Gazette No. 45/2000, Section II)

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**METHODS AND APPARATUSES FOR
TRACKING THE ACTIVE WINDOW OF A HOST COMPUTER
IN A REMOTE COMPUTER DISPLAY WINDOW**

5

BACKGROUND OF THE INVENTION

1. FIELD OF THE INVENTION

The present invention pertains to the field of controlling a host computer
10 from a remote computer, and more particularly to host and remote computers
running an operating system that uses windows for various applications and
utilities. Specifically, the present invention relates to remote control of a host
computer where the display viewport of the remote computer display used for
the remote application to display a duplicate of the host screen image is less
15 than the display area of the host display.

2. DISCUSSION OF THE RELATED ART

In IBM compatible personal computers which run the Windows
operating system, Symantec Corporation has developed a program called
20 pcAnywhere for allowing remote access of a host computer from a remote
computer. For example, a user's office personal computer may have network
connections, files, programs, and other capabilities which the user may want
to access when the user is away from his office in which his office personal
computer is located. To allow remote access using the pcAnywhere program,
25 the user starts the pcAnywhere host application on his office (host) computer
and leaves the host computer running. The host computer may be secured from
unauthorized use by a passworded screen saver or other utility.

When the user desires to access the host computer from a remote computer, he dials in or connects by some other means to the host computer from a remote computer using the pcAnywhere remote application. With the increasing popularity of hand-held Windows CE computers as the remote computer, it is often not possible to duplicate the entire host computer screen image on the remote computer. The pcAnywhere remote application provides the remote user with the ability to scroll around on the host computer display. However, frequently it is not evident to a remote user to which portion of the host computer display he should pan to find the active window of the remote computer.

This phenomenon is exceptionally problematic in the context of applications running on the host computer which spawn temporary new windows requiring some user input in order to continue any activity on the host machine. For example, the remote user might be using a word processing application running in a display window on the host computer, and upon attempting to save the a file within the word processing program, the word processing application might spawn a small window which would pop up in an area of the host computer display not shown on the small remote display, so that the remote user viewing the host computer display screen image through the pcAnywhere remote application display window of the remote computer would not be able to see the spawned window that required input in order to continue.

For example, if the word processing application upon being directed to save a file pops up a window that says "file already exists, replace existing file with this file?" and includes yes and no buttons within the small window, then unless the small pop-up window is viewable within the pcAnywhere remote application display window of the remote computer, then the remote user may

inaccurately view his system as being frozen. The remote user will not see the pop-up window of the host computer through the remote application display window, and therefore will not be able to provide the yes/no response to the pop-up window, and therefore will not be able to continue using the word processing application running on the host computer. Moreover, the remote user will not necessarily even know that the pop-up window has appeared on the host computer. The remote user will merely observe that no input into the regions of the host computer displayed on his remote display is possible, and therefore may erroneously conclude that his system has crashed.

10 As is apparent from the above discussion, a need exists for a method which would automatically focus or pan the remote application display screen image upon the portion of the host computer which is currently active and requiring input.

SUMMARY OF THE INVENTION

When the viewport of a remote application display window on a remote computer for remote access of a host computer is smaller than the host computer display, only a portion of the host computer screen image can be displayed on the remote application display window. If the active window of the host computer is not visible in the remote application display window, then the remote user is unable to see the active window of the host computer and may believe that the host computer is frozen, or will not be able to easily understand what is happening on the host computer. Therefore, an object of the present invention is to provide a method by which the viewport which determines which portion of the host computer display image is reproduced within the remote application display window can automatically be adjusted so as to display the portion of the host computer display image which includes the currently active host window. Another object of the present invention is to accomplish these adjustments to the contents of the remote application display window in a manner which is visually pleasing and understandable to the remote user.

According to the present invention, a remote application on a remote computer interacts with a host application on a host computer so as to present in a remote application display window of the remote computer display a portion of the host computer screen image which intersects the foreground window of the host computer. According to the present invention, a method performed by a remote application on a remote computer involves receiving a new active window message specifying an active window rectangle from the host application on the host computer, determining whether or not the moveable viewport rectangle (which defines the portion of the host computer display image to be displayed in the remote application display window of the remote

computer display) intersects the active window rectangle, and moving the moveable viewport rectangle so as to intersect the active window rectangle if necessary.

In the preferred embodiment of the present invention, the new position of the moveable viewport rectangle is calculated so as to center the image of the host active window within the remote application display window if the active window rectangle's dimensions are less than the moveable viewport rectangle's dimensions; if the moveable viewport rectangle's dimensions are less than the active window rectangle's dimensions, then the new position of the moveable viewport rectangle is calculated so as to left and/or top align the moveable viewport rectangle and the active window rectangle.

According to another aspect of the preferred embodiment of the present invention, the moveable viewport rectangle is smoothly scrolled from its old position to its new position by accelerating the movement of the moveable viewport rectangle during the first half of the scroll, and decelerating the movement of the moveable viewport rectangle during the second half of the scroll. Because the scrolling operation takes a not insignificant amount of real time (on the order of one second), it is possible for one or more additional new active window messages to be sent from the host application to the remote application while a smooth scroll operation is in progress. Therefore, according to the preferred embodiment, the new active window messages are stored by the remote application in a first-in-first-out buffer upon receipt from the host application. The remote application retrieves the oldest new active window message from the first-in-first-out buffer for processing after completing a smooth scroll operation.

According to another aspect of the present invention, the host application on the host computer receives notification of a new foreground

window from the host operating system by receiving a new foreground window message from the host operating system. The host application packages the information contained in the new foreground message to create a new active window message for the remote application. The new active window message
5 created by the host application includes an active window rectangle specified by the pixel coordinates of its upper-left and lower-right corners.

These and other features, aspects, and advantages of the present invention will be apparent from the Detailed Description of the Invention which discusses the Figures, in which like parts are referred to with like reference
10 numerals.

BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1 illustrates a general purpose computer architecture suitable for running a remote or host application allowing remote access of a host computer with host active window tracking on the remote computer according to the
15 present invention.

Figure 2 illustrates a host computer and a remote computer suitable for performing remote access of the host computer, suitable for displaying a portion of the host computer screen image in the display window of the remote
20 computer, and suitable for tracking the host active window in the display window of the remote computer according to the present invention.

Figure 3 is a logical depiction of a host computer system and a remote computer system suitable for performing remote access of the host computer, suitable for displaying a portion of the host computer screen image in the
25 display window of the remote computer, and suitable for tracking the host active window in the display window of the remote computer according to the present invention.

Figure 4 illustrates the host computer display having four open windows and showing a rectangle corresponding to the position of a moveable viewport rectangle designating an area to be presented in the display window of the remote computer display.

5 Figure 5 illustrates a method by which the remote application on the remote computer processes a new active window message according to the present invention.

 Figure 6 illustrates a method for computing whether or not the active window rectangle intersects the current position of the moveable viewport
10 rectangle according to the present invention.

 Figure 7 illustrates a method by which the remote application on the remote computer calculates the new position of the moveable viewport rectangle so as to be to left-aligned or centered in the x-dimension and top-aligned or centered in the y-dimension with respect to the active window rectangle
15 according to the preferred embodiment of the present invention.

 Figure 8 illustrates a method by which the remote application on the remote computer calculates the new position of the moveable viewport rectangle so as to be left or right aligned to the left or right edge, respectively, of the host display screen image and/or to be top or bottom aligned to the top or bottom
20 edge, respectively, of the host display screen image if the centering steps illustrated in Figure 7 would otherwise cause the moveable viewport rectangle to intersect any areas outside the host display area according to the preferred embodiment of the present invention.

 Figure 9 illustrates a method by which the remote application on the remote computer calculates a viewport delta and scrolls the moveable viewport
25 rectangle by the viewport delta over N sequential time steps according to the present invention.

Figure 10 illustrates in graphical form the remote application copy of the host computer display bitmap and the moveable viewport rectangle in its initial and final positions and its scroll path during a scroll in response to a change in the active window according to the present invention.

5 Figure 11 illustrates the scroll velocity over time during a smooth scroll operation on the moveable viewport rectangle in the preferred embodiment of the present invention.

 Figure 12 illustrates a method by which the remote application on the remote computer performs a smooth scroll operation on the moveable viewport
10 rectangle according to the preferred embodiment of the present invention.

 Figure 13 illustrates a method by which the remote application on the remote computer stores an incoming new active window message from the host application in a first-in-first-out buffer according to a preferred embodiment of the present invention.

15 Figure 14 illustrates a method by which the remote application on the remote computer removes and processes a new active window message from the first-in-first-out buffer according to the preferred embodiment of the present invention.

 Figure 15 illustrates a method by which the host application on the host
20 computer receives a new foreground window message from the host operating system and generates a new active window message to be sent to the remote application on the remote computer according to the preferred embodiment of the present invention.

 The Figures are more fully explained in the Detailed Description of the
25 Invention, in which like parts are designated by like reference numerals.

DETAILED DESCRIPTION OF THE INVENTION

When the viewport of a remote application display window on a remote computer for remote access of a host computer is smaller than the host computer display, only a portion of the host computer screen image can be displayed on the remote application display window. If the active window of the host computer is not visible in the remote application display window, then the remote user is unable to see the active window of the host computer and may believe that the host computer is frozen, or will not be able to easily understand what is happening on the host computer. According to the present invention, a method by which the viewport which determines which portion of the host computer display image is reproduced within the remote application display window can automatically be adjusted so as to display the portion of the host computer display image which includes the currently active host window. In addition, these adjustments to the contents of the remote application display window are accomplished in a manner which is visually pleasing and understandable to the remote user.

Fig. 1 illustrates a general purpose computer architectures 100 suitable for running a remote or host application allowing remote access of a host computer with host active window tracking on the remote computer according to the present invention. The general purpose computer 100 includes at least a microprocessor 101, Random Access Memory (RAM) 105, a display 106, and either a network interface 111 or a modem 112. The general purpose computer 100 may also include a hard disk 102, Read-Only Memory (ROM) 103, and Non-Volatile Random Access Memory (NVRAM) 104. The hard disk 102, ROM 103, and NVRAM 104 provide permanent storage capability for various purposes on the general purpose computer 100. The general purpose computer 100 additionally also includes user input devices such as a mouse 107 and

keyboard 108. As additional data input facilities, the general purpose computer 100 may include a floppy drive 109 and a CD ROM drive 110. In order to communicate with other computing devices, the general purpose computer 100 must include either a network interface 111 or a modem 112 or both. As
5 illustrated in Fig. 1, all of these elements are connected to a common data bus 113 having data, address, and control data paths.

Although the general purpose computer 100 illustrated in Fig. 1 includes only a single data bus 113, there is no requirement that this be the case. For example, the microprocessor 101 may alternatively be connected to multiple
10 data buses which interface various subsets of the general purpose computer elements to each other. For example, the microprocessor 101, RAM 105, and NVRAM 104 may be connected by a single data bus; while the ROM 103 and hard disk 102 are connected to a second data bus that also interfaces with the microprocessor 101 indirectly. Similarly, the CD ROM drive 110, network
15 interface 111, modem 112, floppy drive 109, mouse 107, and keyboard 108 may also be connected to each other via a third data bus which is indirectly connected to the microprocessor 101. Similarly, the display 106 may be connected to the microprocessor 101 indirectly through a separate data bus. As described above, it is to be understood that the general purpose computer 100
20 suitable for implementing the methods according to the present invention may take a variety of forms.

Fig. 2 illustrates a host computer and a remote computer suitable for performing remote access of the host computer, suitable for displaying a portion of the host computer screen image in the display window of the remote
25 computer, and suitable for tracking the host active window in the display window of the remote computer according to the present invention. The remote computer 201 consists primarily of a remote computer display 204, a remote

keyboard 206, a remote mouse 207, and the remote hardware and software unit 208. The remote hardware and software unit 208 includes all of the CD ROM drives, floppy drives, network connections, modems, and most of the internal hardware necessary to run a computer, as is typical with modern personal computers. The remote hardware and software 208 also includes an operating system and application software.

Within the remote computer display 204 of the remote computer 201, a display window 205 corresponds to a remote application according to the present invention which is described below. The remote computer 201 interacts with a host computer 202 via a communication link 203. The communication link 203 may be implemented in a variety of methods, such as a TCP/IP connection, a direct modem-to-modem connection, or various other standard communication protocols and devices that are known in the art. The host computer 202 includes a host computer display 209, a host keyboard 210, a host mouse 211, and a host hardware and software unit 212. The host hardware and software unit 212 includes the various CD ROM drives and floppy drives and microprocessors, RAM, and other components necessary to implement a personal computer. The host hardware and software 212 also includes a host operating system and a host application, which will be discussed later.

Fig. 3 is a logical depiction of a host computer system and remote computer system suitable for performing remote access of the host computer, suitable for displaying a portion of the host computer screen image in the display window of the remote computer, and suitable for tracking the host active window in the display window of the remote computer according to the present invention. Fig. 3 shows the primary components necessary for practicing the present invention. Specifically, the remote computer display 204

displays a remote computer screen image which is contained in digital form in the remote computer display bitmap 302. The remote computer display bitmap 302 typically resides in RAM 105 and is read by a display driver (not shown) so that the contents of the remote computer display bitmap 302 are portrayed
5 as a screen image on the remote computer display 204.

The remote computer display bitmap 302 includes a portion 303 which corresponds to the display window 205. The display window 205 corresponds to the remote application 301. In other words, the remote application 301 appears to the user through a display window 205. Therefore, the remote
10 application 301 typically writes into the remote computer display bitmap 302 only in the section 303 of the remote computer display bitmap which corresponds to its display window 205. The display driver 311 is responsible for reading out the contents of the remote computer display bitmap 302 portraying the remote computer screen image 204 which includes the remote
15 application display window 205.

The remote computer also typically includes other remote applications 305 which are responsible for writing various portions of the remote computer display bitmap 302 which will ultimately be displayed as other application windows in the remote computer display 204. The remote computer also
20 includes a remote operating system 304, which interfaces with the remote application 301 and the other application 305, as well as with the remote computer display bitmap 302. The remote operating system receives user input 312 through a mouse 207 or keyboard 206, or other input device, and determines how to act on the remote user input 312. For example, if the mouse
25 cursor is in a region of the remote computer display 204, which corresponds to the remote application 301 (if the mouse cursor is within remote application display window 205), and the user clicks the mouse 207, then the mouse click

event is handed down to the remote application 301 by the operating system 304, through the link 313 illustrated in Fig. 3. Alternatively, if the mouse click occurs outside of any application window of the remote computer display 204, then the remote operating system 304 may update the remote computer display bitmap 302 directly through the link 314, if such updating is appropriate. Finally, other applications 305 will receive mouse input from the remote operating system 304 if the mouse appears in the display windows corresponding to the other remote applications when the mouse click event occurs. If appropriate, the other remote applications will update portions of the remote computer display bitmap which correspond to their respective display windows.

Similarly, the host computer includes a host computer display 209 and a host computer display bitmap 308, which digitally represents the host computer screen image to be displayed on the host computer display 209. The host computer graphics driver 315 is responsible for reading out of the host computer display bitmap 308 and displaying it as a host computer screen image on the host computer display 209. The host computer also includes a host operating system 309 and a host application 307.

In the system for providing remote access to a host computer according to the present invention, the remote user places the mouse cursor in the remote mouse 207 in the display window 205 corresponding to the remote application 301. By selecting the display window 205 corresponding to the remote application 301, the remote operating system 304 designates the remote application 301 as the foreground window which receives keyboard input from the remote keyboard 206. As long as the display window 205 corresponding with the remote application 301 is selected as the foreground window of the remote computer 201, remote user input 312 is channeled to the remote

application 301 through the link 313 to be processed by the remote application 301.

5 The remote user input channeled to the remote application 301 through the link 313 is processed as described below. Because the system according to the present invention allows remote access of the host computer, the input 313 to the remote application is packaged by the remote application 301 and communicated to the host application 307 running on the host computer 202 through the communication link 316.

10 The host application 307 receives the messages from the remote application through the communication link 316 and delivers that input to the host operating system 309 through the link 317. In other words, the host application 307 directs the user input from the remote application 301 coming in on link 316 to the host operating system 309 as if the input 317 were host user input. Thus, the remote user input 312 having been processed by the remote operating system 304, the remote application 301, and the host application 307, is presented to the host operating system 309 as if it were coming directly from a host user. In this way, the remote user input 312 is delivered to the host computer 202 into the host operating system 309 in exactly the same manner as if a host user had been sitting at the host computer and performed the operations which were performed by the remote user through the remote user input 312.

20 Similarly to the way remote user input 312 is processed by remote operating system 304 for any of the applications running on the remote computer 201, the remote input 317 to the host computer 202 is processed by the host operating system 309 in an identical manner for all the applications running on the host computer 202. Specifically, if the remote input 317 corresponds to a host application 310, then the remote input 317 is delivered to

the host application through link 318, thereby causing some activity to occur in the application 310, which might involve redrawing the portion of the host computer display bitmap 308, which corresponds to the application 310. Thus, the application 310 writes into the host computer display bitmap through link 5 319 into the portion of the host computer display bitmap 308 which corresponds to the display window of the application 310. Alternatively, if the remote input 317 is directed to the host operating system, rather than an application on the host computer 202, then the host operating system 309 may update the host computer display bitmap 308 directly through the link 320, if appropriate.

10 The host application 307 is capable of reading the host computer display bitmap 308 through the link 321. The host application 307 delivers messages to the remote application 301 through the link 322 so as to keep the remote application copy of the host computer display bitmap 306 as current and accurate as possible. In other words, the host computer display bitmap 308 is 15 reproduced within the remote application 301 as the remote application copy of the host computer display bitmap 306. As a practical matter, the host application 307 must detect changes in the host computer display bitmap 308 in order to generate messages for the remote application 301 indicating updating portions of the remote application copy of the host computer display bitmap 20 306. Due to the delay in detecting changes in the host computer display bitmap 308 by the host application 307, in addition to the delays in creating messages by the host application 307 to be transmitted to the remote application 301, in addition to the communication delays through the communication channel 322 between the host applications 307 and the remote application 301, in addition 25 to the processing delay in receiving messages indicating changes in the host computer display bitmap by the remote application 301, the updating of the remote application copy of the host computer display bitmap 306 may not occur

instantaneously in the eyes of a human user watching the remote application display window 205. However, for the most part, the host computer display bitmap 308 and the remote application copy of the host computer display bitmap 306 can practically be maintained in near synchronization at all times.

5 Whenever a change in the remote application copy of the host computer display bitmap 306 occurs that is within the moveable viewport rectangle (which corresponds to the portion of the host computer screen image which is being displayed within the remote application display window 205), the remote application 301 updates the remote computer display bitmap 302 (specifically
10 the portion 303 of the remote computer display bitmap 302) so that the remote application display window 205 will accurately reproduce the portion of the host computer screen image that is being displayed within the remote application display window 205.

As can be ascertained by looking at either Figs. 2 or 3, both the remote
15 computer display 204 and the host computer display 209 may or may not be the same size in terms of pixel height and width. In Figs. 2 and 3, the remote computer display 204 and host computer display 209 are drawn as the same size. However, it is possible that the remote computer 204 may have a significantly smaller display 204 than the host computer 209. For example, if
20 the host computer 209 is a full blown personal computer having a large display, such as 1024 pixels width and 760 pixels height, while the remote computer has a smaller display, such as a 640 pixel width and 480 pixel height display, then it is impossible to reproduce the host computer display image on the remote computer display 204, because the remote computer display 204 is smaller in
25 pixel dimensions than the host computer display 209. In other words, even if the remote application display window 205 is permitted to occupy the entire remote computer display 204, if the remote computer display 204 dimensions

are smaller than the host computer display 209 dimensions, then the entire host computer display image cannot be reproduced on the remote computer display 204.

As is illustrated in Figs. 2 and 3, the remote application display window 205 is significantly smaller than the remote computer display 204. This is frequently the case when the remote user wants to control the host computer 202 through the remote application display window 205, but also wants to run independent other applications 305 on the remote computer 201, and therefore needs to reserve a significant portion of the remote computer display 204 to the display windows of the other applications 305 or windows of the remote operating system 304. Thus, as illustrated in Figs. 2 and 3, the remote application display window 205 is significantly smaller in both height pixel dimension and width pixel dimension as compared to the host computer display 209. In this case, it is not possible to show on the remote application display window 205 the entire host computer screen image shown on the host computer display 209.

Fig. 4 illustrates the host computer display having four open windows and showing a rectangle corresponding to the position of a movable viewport rectangle designating an area to be presented in the display window of the remote computer display. Fig. 4 depicts a rectangle 209 corresponding to the host computer display. The host computer display 209 has a pixel width of 1024 pixels, and a pixel height of 760 pixels. This is illustrated by the (X,Y) coordinates at the origin in the upper left-hand corner of the host computer display 209, shown as (0,0). In the lower right-hand corner of the host computer display 209, the coordinates of the lower right-hand corner is illustrated as (1024, 760).

Fig. 4 also illustrates four open windows 401, 402, 403, and 404 within the host computer display screen image. Dotted rectangle 405 corresponds to one possible position of the movable viewport rectangle maintained by the remote application 301. If the movable viewport rectangle 405 is logically in the position illustrated in Fig. 4, then the area enclosed by dotted rectangle 405 will be copied by the remote application 301 from the remote application copy of the host computer display bitmap 306 into the portion 303 of the remote computer display bitmap 302. In other words, although the entire host computer display bitmap 308 is duplicated in the remote application copy of the host computer display bitmap 306, only the portion of the remote application copy of the host computer display bitmap 306 which is contained within a movable viewport rectangle is copied into the portion 303 of the remote computer display bitmap 302 for display within the remote application display window 205.

The size of the movable viewport rectangle is governed by the size of the remote application display window. The size of the movable viewport rectangle is typically slightly less than the size of the remote application viewport window 205. The size of the remote application viewport rectangle 205 is typically set by the user in a normal drag and drop window sizing operation on the remote computer 201. However, because the remote application 301 itself has buttons and borders along the bottom sides and top of the remote application display window 205, the portion of the remote application display window 205 which can be dedicated to reproducing the host computer display screen image is slightly smaller than the remote application display window 205 itself.

It is generally desirable for the user of the remote computer 201 to be viewing the portion of the host computer screen image in which activity is

occurring. For example, in the example shown in Fig. 4, there are four open windows 401, 402, 403, and 404. At time 1, perhaps window 401 is the active window for which activity is occurring on the host computer. In this event, having the movable viewport rectangle 405 in the position illustrated in Fig. 4 is desirable because the active window 401 would be displayed on the remote application display window 205 of the remote computer display 204. However, if the active window in the host computer display 209 were to change from window 401 to window 404, then the remote user viewing the portion of the host computer screen image within the movable viewport rectangle 405 would be confused by the fact that he is no longer observing the activity on the host computer display screen image. In other words, activity would be occurring in window 404, and yet this portion of the host computer display image would not be shown on the remote computer display window.

According to the present invention, whenever a new window becomes the foreground window on the host computer 202, then the movable viewport rectangle designating which portion of the remote application copy of the host computer display bitmap 306 is to be written into the portion 303 of the remote computer display bitmap 302 is moved so as to intersect the new active window within the host computer display screen image. As illustrated in Fig. 4, if the foreground window at time 1 is window 401, then movable viewport rectangle 405 is suitably positioned, because it encloses and therefore intersects the active window 401. However, if the host computer foreground window changes to window 404 at time 2, then according to the present invention it is necessary to move the movable viewport rectangle 405 to a new position which will intersect the new active window 404. As shown in Fig. 4, movable viewport rectangle 406 is suitably placed at time 2 since window 404 has become the active window on the host computer 202. If however at time 1 window 401 is

the active window, and the active window is changed at time 2 to window 402, then the placement of movable viewport rectangle 405 is suitable because it intersects (although it does not completely enclose) window 402 according to the present invention.

5 It should be noted that Fig. 4 illustrates the host computer display 209 and certain elements within the host computer display screen image, such as windows 401, 402, 403, and 404, however movable viewport rectangles 405 and 406 are illustrated on Fig. 4 only for the purposes of illustrating the affect of their placement. In actuality, the movable viewport rectangle is maintained
10 on the remote application 301. The movable viewport rectangle determines which portion of the remote application copy of the host computer display bitmap 306 is to be written into the portion 303 of the remote computer display bitmap 302. The content of the portion 303 of the remote computer display
15 bitmap 302 determines what screen image appears within the remote application display window 205.

 According to the present invention, in order to notify the remote application 301 of the existence of a positioning of a new foreground window on the host computer 202, the host application 307 sends the remote application 301 a new active window message through the link 323. The new active
20 window message specifies a rectangle that is the position of the new active window. The active window rectangle contained within the new active window message transmitted through link 323 from the host application 307 to the remote application 301 typically is represented as an upper left-hand coordinate position and a lower right-hand coordinate position. Alternatively, the active
25 window rectangle may be represented as a upper left-hand corner coordinate and a width and height, thereby allowing easy calculation of the lower right-hand corner and the other two corners as well.

The host application 307 receives notification of a new foreground window on the host computer 202 from the host operating system 309 through link 324. This new foreground window message received from the operating system 309 is then processed by the host application 307 and transmitted to the remote application 301 through link 323 as described above. Fig. 3 shows links 316, 322, and 323 as being separate links, however, they are all logical representations of the processes being carried out by the remote application 301 and host application 307. In actuality, links 316, 322 and 323 are all part of the communication link 203 illustrated in Fig. 2. In fact, the links 316, 322, and 323 may actually occur through the operating systems 304 and 309 rather than directly from host application 307 to a remote application 301 as illustrated in Fig. 3. Thus, Fig. 3 is a logical diagram showing the flow of messages from various software and hardware entities according to the present invention. It is to be understood that the messages being transmitted on links 322 and 323 from the host application 307 to the remote application 301 may actually be accomplished by any one of several well known methods involving calls to the operating system 309 or other utilities. Similarly, the remote application 301 may receive messages transmitted on links 322 and 323 through operating system 304. In addition, the messages 316 traveling from the remote application 301 to the host application 307 may actually be routed through the remote operating system 304 to the host operating system 309 and then down to the host application 307. Such communication described above between operating system 304 and 309 may actually involve several intermediate elements such as network interface 111 or modem 112 illustrated in Fig. 1.

Fig. 5 illustrates a method by which a remote application on the remote computer processes a new active window message according to the present invention. Some time after a new active window message is transmitted from

the host application 307 to the remote application 301, the new active window message is processed. This processing occurs in the most general sense as illustrated in Fig. 5 according to the present invention. The remote application 301 begins processing the new active window message at step 501. At step 5 502, the remote application 301 computes the intersection of the active window rectangle and viewport rectangle. Step 502 computes a logic variable having either a true or false output. For example, if the active window rectangle and movable viewport rectangle intersect at all, meaning they have at least one point in common, then the intersection is deemed true. If there is no intersection or overlap between the active window rectangle and movable viewport rectangle, then the intersection is deemed to be false. In practice, the operating system 304 on the remote computer 201 may include a utility or routine which is capable of performing the intersection computation for the remote application 301. In this case, the remote application 301 at step 502 calls the operating system utility having the capability of computing intersection with the two 10 rectangles as arguments. However, there is no requirement according to the present invention that the remote application 301 rely on the operating system 304 to compute the intersection of the active window rectangle and the movable viewport rectangle.

20 Once the logic value of the intersection has been computed at step 502, then the method progresses to test 503 which checks the value of the intersection variable computed at step 502. If there is an intersection, then the intersection variable computed at step 502 is true, and branch 506 takes the method to completion at step 505. If however the intersection is false, meaning 25 that there was no overlap between the active window rectangle and the movable viewport rectangle, then branch 507 takes the method to step 504. At step 504,

the movable viewport rectangle is moved so as to intersect the active window rectangle according to the present invention.

Fig. 6 illustrates a method for computing whether or not the active window rectangle intersects the current position of the movable viewport rectangle according to the present invention. The method begins at step 601, corresponding to the beginning of step 502 in Fig. 5. At step 602, the intersection variable is computed. In Fig. 6, each edge is represented by an X or Y value. For example, the left edge of the movable viewport rectangle is represented by $X(\text{view}, \text{left})$. The top edge of the movable viewport rectangle is represented by the expression $Y(\text{view}, \text{top})$. Similarly, the right edge of the active window rectangle is represented by the expression $Y(\text{active}, \text{right})$. The bottom edge of the active window rectangle is represented by the expression $Y(\text{active}, \text{bottom})$.

The intersection variable is a logical function of the six inequality and logic lines having expressions such as discussed above with respect to the edges of the rectangle. The first line in step 602 determines if the active window rectangle left edge is between the left and right edges of the viewport rectangle. The second line in step 202 determines if the right edge of the active window rectangle is between the left and right edges of the movable viewport rectangle. The third line in step 602 indicates if the left edge of the active window is left of the viewport left edge, and the right edge of the active window is right of the viewport right edge. In any of those cases, there is intersection between the viewport rectangle and the active window rectangle with respect to the X dimension.

The lower three lines in step 602 determine whether or not there is intersection between the movable viewport rectangle and the active window rectangle with respect to the Y dimension. The fourth line in step 602

determines if the top edge of the active window rectangle is between the top and bottom edges of the movable viewport rectangle. The fifth line of the step 602 determines whether or not the bottom edge of the active window rectangle is between the top and bottom edges of the movable viewport rectangle. The sixth
5 line of the step 602 determines whether or not the top edge of the movable viewport rectangle is above the top edge of the active window rectangle and the bottom edge of the active window rectangle is below the bottom edge of the movable viewport rectangle. Lines 4, 5, and 6 of step 602 therefore determine if there is overlap between the movable viewport rectangle and the active
10 window rectangle with respect to the Y dimension.

Only if there is overlap in both the X dimension and the Y dimension of the active window rectangle and movable viewport rectangle is there an intersection between the active window rectangle and the movable viewport rectangle. Once this logic test has been performed and true or false value
15 assigned to the intersection variable at step 602, then the process is done at step 603 and the method in Fig. 5 progresses to step 503. It is to be understood that the inequalities discussed and shown in step 602 are not necessarily the simplest computations which could be performed to determine the intersection of the active window rectangle on the movable viewport rectangle. These steps are
20 merely exemplary and are not limiting to the present invention.

Fig. 7 illustrates a method by which the remote application on the remote computer calculates the new position of the movable viewport rectangle so as to be left aligned or centered in the X dimension and top aligned or centered in the Y dimension with respect to the active window rectangle according to the preferred embodiment of the present invention. Figs. 7, 8, 9
25 and 12, taken together describe the preferred embodiment for the method of carrying out step 504 shown in Fig. 5. In other words, Figs. 7, 8, 9, and 12

describe the preferred embodiment of the way to move the viewport rectangle so as to intersect the active window rectangle.

The method starts at step 701 with the beginning of step 504 in Fig. 5. At test 702, the remote application 301 determines whether or not the viewport rectangle width is less than the active rectangle width. If the viewport rectangle width is less than the active window rectangle width, then it is impossible to show the entire active window rectangle X dimension within the viewport rectangle of the remote application display window 205. Therefore, if the answer to test 702 is yes, in the preferred embodiment the remote application aligns the viewport rectangle with the left edge of the active window rectangle left edge. This permits the right edge of the active window rectangle to not be shown within the remote application display window 205. If however the viewport rectangle width is not less than the active window rectangle width, then it is possible to show the entire active window rectangle X dimension within the remote application display window 205. Thus, if the answer to step 702 is no in the preferred embodiment, the remote application at step 704 centers the active window rectangle left and right edges within the viewport rectangle. Such centering is shown for example in Fig. 4 with the logical position of viewport rectangle 406 and active window rectangle 404. The active window rectangle 404 is centered in the X dimension and in the Y dimension within the movable viewport rectangle 406. Test 702 determines which of steps 703 and 704 to perform. Either step 703 left aligns the viewport rectangle with the active window rectangle left edge or step 704 centers the active window rectangle left and right edges within the viewport rectangle. In either event the method then reverts to test 705 which determines whether or not the viewport rectangle height is less than the active window rectangle height.

If the viewport rectangle height is less than the active window rectangle height, then it is impossible to display the entire active window rectangle image on the remote application display window 205. Therefore, in that event, step 706 aligns the viewport rectangle top edge to the active window rectangle top edge, thereby allowing the active window rectangle bottom edge to not be displayed within the remote application display window 205. If however the viewport rectangle height is not less than the active window rectangle height, then the entire active window rectangle Y dimension can be successfully displayed within the remote application display window 205. In that event then step 707 centers the active window rectangle top and bottom edges within the viewport rectangle. In summary, the method of Fig. 7 either left aligns or centers in the X dimension the active window rectangle and the viewport rectangle, and either top aligns or centers in the Y dimension the active window rectangle and the viewport rectangle.

It is possible if step 704 and step 707 were performed that the new calculated position of the movable viewport rectangle may cover areas outside of the host computer display dimensions. For example, if the active window on the host computer is very small and is very near a corner of the host computer display and if the movable viewport rectangle is significantly larger than the active window rectangle, then the centering operations in steps 704 and 707 may result in the viewport rectangle edges falling outside of the host computer display edges, thereby attempting to display in the remote application display window 205 host computer display screen image regions which are not defined. Because it is generally undesirable to display blank regions outside of the dimensions of the host computer display, Fig. 8 illustrates a method according to the preferred embodiment of the present invention whereby it is ensured that the remote application display window 205 never displays regions

outside of the host computer display outer boundaries. For example, step 801 determines whether or not the left edge of the viewport rectangle is left of the left edge of the host computer display. If the left edge of the viewport rectangle is left of the host computer display left edge, then step 802 sets and thereby aligns the left edge of the viewport rectangle to the left edge of the host computer display. Step 803 determines whether or not the right edge of the viewport rectangle is right of the host computer display right edge. If the right edge of the viewport rectangle is right of the host computer display right edge, then step 804 aligns the right edge of the viewport rectangle with the right edge of the host computer display.

Steps 805 through 808 perform a similar adjustment to the top and bottom edges of the viewport rectangle. Specifically, step 805 determines if the viewport top edge is above the top edge of the host computer display. If the top edge of the viewport rectangle is above the top edge of the host computer display, then step 806 sets the top edge of the viewport rectangle to be aligned with the top edge of the host computer display. Step 807 determines if the bottom edge of the viewport rectangle is below the bottom edge of the host computer display. If the bottom edge of the viewport rectangle is below the host computer display, then the step 808 aligns the bottom edge of the viewport rectangle with the bottom edge of the host computer display. After steps 801 through 808 have been performed, the new position of the movable viewport rectangle will intercept the host computer display at all points within the movable viewport rectangle. In other words, the movable viewport rectangle will never include any points outside the host computer display. Although this feature is not required according to the present invention, it is included in the preferred embodiment of the present invention because it is assumed that the

user will not want to view blank space within the remote application display window 205 on the remote computer 201.

The methods shown in Figs. 7 and 8 have demonstrated how the remote application 301 computes the new position of the movable viewport rectangle.

5 The methods illustrated in Figs. 7 and 8 have not actually moved the movable viewport rectangle or changed the display through the remote application display window 205, but they have calculated the new position of the moveable viewport rectangle which will affect the screen image of the remote application display window 205 after movement is made. The actual movement of the
10 moveable viewport rectangle is described below.

Fig. 9 illustrates the movement of the movable viewport rectangle to its new position which was calculated in the methods shown in Figs. 7 and 8. At step 901, a viewport delta is computed for both the X dimension and Y dimension movement. The viewport delta represents a two-dimensional vector
15 describing how much the movable viewport rectangle must be moved from its current position, thereby to be placed in its new position which was calculated in the methods of Figs. 7 and 8.

At step 902, the movable viewport rectangle is smoothly scrolled from its old position to its new position over a time period which is not insignificant
20 to a remote user watching the movement. In other words, the movable viewport rectangle is scrolled to its new position in a manner similar to how a user himself might have manually scrolled over to a new position on the screen. (Actually, the smooth scroll involves movement in the horizontal and vertical directions simultaneously, which is impossible in a single mouse system using
25 thumbwheels along the bottom and sides as is typical in many applications.) It is to be noted that there is no requirement according to the present invention that the movable viewport rectangle be scrolled to its new position according

to the present invention. For example, the movable viewport rectangle may simply be instantaneously changed from its old position to its new position. Alternatively, the movable viewport rectangle may be moved at a constant velocity from its old position to its new position in a not insignificant time when viewed by the user. There is no requirement according to the present invention as to how the movable viewport rectangle is moved from its current position to its new position. However, in the preferred embodiment of the present invention, the movable viewport rectangle is smoothly scrolled from its old position to its new position. Fig. 10 illustrates how this smooth scrolling might appear in the context of the example shown in Fig. 4.

Fig. 10 illustrates the remote application copy of the host computer display bitmap 306. The movable viewport rectangle 101 encloses an area 401' which represents the position of the active window 401 at time 0. An active window message is processed by the remote application which indicates that the new active window rectangle is at the position illustrated by dotted rectangle 404' in Fig. 10. Because active window rectangle 404' is smaller in both the X dimensions and the Y dimensions from the movable viewport rectangle 1001 and 1002, steps 704 and 707 in Fig. 7 perform a centering operation thereby calculating a new position 1002 for the movable viewport rectangle such that the active window rectangle 404' is centered within the movable viewport rectangle 1002. Once the new position 1002 has been calculated, the remote application smoothly scrolls the movable viewport rectangle from its current position 1001 to its new position 1002.

During the first half 1003 of this movement, the velocity of the scrolling increases linearly in the preferred embodiment of the present invention. During the second half 1004 of this movement the scroll velocity of the movable

viewport rectangle decreases linearly until the movable viewport rectangle 1002 reaches its new position 1002.

Fig. 10 illustrates logically the movement of the movable viewport rectangle 1001 to its new position 1002. However, it is to be understood that the position of the remote application display window 205 does not change during the movement of the movable viewport rectangle. As the movable viewport rectangle is scrolled over to its new position a different portion of the remote application copy of the host computer display bitmap 306 is continuously written through link 325 from the remote application into the portion 303 of the remote computer display bitmap 302. The portion 303 includes at all times during the scroll operation the portion of the remote application copy of the host computer display bitmap 306 which is contained within the movable viewport rectangle as it is scrolled from its old position 1001 to its new position 1002. Therefore, the appearance within the remote application display window 205 is that of a stationary window looking into a host computer display which is moving relative to the fixed window 205.

Fig. 11 shows the scroll velocity versus time during the smooth scroll operation according to the preferred embodiment of the present invention. If the smooth scroll operation is performed over N time steps, then the peak velocity occurs at time step $N/2$, and the peak velocity equals $2\Delta/N$, where Δ represents the delta in one dimension. After N time steps, the movable viewport rectangle will have been moved by the intended delta amount. During the accelerating portion 1101 of the scroll, which corresponds to movement 1003 shown in Fig. 10, the movable viewport rectangle is accelerating along its scroll path. During the deceleration portion 1102 of the scroll, corresponding to section 1004 illustrated in Fig. 10, the movable viewport

rectangle is decelerating to its final position 1002. This smooth scroll operation provides a smooth and pleasant appearance to the remote user.

Fig. 12 illustrates a method by which the remote application and the remote computer performs a smooth scroll operation on the movable viewport rectangle according to the preferred embodiment of the present invention. The smooth scroll operation begins at step 1201 which occurs during the beginning of step 902. The smooth scroll begins at step 1201, and the time is set to 1. At step 1202, the method determines whether or not it is accelerating the scroll. If the time is during the first half of the smooth scroll operation, then step 1202 directs the method to step 1203. At step 1203, the position of the movable viewport rectangle is changed incrementally by changing the position of the horizontal and vertical edges of the movable viewport rectangle. At step 1204, the movable viewport rectangle contents are written to the portion 303 of the remote computer display bitmap 302. At step 1205, the method proceeds to the next step of the smooth scroll operation.

For the first $N/2$ steps of the smooth scroll operation, the method iterates through steps 1202, 1203, 1204, and 1205. During each successive pass through step 1203 the position of the movable viewport rectangle is moved by slightly more each time in correspondence with the fact that the overall movement is accelerating during the first half of the smooth scroll operation. After the $N/2$ step, the result of test 1202 is false and the smooth scroll operation begins to decelerate. At step 1206 the method checks to see whether or not the smooth scroll operation is finished entirely or not. If not, at step 1207, the movable viewport rectangle edges are moved again. At step 1204 the viewport contents are written to the portion 303 of the remote computer display bitmap 302. At step 1205, the time is incremented and during the deceleration portion of the smooth scroll the method iterates through steps 1206, 1207,

1204, and 1205 until the smooth scroll is completed, at which time test 1206 results in a "no" answer and the method is done at step 1208. During each successive loop through the deceleration portion of the smooth scroll, at step 1207 the movable viewport rectangle is moved by slightly less each time in
5 correspondence with the fact that the scroll is decelerating.

Fig. 13 illustrates a method by which the remote application on the remote computer stores an incoming new active window message from the host application in a first-in-first-out buffer according to a preferred embodiment of the present invention. Because the smooth scroll operation described above
10 takes a not insignificant real time to be accomplished, and indeed this user observable smooth and slow scrolling is actually desired, it is possible for several new active window messages to be generated by the host application and transmitted to the remote application before a single new active window message can be processed. In other words, during the smooth scroll operation
15 resulting from one new active window message, one or more additional new window messages may come into the remote application.

Thus, in the preferred embodiment of the present invention, when a new active window message is received from the host application 307, the remote application 301 places the new active window message in a first-in first-out
20 buffer at step 1302. Each new active window message received from the host application at step 1301 results in the placement of that new active new window message in the first-in first-out buffer at step 1302.

Fig. 14 illustrates a method by which the remote application on the remote computer removes and processes a new active window message from the
25 first-in first-out buffer according to the preferred embodiment of the present invention. If the first-in first-out buffer is not empty, step 1401 carries the method to step 1402 where the oldest new active window message in the first-in

first-out buffer is removed and processed according to the method illustrated in Fig. 5.

Fig. 15 illustrates a method by which the host application on the host computer receives a new foreground window message from the host operating system and generates a new active window message to be sent to the remote application on the remote computer according to the preferred embodiment of the present invention. The host operating system typically sends foreground window messages to all the applications running under it on the host machine. At step 1501, when the host application receives a new foreground window message from the host operating system, then the host application generates a new active window message for the remote computer at step 1502. This process of generating the new active window message involves creating a rectangle which defines the new active window and packaging it in a format which is suitable for the remote application.

Although the present invention has been described in its presently preferred embodiment, that embodiment is offered by way of example, not by way of limitation. It is to be understood that various additions and modifications can be made without departed from the spirit and scope of the present invention. Accordingly, all such additions and modifications are deemed to lie with the spirit and scope of the present invention as set out in the appended claims.

WHAT IS CLAIMED IS:

1. A method for presenting in a display window a portion of a computer display screen image, the portion being defined by a moveable viewport
5 rectangle, the method comprising the steps of:

receiving a new active window message specifying an active window rectangle;

determining whether the moveable viewport rectangle intersects the active window rectangle; and

10 if the determining step determines that the moveable viewport rectangle does not intersect the active window rectangle, moving the moveable viewport rectangle to intersect the active window rectangle.

2. A method as in claim 1, wherein the step of moving the moveable viewport rectangle to intersect the active window rectangle comprises the steps
15 of:

aligning a moveable viewport rectangle new left edge to an active window rectangle left edge; and

20 aligning a moveable viewport rectangle new top edge to an active window rectangle top edge.

3. A method as in claim 1, wherein the step of moving the moveable viewport rectangle to intersect the active window rectangle comprises the steps
of:

25 if a moveable viewport rectangle width is less than an active window rectangle width, aligning a moveable viewport rectangle new left edge to an active window rectangle left edge;

if a moveable viewport rectangle height is less than an active window rectangle height,
aligning a moveable viewport rectangle new top edge to an active window rectangle top edge;

5 if the moveable viewport rectangle width is not less than an active window rectangle width, horizontally positioning the moveable viewport rectangle new left edge such that the active window rectangle will be horizontally centered within the moveable viewport rectangle; and

10 if the moveable viewport rectangle height is not less than an active window rectangle height, vertically positioning the moveable viewport rectangle new top edge such that the active window rectangle will be vertically centered within the moveable viewport rectangle.

4. A method as in claim 3, wherein the step of moving the moveable viewport rectangle to intersect the active window rectangle further comprises the steps of:

if the moveable viewport rectangle new left edge is left of a computer display left edge, aligning the moveable viewport rectangle new left edge to the computer display left edge;

20 if a moveable viewport rectangle new right edge is left of a computer display right edge, aligning the moveable viewport rectangle new right edge to the computer display right edge;

if the moveable viewport rectangle new top edge is above a computer display top edge, aligning the moveable viewport rectangle new top edge to the computer display top edge; and

25

if a moveable viewport rectangle new bottom edge is below a computer display bottom edge, aligning the moveable viewport rectangle new bottom edge to the computer display bottom edge.

5 5. A method as in claim 1, wherein the step of moving the moveable viewport rectangle to intersect the active window rectangle comprises the steps of:

10 computing a viewport delta for the moveable viewport rectangle representing a difference of a moveable viewport rectangle new position from a moveable viewport rectangle current position; and
smoothly scrolling the moveable viewport rectangle by the viewport delta.

15 6. A method as in claim 5, wherein the step of smoothly scrolling comprises the steps of:

accelerating movement of the moveable viewport rectangle during scrolling along a first half of the viewport delta; and
decelerating movement of the moveable viewport rectangle during scrolling along a second half of the viewport delta.

20

7. A method as in claim 1,
wherein the display window corresponds to a remote application on a remote computer;

25 wherein the computer display screen image corresponds to a remote application copy of a host computer display bitmap; and

wherein the step of receiving the new active window message comprises the step of:

accepting into the remote application the new active window message from a host computer.

8. A method as in claim 7, wherein the step of receiving the new active window message further comprises the steps of:
5 placing the new active window message in a first-in-first-out buffer; and removing the new active window message from the first-in-first-out buffer.
- 10 9. A method for notifying a remote computer of a change in a foreground window, the method comprising the steps of:
receiving a foreground window change message from a host operating system; and
15 generating a new active window message for a remote computer.
10. A method as in claim 9, wherein the new active window message includes an active window rectangle.
- 20 11. A computer readable storage medium comprising:
computer readable program code embodied on said computer readable storage medium, said computer readable program code for programming a computer to perform a method for presenting in a display window a portion of a computer display screen image, the portion being defined by a moveable
25 viewport rectangle, the method comprising the steps of:
receiving a new active window message specifying an active window rectangle;

determining whether the moveable viewport rectangle intersects the active window rectangle; and

if the determining step determines that the moveable viewport rectangle does not intersect the active window rectangle, moving the moveable viewport rectangle to intersect the active window rectangle.

12. A computer readable storage medium as in claim 11, wherein the step of moving the moveable viewport rectangle to intersect the active window rectangle comprises the steps of:

10 aligning a moveable viewport rectangle new left edge to an active window rectangle left edge; and

aligning a moveable viewport rectangle new top edge to an active window rectangle top edge.

15 13. A computer readable storage medium as in claim 11, wherein the step of moving the moveable viewport rectangle to intersect the active window rectangle comprises the steps of:

if a moveable viewport rectangle width is less than an active window rectangle width, aligning a moveable viewport rectangle new left edge to an active window rectangle left edge;

if a moveable viewport rectangle height is less than an active window rectangle height,

aligning a moveable viewport rectangle new top edge to an active window rectangle top edge;

25 if the moveable viewport rectangle width is not less than an active window rectangle width, horizontally positioning the moveable viewport

rectangle new left edge such that the active window rectangle will be horizontally centered within the moveable viewport rectangle; and

if the moveable viewport rectangle height is not less than an active window rectangle height, vertically positioning the moveable viewport rectangle new top edge such that the active window rectangle will be vertically centered within the moveable viewport rectangle.

14. A computer readable storage medium as in claim 13, wherein the step of moving the moveable viewport rectangle to intersect the active window rectangle further comprises the steps of:

if the moveable viewport rectangle new left edge is left of a computer display left edge, aligning the moveable viewport rectangle new left edge to the computer display left edge;

if a moveable viewport rectangle new right edge is left of a computer display right edge, aligning the moveable viewport rectangle new right edge to the computer display right edge;

if the moveable viewport rectangle new top edge is above a computer display top edge, aligning the moveable viewport rectangle new top edge to the computer display top edge; and

if a moveable viewport rectangle new bottom edge is below a computer display bottom edge, aligning the moveable viewport rectangle new bottom edge to the computer display bottom edge.

15. A computer readable storage medium as in claim 11, wherein the step of moving the moveable viewport rectangle to intersect the active window rectangle comprises the steps of:

40

computing a viewport delta for the moveable viewport rectangle representing a difference of a moveable viewport rectangle new position from a moveable viewport rectangle current position; and

5 smoothly scrolling the moveable viewport rectangle by the viewport delta.

16. A computer readable storage medium as in claim 15, wherein the step of smoothly scrolling comprises the steps of:
- 10 accelerating movement of the moveable viewport rectangle during scrolling along a first half of the viewport delta; and
- decelerating movement of the moveable viewport rectangle during scrolling along a second half of the viewport delta.

17. A computer readable storage medium as in claim 11,
- 15 wherein the display window corresponds to a remote application on a remote computer;
- wherein the computer display screen image corresponds to a remote application copy of a host computer display bitmap; and
- 20 wherein the step of receiving the new active window message comprises the step of:
- accepting into the remote application the new active window message from a host computer.

18. A computer readable storage medium as in claim 17, wherein the step
- 25 of receiving the new active window message further comprises the steps of:
- placing the new active window message in a first-in-first-out buffer; and

removing the new active window message from the first-in-first-out buffer.

- 5 19. A computer readable storage medium comprising:
computer readable program code embodied on said computer readable
storage medium, said computer readable program code for programming a
computer to perform a method for notifying a remote computer of a change in
a foreground window, the method comprising the steps of:
- 10 receiving a foreground window change message from a host operating
system; and
generating a new active window message for a remote computer.
20. A computer readable storage medium as in claim 19, wherein the new
15 active window message includes an active window rectangle.
21. A remote computer system comprising:
a remote computer display for displaying a remote computer screen
20 image;
a remote computer display bitmap, coupled to the remote computer
display, for storing a digital representation of the remote computer screen
image; and
a remote application, coupled to the remote computer display bitmap,
25 for writing a portion of the remote computer display bitmap corresponding to
a display window, the remote application including:

a copy of a host computer display bitmap for storing a digital representation of a host computer screen image; and

remote new active window message handling means coupled to the copy of the host computer display bitmap for receiving a new active window message specifying an active window rectangle, for moving a moveable viewport rectangle so as to intersect the active window rectangle, and for writing the portion of the remote computer display bitmap corresponding to the display window with a portion of the copy of the host computer display bitmap corresponding to the moveable viewport rectangle.

22. A remote computer system as in claim 21,

wherein the remote new active window message handling means is operable to:

if a moveable viewport rectangle width is less than an active window rectangle width, aligning a moveable viewport rectangle new left edge to an active window rectangle left edge;

if a moveable viewport rectangle height is less than an active window rectangle height,

aligning a moveable viewport rectangle new top edge to an active window rectangle top edge;

if the moveable viewport rectangle width is not less than an active window rectangle width, horizontally positioning the moveable viewport rectangle new left edge such that the active window rectangle will be horizontally centered within the moveable viewport rectangle;

if the moveable viewport rectangle height is not less than an active window rectangle height, vertically positioning the moveable viewport rectangle

new top edge such that the active window rectangle will be vertically centered within the moveable viewport rectangle;

if the moveable viewport rectangle new left edge is left of a computer display left edge, aligning the moveable viewport rectangle new left edge to the computer display left edge;

if a moveable viewport rectangle new right edge is left of a computer display right edge, aligning the moveable viewport rectangle new right edge to the computer display right edge;

if the moveable viewport rectangle new top edge is above a computer display top edge, aligning the moveable viewport rectangle new top edge to the computer display top edge; and

if a moveable viewport rectangle new bottom edge is below a computer display bottom edge, aligning the moveable viewport rectangle new bottom edge to the computer display bottom edge.

15

23. A host computer system comprising:

an operating system for generating a foreground window message; and

a host application, coupled to the operating system, for receiving the foreground window message from the operating system, and for generating a new active window message, the host application including:

host foreground window message handling means for generating a new active window message, and for sending the new active window message to a remote computer system.

25

24. A host computer system as in claim 23, wherein the new active window message specifies an active window rectangle.

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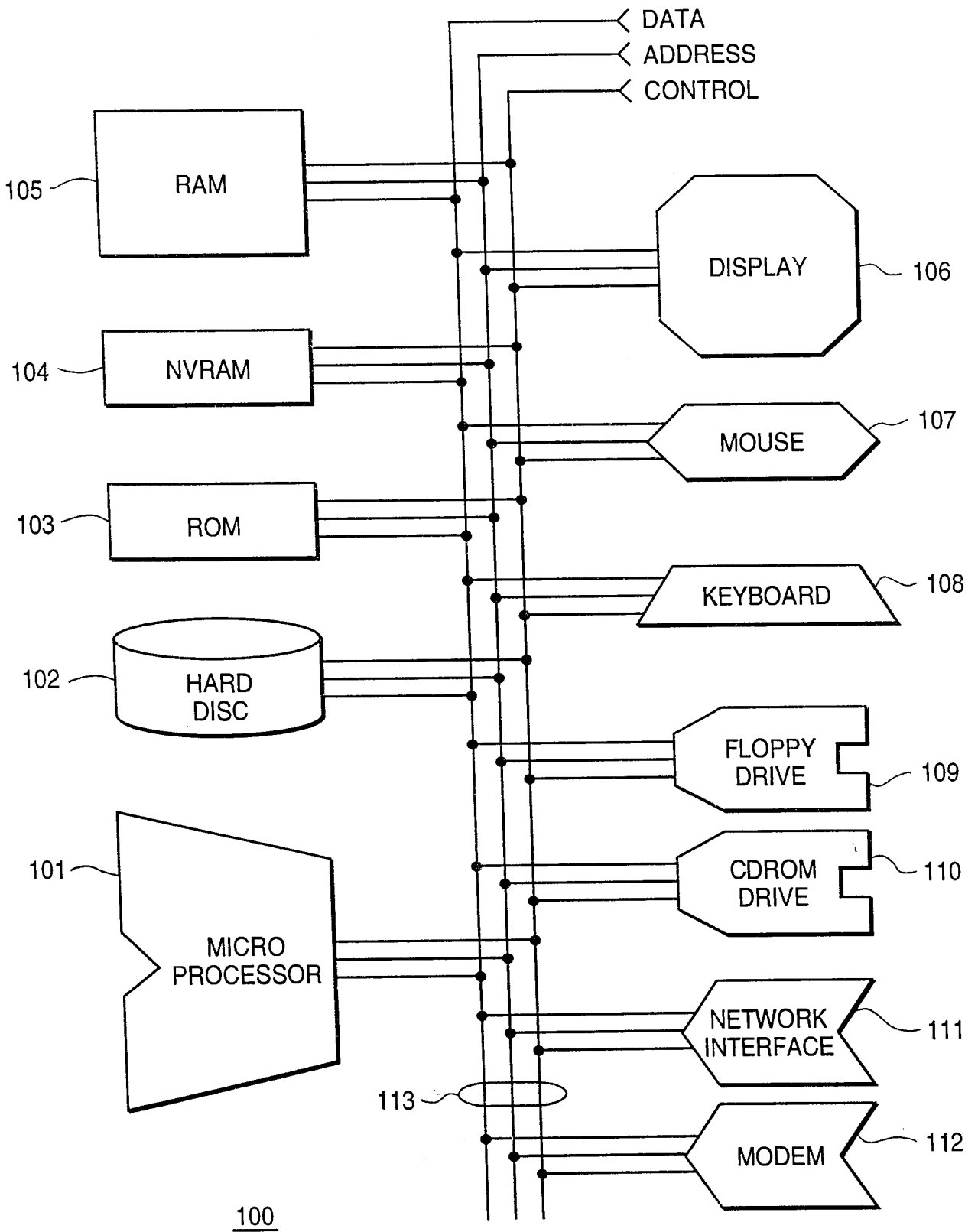


FIG. 1 SUBSTITUTE SHEET (RULE 26)

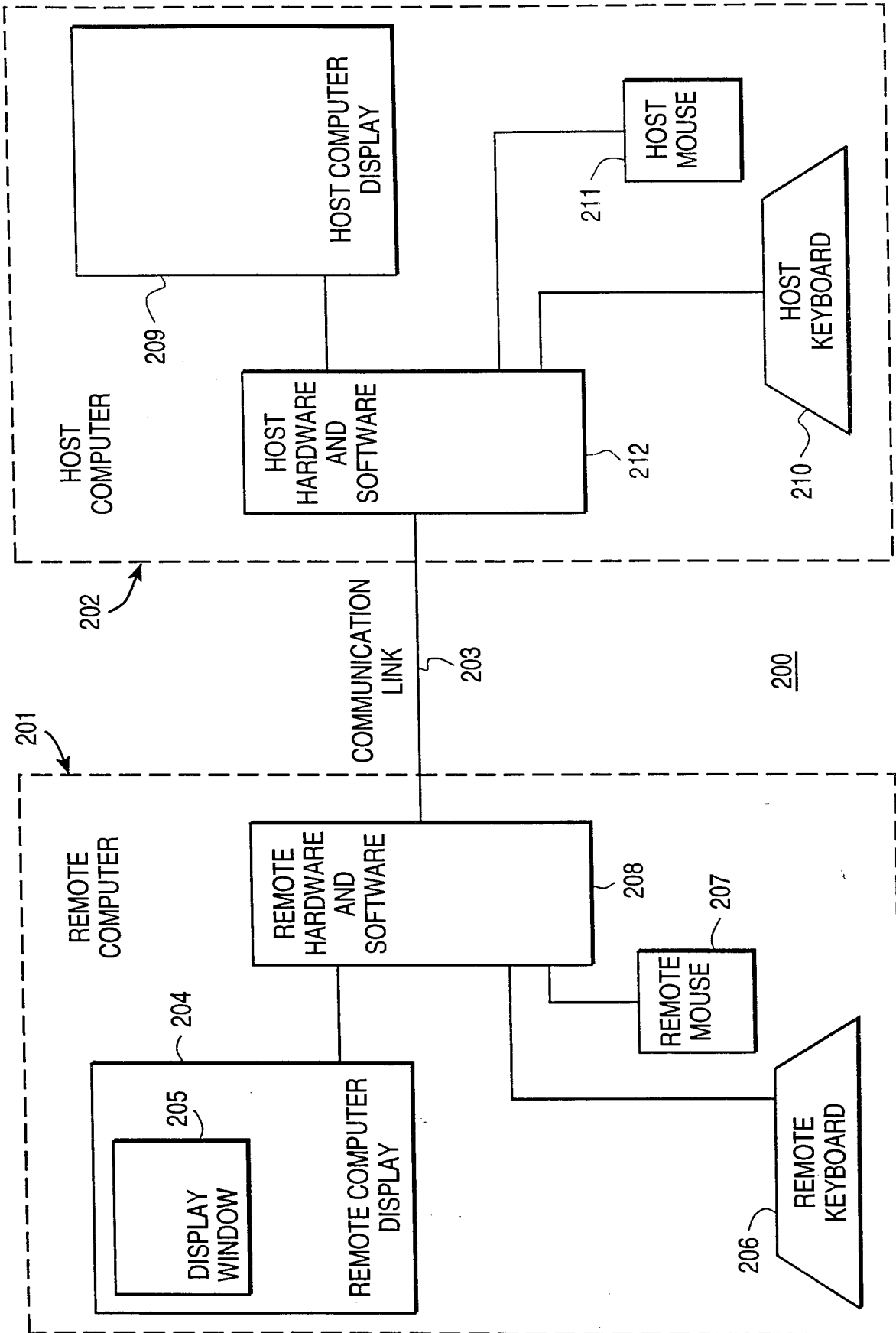


FIG. 2

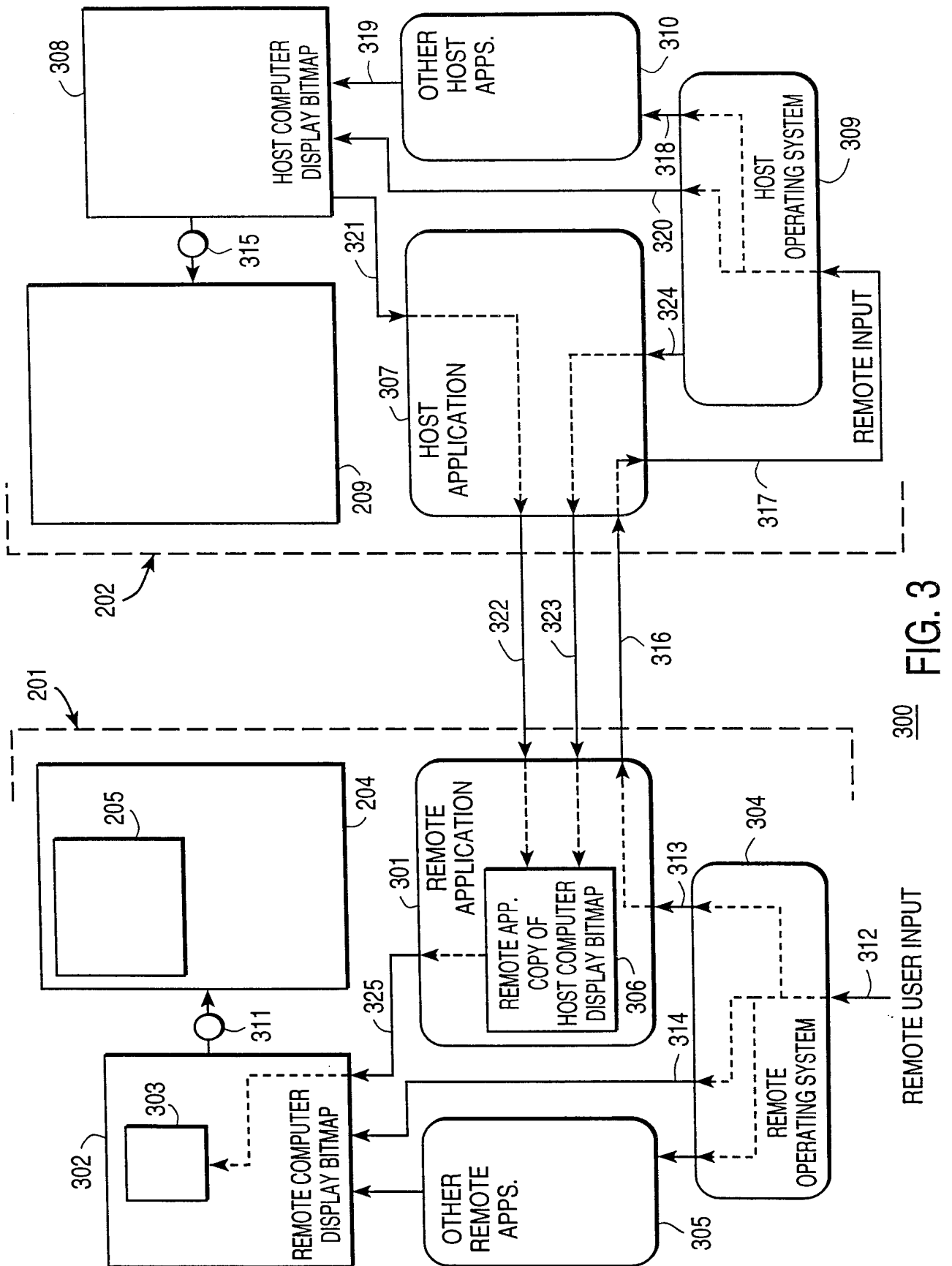


FIG. 3

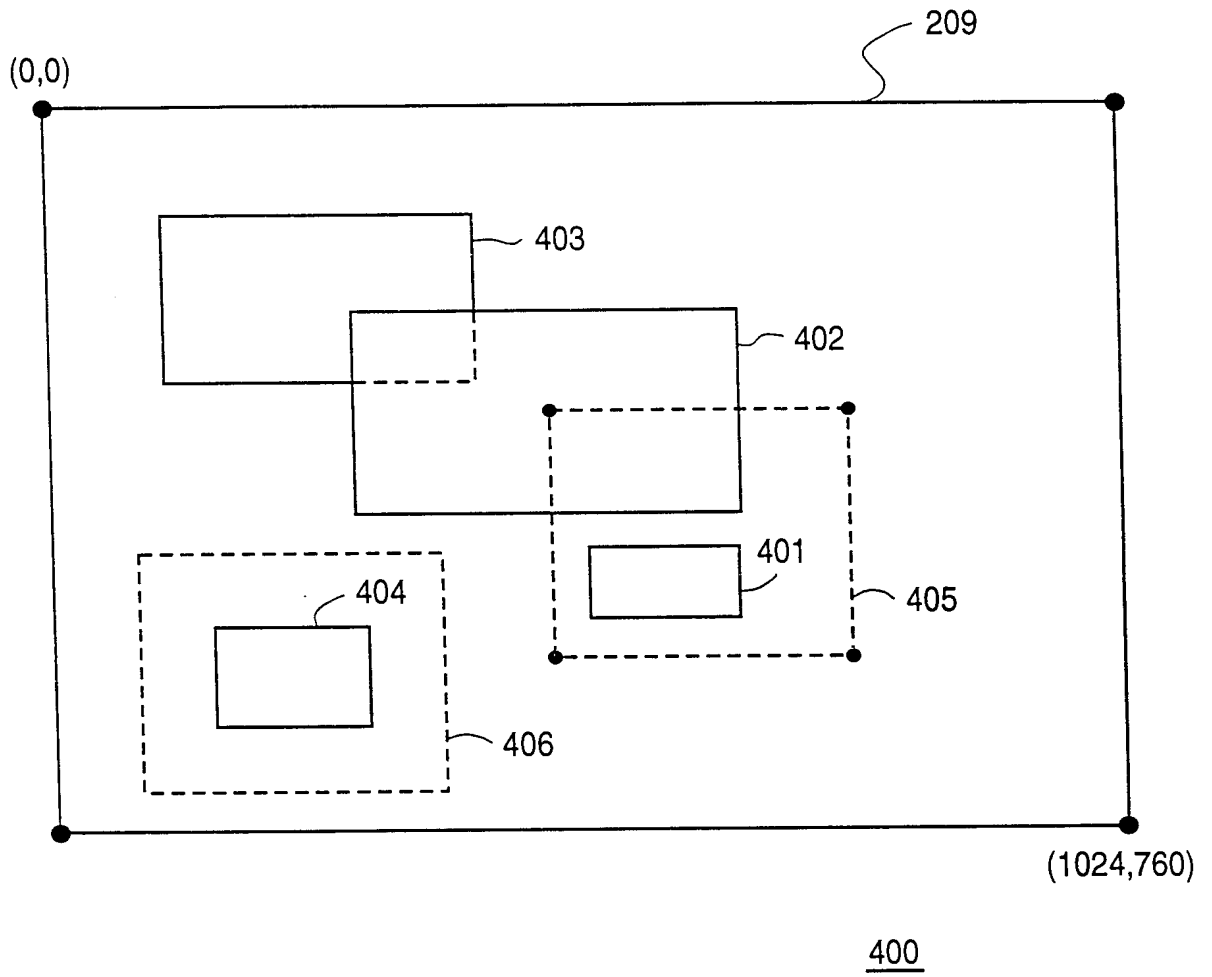


FIG. 4

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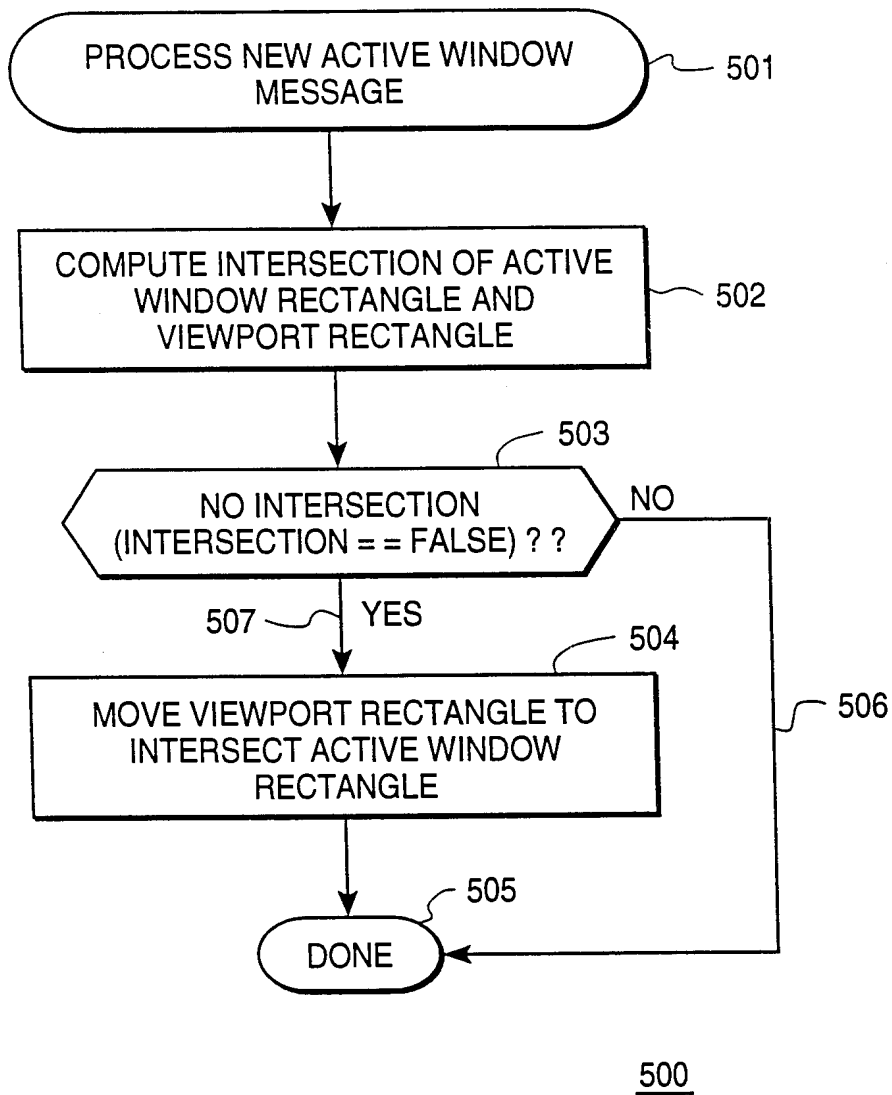


FIG. 5

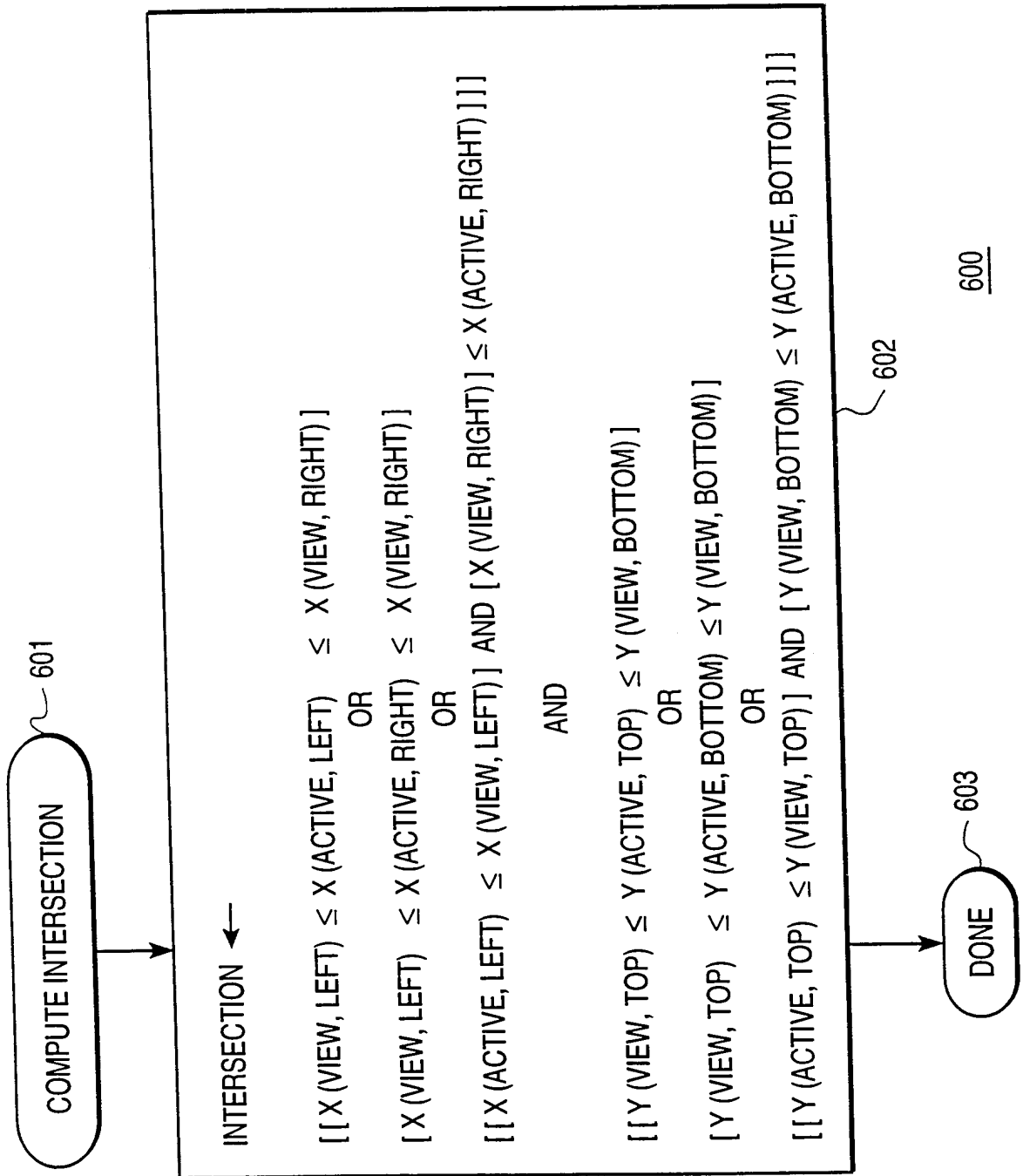


FIG. 6

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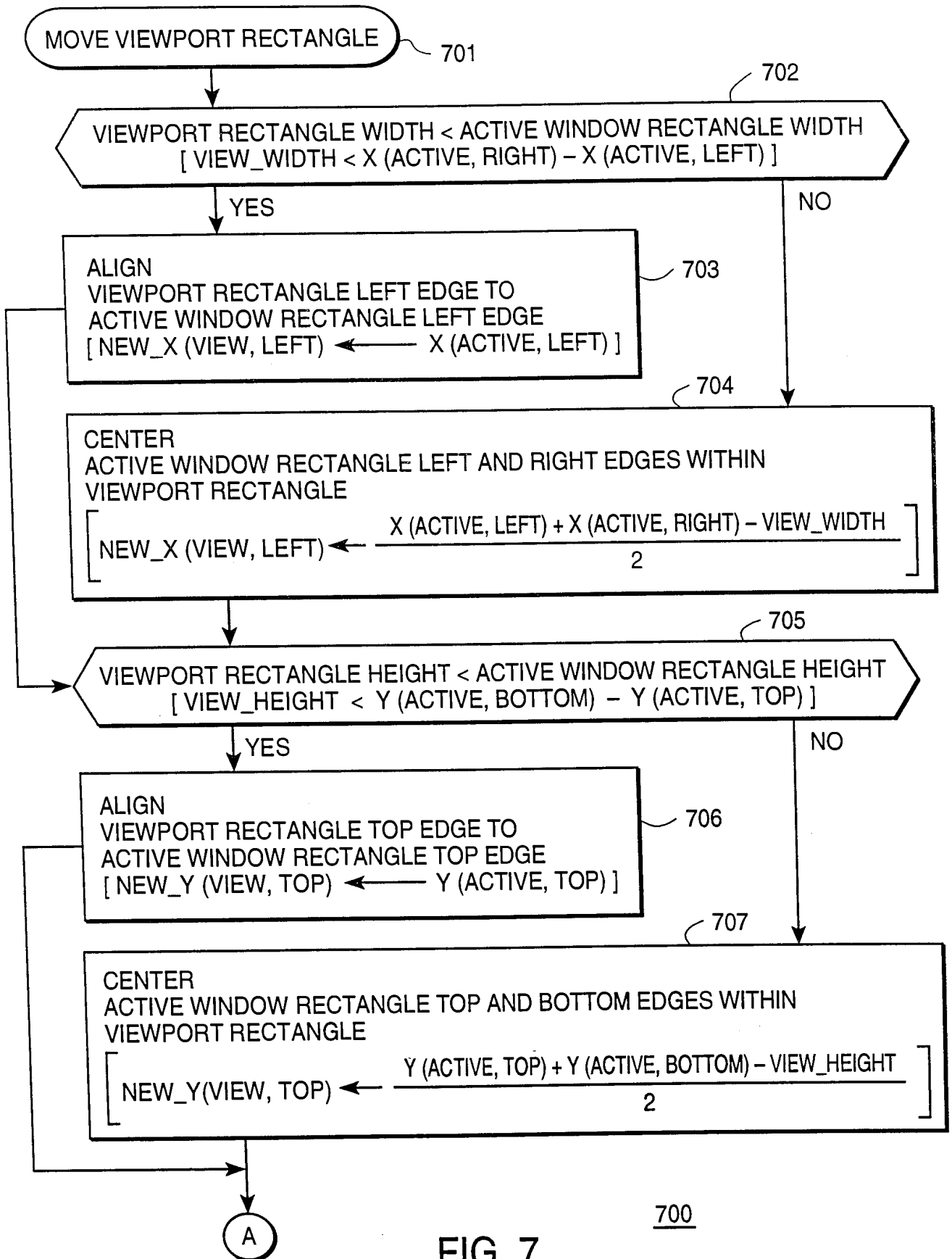
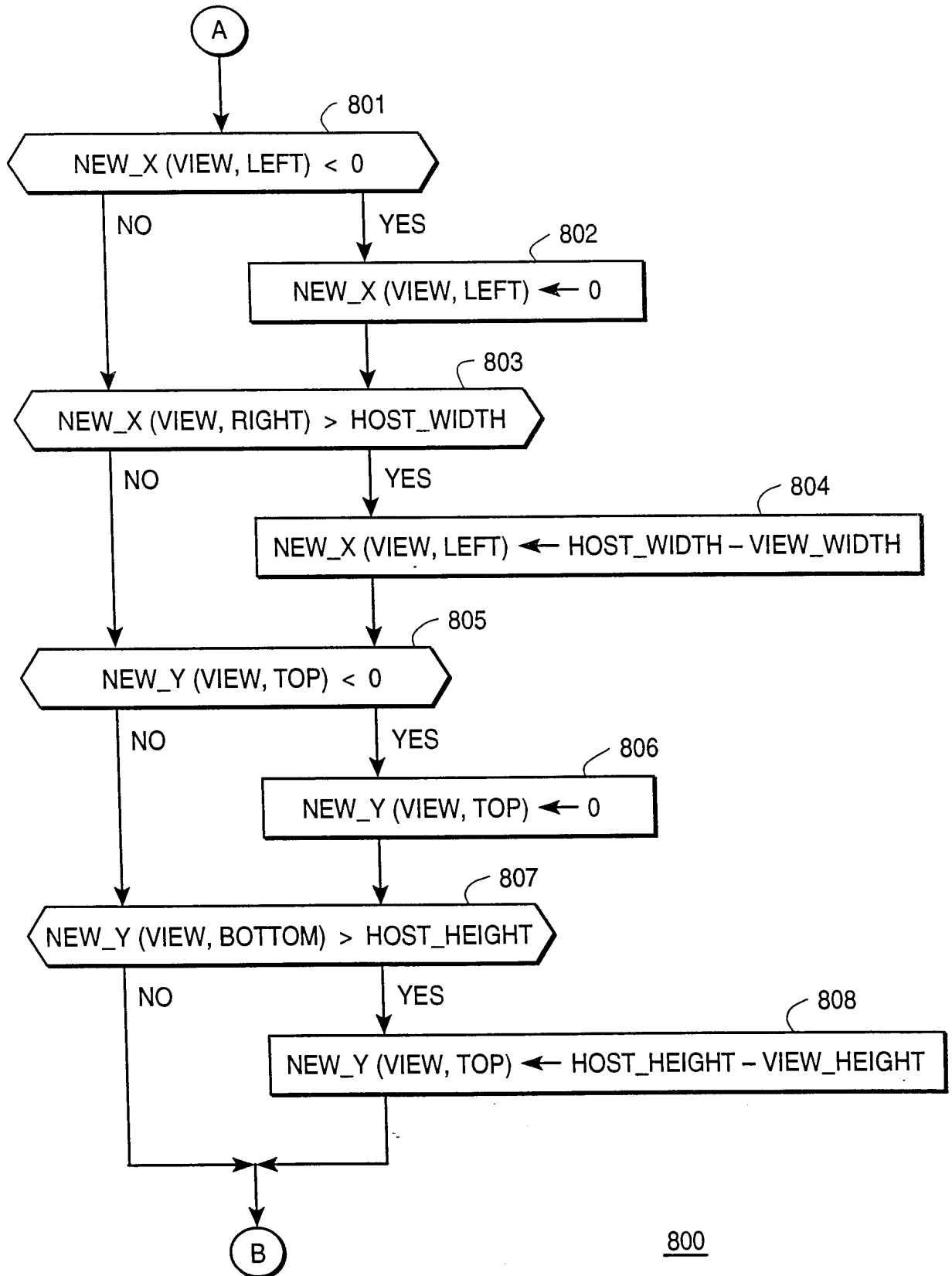


FIG. 7
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800

FIG. 8

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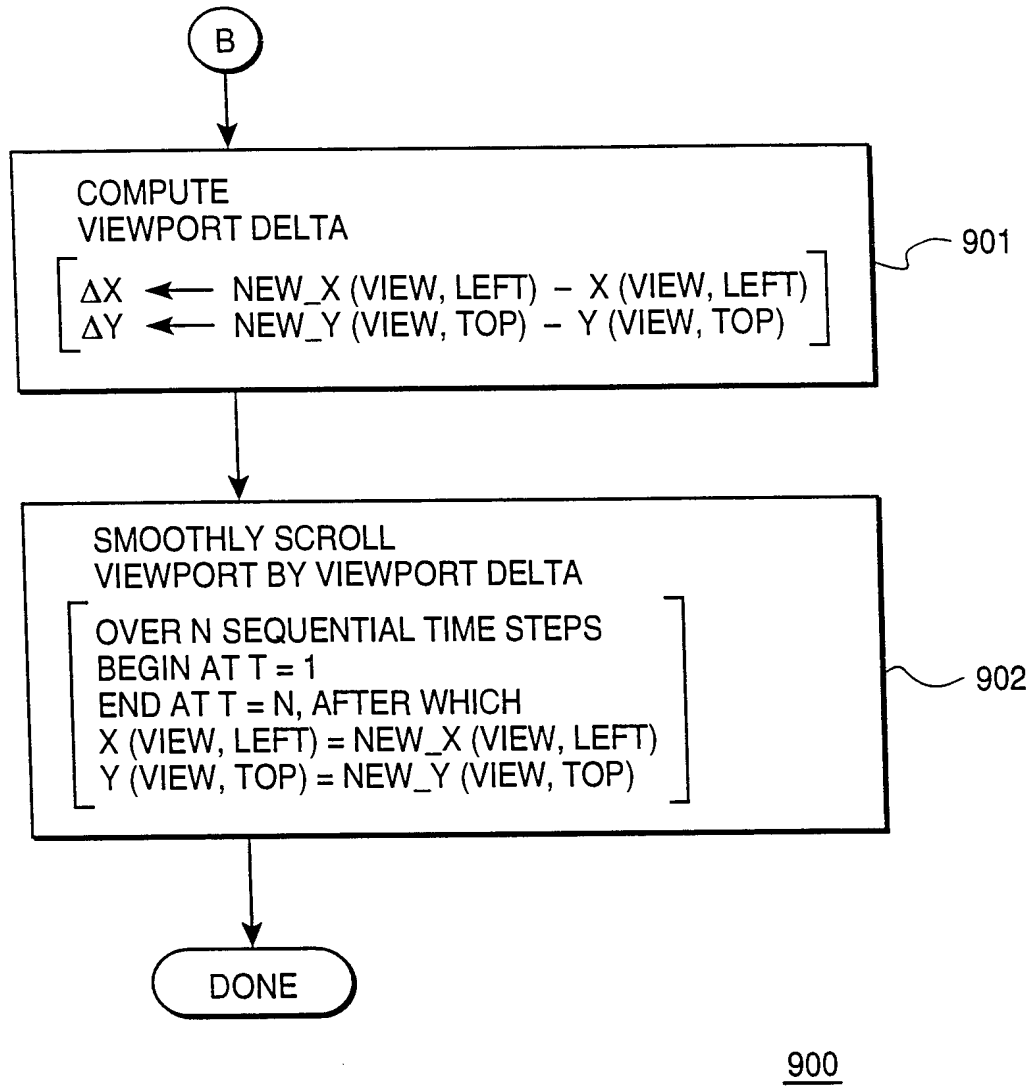


FIG. 9

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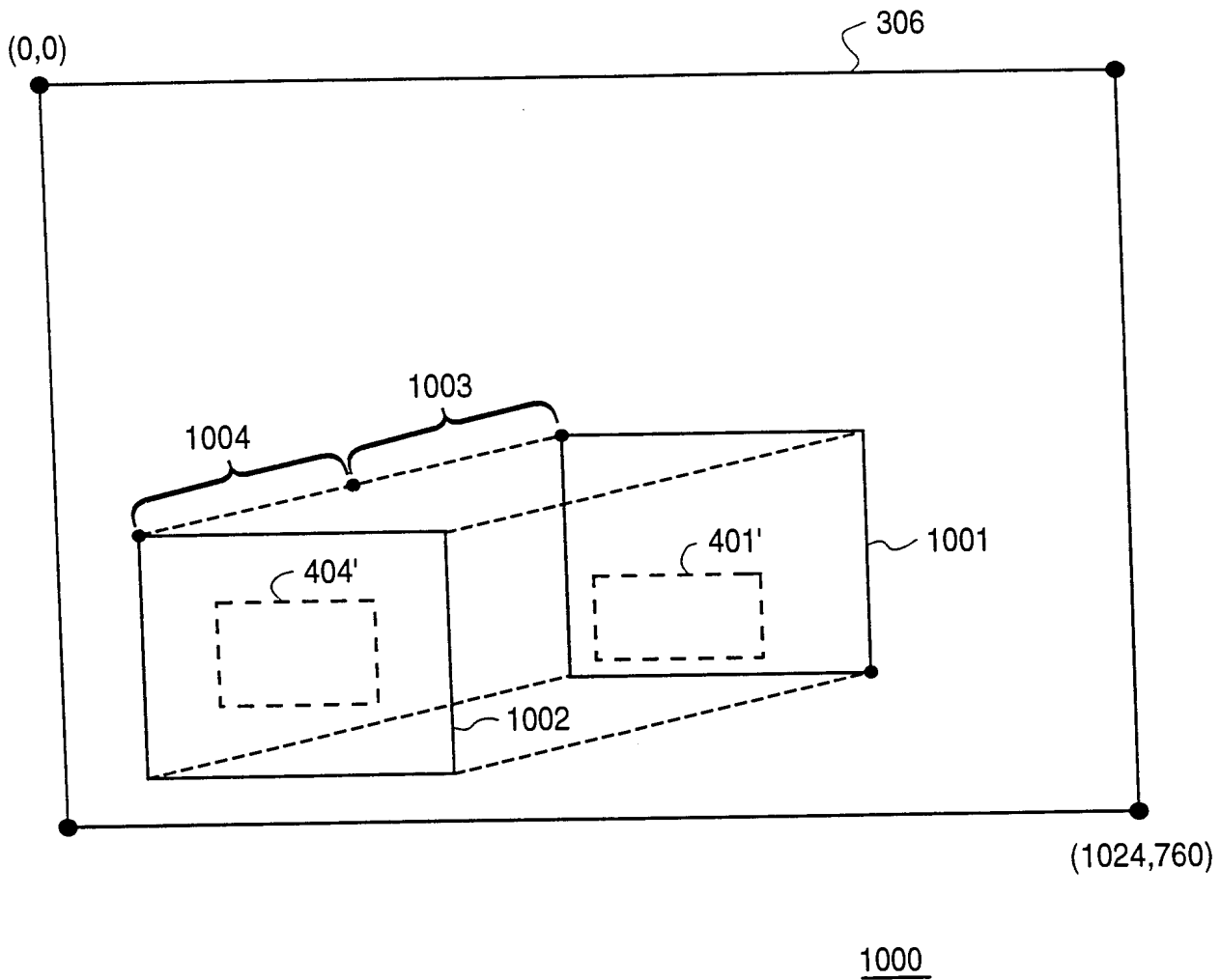


FIG. 10

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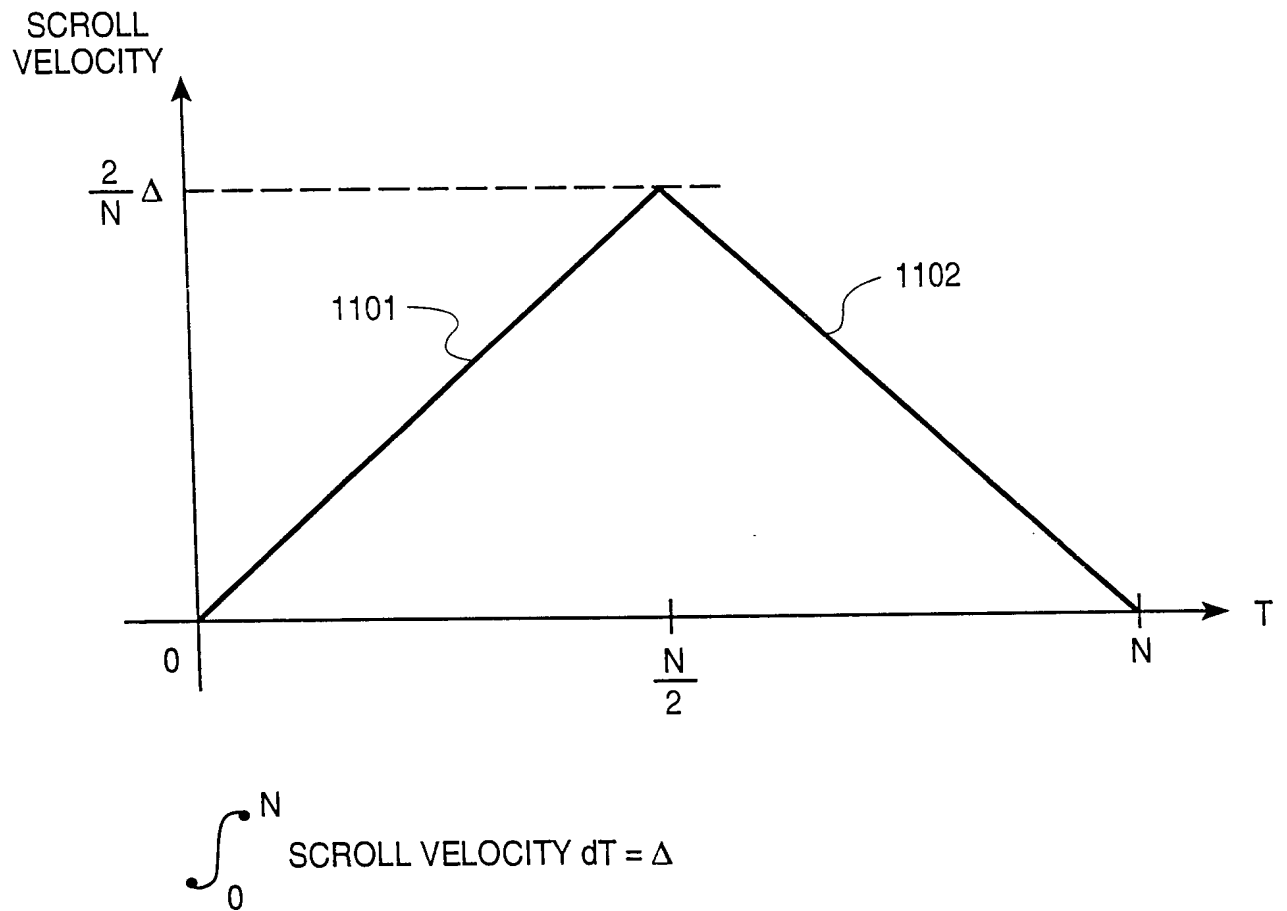


FIG. 11

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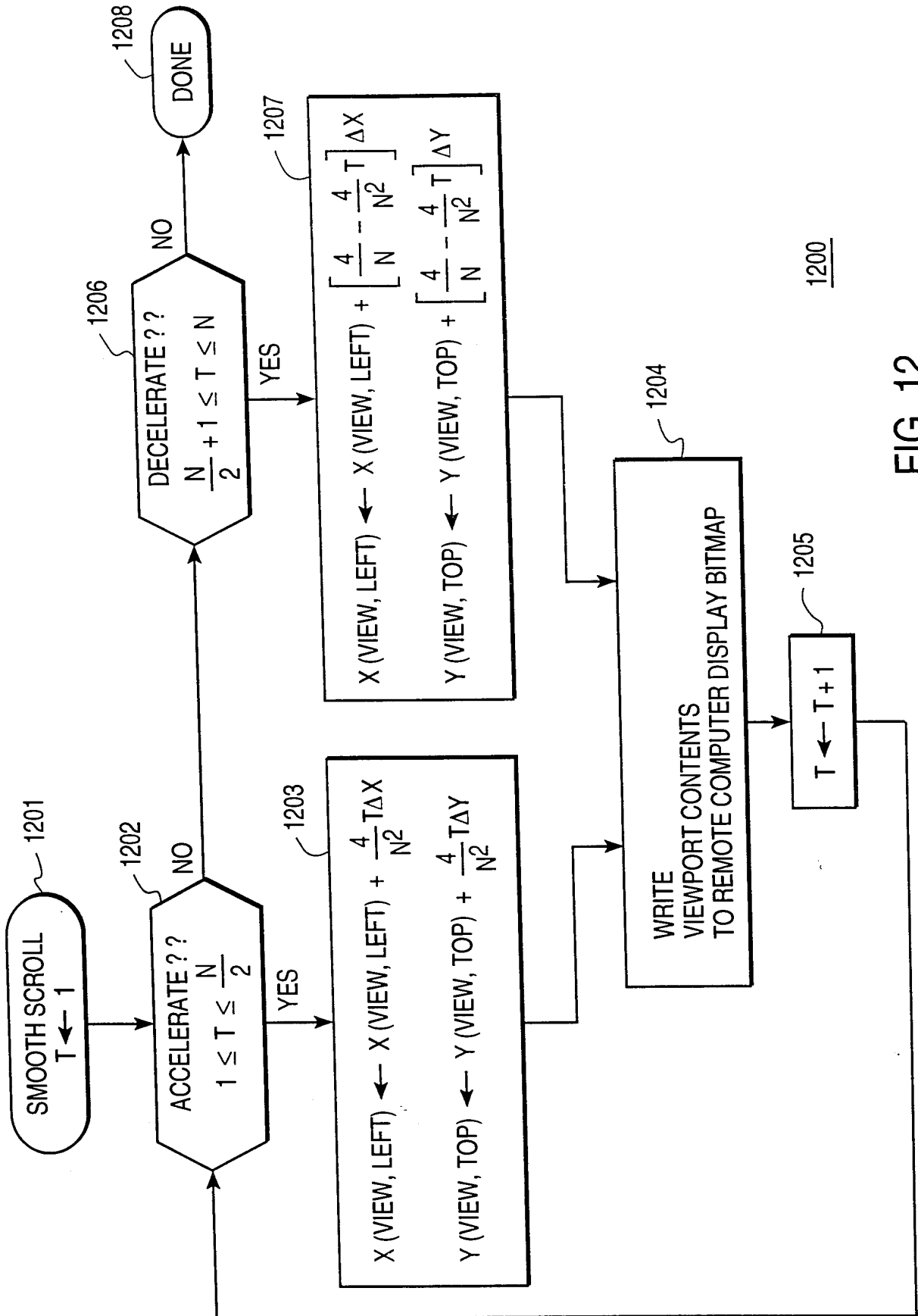


FIG. 12

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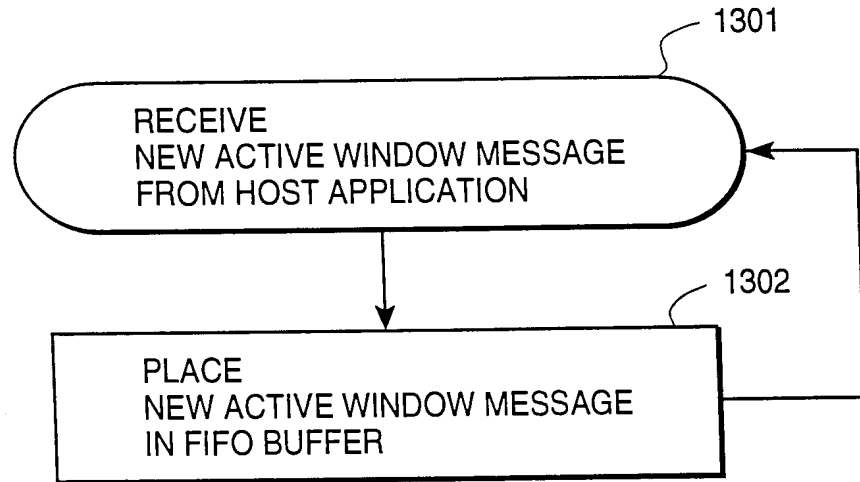


FIG. 13

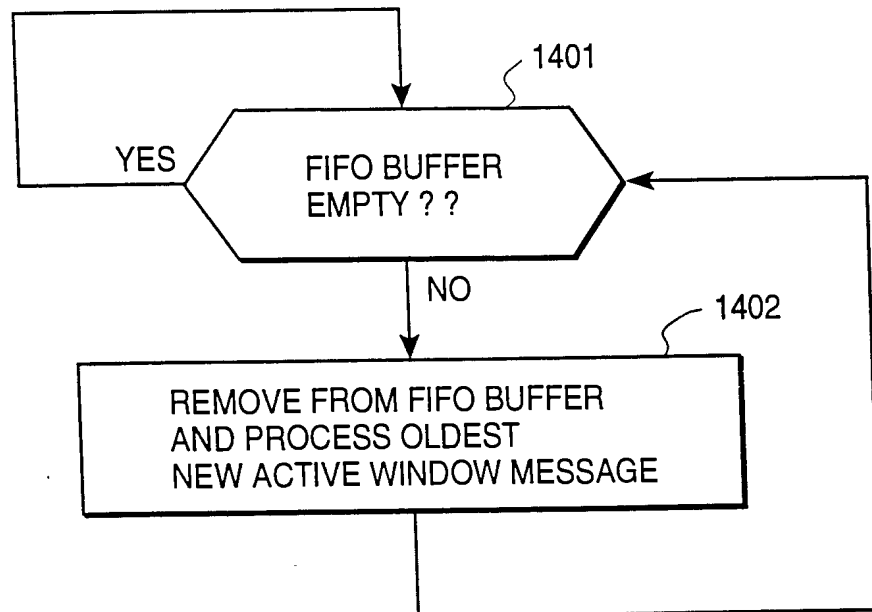


FIG. 14

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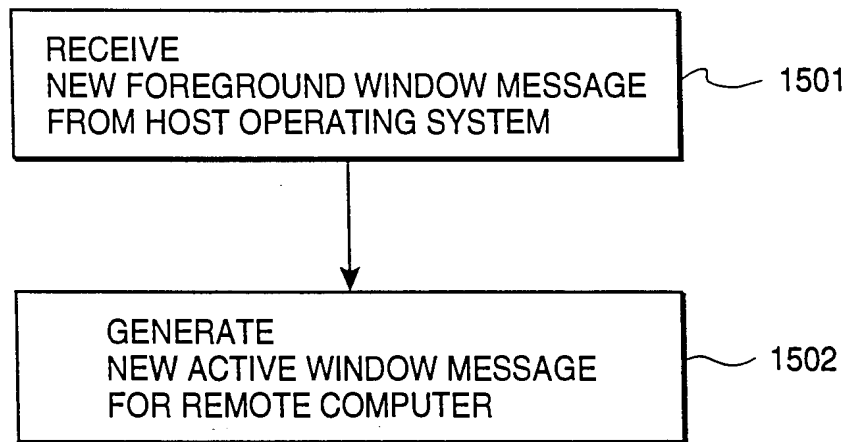


FIG. 15

INTERNATIONAL SEARCH REPORT

Inter. Patent Application No

PCT/US 99/18072

A. CLASSIFICATION OF SUBJECT MATTER
 IPC 7 G06F9/44 G06F3/033

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 G06F G09G

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	GB 2 296 114 A (IBM)	1, 9, 11,
Y	19 June 1996 (1996-06-19)	19, 21, 23
A	abstract	5, 6, 15,
	page 1, line 1 -page 2, line 40	16
	page 7, line 1 -page 16, line 34	7, 10, 17,
	claims 1-22	20
	figures 3A, 3B, 7	

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Further documents are listed in the continuation of box C.

Patent family members are listed in annex.

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Date of the actual completion of the international search

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Date of mailing of the international search report

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International Application No

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C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y A	EP 0 469 923 A (XEROX CORP) 5 February 1992 (1992-02-05) abstract column 6, line 5 -column 6, line 10 column 6, line 28 -column 6, line 33 column 12, line 35 -column 15, line 30 claims 1-10 figure 9 ---	5, 6, 15, 16 2-4, 12-14, 22
A	US 5 309 555 A (AKINS ANTHONY S ET AL) 3 May 1994 (1994-05-03) abstract column 10, line 43 -column 12, line 52 claims 1-4 ---	1-4, 11-14, 21, 22
E	WO 99 63430 A (CITRIX SYSTEMS INC) 9 December 1999 (1999-12-09) the whole document ---	1, 9, 11, 19
X A	EP 0 475 581 A (HEWLETT PACKARD CO) 18 March 1992 (1992-03-18) the whole document ---	1, 9, 11, 19 21, 23
X	US 4 974 173 A (STEFIK MARK J ET AL) 27 November 1990 (1990-11-27) the whole document ---	1, 11
A	FR 2 744 551 A (SAGEM) 8 August 1997 (1997-08-08) the whole document ---	5, 6, 15, 16
X A	"CLIPPING OF A REMOTE POINTER" IBM TECHNICAL DISCLOSURE BULLETIN, US, IBM CORP. NEW YORK, vol. 35, no. 3, 1 August 1992 (1992-08-01), pages 258-260, XP000326261 ISSN: 0018-8689 the whole document -----	1, 11 21, 23

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

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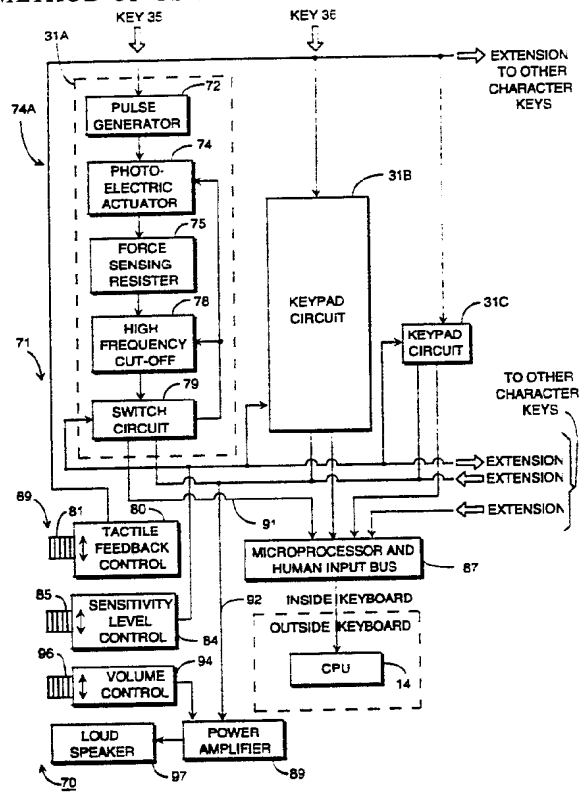
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GB 2296114 A	19-06-1996	DE 69506914 D DE 69506914 T EP 0797796 A WO 9618943 A JP 2970687 B JP 10500514 T US 5913920 A	04-02-1999 05-08-1999 01-10-1997 20-06-1996 02-11-1999 13-01-1998 22-06-1999
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US 5309555 A	03-05-1994	NONE	
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FR 2744551 A	08-08-1997	NONE	



INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

<p>(51) International Patent Classification 5 : G09G 3/02</p>	<p>A1</p>	<p>(11) International Publication Number: WO 92/15083 (43) International Publication Date: 3 September 1992 (03.09.92)</p>
<p>(21) International Application Number: PCT/US91/09797 (22) International Filing Date: 20 December 1991 (20.12.91) (30) Priority data: 659,604 21 February 1991 (21.02.91) US (71) Applicant: TYPERIGHT KEYBOARD CORP. [US/US]; 543 Cerro Street, Encinitas, CA 92024 (US). (72) Inventor: LOUIS, William, M. ; 543 Cerro Street, Encinitas, CA 92024 (US). (74) Agent: KLEINKE, Bernard, L.; Laff, Whitesel, Conte & Saret, 101 West Broadway, Suite 1580, San Diego, CA 92101 (US).</p>	<p>(81) Designated States: AT, AT (European patent), AU, BB, BE (European patent), BF (OAPI patent), BG, BJ (OAPI patent), BR, CA, CF (OAPI patent), CG (OAPI patent), CH, CH (European patent), CI (OAPI patent), CM (OAPI patent), DE, DE (European patent), DK, DK (European patent), ES, ES (European patent), FI, FR (European patent), GA (OAPI patent), GB, GB (European patent), GN (OAPI patent), GR (European patent), HU, IT (European patent), JP, KP, KR, LK, LU, LU (European patent), MC (European patent), MG, ML (OAPI patent), MR (OAPI patent), MW, NL, NL (European patent), NO, RO, SD, SE, SE (European patent), SN (OAPI patent), SU, TD (OAPI patent), TG (OAPI patent).</p> <p>Published <i>With international search report.</i></p>	

(54) Title: MEMBRANE KEYBOARD AND METHOD OF USING SAME



(57) Abstract

A membrane keyboard (10, 110) producing audible (94, 187) and tactile (80, 182) responses when individual character keys are depressed. To facilitate typing efficiency, the keyboard has membrane characters keys with different transverse heights and adjustable sensory responses (84, 184).

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Description**MEMBRANE KEYBOARD AND
METHOD OF USING SAME****Cross-Reference to Related Application**

5 Copending U.S. patent application, entitled
"KEYBOARD ARRANGEMENT AND METHOD OF USING SAME," filed
concurrently herewith on February 21, 1991, assigned
Serial No. 07/659,604, is hereby incorporated by
reference as if fully set forth herein.

10 Technical Field

The present invention relates in general to
keyboards and methods of using them. The invention more
particularly relates to a membrane keyboard for helping
to facilitate the entry of information in a fast and
15 accurate manner, while helping to relieve physical stress
on the user.

Background Art

There have been many different types and kinds of
keyboards for producing signal responses when depressed.
20 For example, membrane keyboards are usually generally
flat or planar in configuration. They do not ordinarily
have the same type of audible and tactile feedback
response as the conventional discrete keys. The keys of
membrane keyboards are usually generally flat and have
25 little or no perceivable travel, and thus little or no
tactile response is produced when depressed. Also, there
is usually no perceivable audible sound, such as a
"click" heard by a discrete key.

The lack of such sensory responses causes a user to
30 be uncertain that individual keys have been depressed
sufficiently to produce a character. Thus, the user can
become frustrated and is oftentimes unable to enter
information in a fast and efficient manner. Therefore,
it would be highly desirable to have a new and improved
35 membrane keyboard having audible and tactile feedback

responses to alert the user when the key was properly actuated to enter the desired information.

Another reason for the poor acceptance of the membrane keyboard in many applications, is not only the
5 lack of perceivable audible and tactile feedback, but also because the membrane keys are substantially flat. In this regard, it has been generally recognized that for rapid and efficient keyboard entry purposes, different keys should have different vertical heights and be
10 positioned at different angles, so the user can conveniently reach all of the keys on the keyboard. Such non-uniform positioning of keys is required in part because of the physical structure of the hands and fingers of the user, as well as the different finger-to-
15 key strokes utilized for rapid keyboard entry. Thus, for efficient use of a keyboard, the individual character keys should be arranged in rows having discrete height differences to provide the keyboard with an overall generally dished working surface. Since membrane keys
20 are substantially flat, they do not lend themselves to forming such a dished surface, which is important for helping provide a more efficient keyboard operation.

Additionally, as more fully described in the foregoing mentioned co-pending application, prior known
25 conventional keyboards, including membrane or planar keyboards can cause physiological injury to the user, after repeated use over long periods of time. Such repetitive stress injuries are collectively referred to as cumulative trauma disorder. Thus, the new and
30 improved keyboard and method of using it should help relieve stress and thus help prevent physical injuries to the user. This should be accomplished without cumbersome, mechanical adjustments of the keyboard housing. Moreover, at the same time, it should be
35 constructed to facilitate fast and accurate keyboard

entry, so that a new user can quickly learn to use such a new membrane keyboard, with little or no unwanted time consuming delays. In this regard, some one who is trained in touch typing techniques, should be able to use
5 such a new membrane keyboard with little or no training.

Therefore it would be highly desirable to have a new and improved membrane keyboard, which would be comfortable to use in a fast and convenient manner, and which could be used in a less physiologically stressful
10 manner.

Disclosure of Invention

Therefore, it is the principal object of the present invention to provide a new and improved membrane keyboard and method of using it, to help the user know when the
15 information has been successfully entered.

Another object of the present invention is to provide such a new and improved membrane keyboard and method of using it, to enable a user to enter information in a fast and accurate manner, without undue
20 physiological stress to the user.

Briefly, the above and further objects of the present invention are realized by providing a membrane keyboard construction with a group of membrane keys, which are adjustable as a group for tactile and audible
25 responses. The keys are arranged in staggered rows and columns to facilitate speed and accuracy of the operator. The keys have different heights for helping a user to reach conveniently all of the keyboard keys. The keyboard includes a pair of inner and outer molded sheets
30 to form the keys. A force sensing resistor device is actuated by the inner sheet when a key is pressed, to cause character information to be entered. A sensory control circuit including a force producing device, enables tactile and audible responses to be adjusted for
35 the user.

In another form of the invention, the tactile and audible responses are caused by providing a liquid sealed between the inner and outer sheets, and electrically energized heating coils cause the liquid to expand rapidly and abruptly to provide a tactile and audible response.

Brief Description of the Drawings

The above mentioned and other objects and features of this invention and the manner of attaining them will become apparent, and the invention itself will be best understood by reference to the following description of the embodiments of the invention in conjunction with the accompanying drawings wherein:

FIG. 1 is a pictorial view of a membrane keyboard constructed in accordance with the present invention and illustrated forming a part of a foldable computer having a liquid crystal display panel;

FIG. 2 is an enlarged face view of a group of representative keys of the keyboard of FIG. 1;

FIG. 3 is a sectional view of the keys of FIG. 2 taken substantially on line 3-3 thereof, illustrating an enlarged circled portion;

FIG. 4 is a block diagram of an electronic circuit arrangement for the keyboard of FIG. 1;

FIG. 4A is a block diagram of a switch circuit of the circuit of FIG. 4;

FIG. 5 is a pictorial view of another membrane keyboard constructed in accordance with the present invention and illustrated forming a part of a foldable computer having a liquid crystal display panel;

FIG. 6 is an enlarged face view of a group of representative keys of the keyboard of FIG. 5;

FIG. 7 is a sectional view of the keys of FIG. 6 taken substantially on line 7-7 thereof, illustrating an enlarged circled portion;

FIG. 8 is a block diagram of an electronic circuit arrangement for the keyboard of FIG. 5; and

FIG. 9 is a sectional view of the keys of FIG. 2 taken substantially on line 9-9 thereof.

5 **Best Mode for Carrying Out the Invention**

Referring now to the drawings and more particularly to FIG. 1 thereof, there is shown a membrane keyboard system 10 which is constructed in accordance with the present invention. The system generally comprises a
10 liquid crystal display panel 12 for visually displaying character information, a microprocessor 14 (FIG. 4) for processing information and a membrane keyboard 16 for permitting a user to enter information into the microprocessor 14 for processing and display purposes.
15 The display panel 12, microprocessor 14 and membrane keyboard 16 are mounted in a substantially flat foldable system housing unit 18. In this regard, the housing unit 18 is foldable into a thin, flat generally rectangularly shaped compact unit that may be conveniently carried by a
20 user.

In operation, the system 10 permits a user to enter data quickly and accurately into the microprocessor 14 for processing purposes. In this regard, a skilled touch typist is able to use the membrane keyboard 16 for
25 entering data at substantially the same speed and with substantially the same accuracy according to familiar touch typing techniques.

To use the system 10, a user unfolds the housing unit 18 into its operating configuration as best seen in
30 FIG. 1. In this regard, when the housing unit 18 is unfolded, the system 10 is immediately powered by the portable power source causing the microprocessor 14 to produce a reference character such as a cursor on the display panel 12. The user then begins entering
35 information into the microprocessor 14 via the membrane

keyboard 16 in substantially the same manner as a touch typist would do according to familiar touch typing techniques.

As best seen in FIG. 1, the interconnected membrane keys are arranged in rows and columns, where the individual rows of character keys have different transverse height to facilitate the rapid and efficient entry of character information. Also, as will be explained hereinafter in greater detail, sensory responses are produced as the user enters information in order to further facilitate the rapid and efficient entry of information. In this regard, when a user presses any one of the character keys, the user will sense a tactile response in the form of a gentle reaction force, indicating that the selected key has been successfully actuated. In addition, the user will also hear a audible sound indicative of the selected key having been successfully actuated.

Considering now the membrane keyboard 16 in greater detail with reference to FIGS. 1-4, the keyboard 16 generally comprises a keyboard housing 20 which forms an integral part of the system housing unit 18. In this regard, the keyboard housing 20 includes a left hand portion 22 and a right hand portion 24 that are mounted hingeably together through a living hinge, shown generally at 26. For the purpose of permitting the system 10 to be folded into a substantially flat package for storage or transportation purposes, the right portion 24 of the housing unit 20 is mounted hingeably to the liquid crystal panel 12 by a living hinge 27. Another living hinge 28 integrally connects a triangularly shaped support flap 17 for helping to support the panel 12 in an upright position as shown in FIG. 1.

The keyboard housing 20 is composed of a suitable thermoplastic material that may be folded repeatedly

about the living hinges. In this regard, it should be noted that when the left portion 22 of the keyboard housing 20 is folded away from the right portion 24 into their illustrated opened position in a side by side configuration, the right and left portions 22 and 24 become disposed at an angle θ of between about 25° and about 36° relative to one another. A more preferred angle θ is between about 30° and about 33°, and a most preferred angle of θ is about 31°.

10 The configuration of character keys in the left side 22 and the right side 24 of the keyboard 16 is more fully described in the above mentioned copending U.S. patent application.

15 The membrane keyboard 16 also includes a left side keypad arrangement and right side keypad arrangement shown generally at 30 and 31 respectively. As the construction of the keypad arrangements 30 and 31 are substantially similar to one another, only the leftside keypad arrangement 30 will be described in greater
20 detail.

Considering now the keypad arrangement 30 in greater detail with reference to FIGS. 1-4, the left keypad arrangement 30 generally comprises a keypad printed circuit board 32 (FIG. 3) and a control circuit 70 (FIG. 25 4) for generating electrical signals to produce sensory responses and codes when the individual character keys are depressed. Arrangement 30 also includes a membrane panel 33 having a generally rectangular group of membrane character keys, such as keys 34-39 shown in FIG. 2. The
30 membrane keys, such as keys 34-39, are configured or arranged in a series of parallel spaced apart, staggered rows, such as rows 40, 41, 43, 45, and 47, and columns, such as 42, 44, and 46 to facilitate touch typing techniques by an operator.

As best seen in FIGS. 1 and 2, selected ones of the character keys have a character indicia disposed thereon, such as the character indicia 34D, 35F, 36G, 37E, 38R, and 39T on keys 34 - 39 respectively. The character
5 indicia on each of the selected keys, such as indicia 37E is disposed at an angle $\theta/2$ relative to the transverse dimension of the group 30.

Considering now the panel 33 in greater detail with reference to FIGS 2-3, the panel 33 generally comprises a
10 pair of inner and outer thin sheets of thermoplastic material bonded together by any suitable means, such as heat welding. In this regard, the panel 33 includes an outer keypad sheet 51 for forming the individual character keypads, such as pads 34-39, and an inner sheet
15 61 for establishing a communication path between the individual character keys, such is keys 34-39, and a plurality of keypad control circuits, such as the keypad control circuits 31A, 31B, and 31C as shown in FIG. 4.

For the purpose of forming the individual character
20 keypads, the keypad sheet 51 is molded into the character keys, each having finger engageable recessed keypads or top wall P that are integrally connected and arranged in a common plane. Each keypad is generally rectangularly shaped and spaced apart from the adjoining keypads, by
25 valley members, such as the valley member 53. As best seen in FIG. 1, character indicia, such as character indicia 55, is disposed on the top surface of each of the keypads for helping a user identify the character code to be produced when the user presses a given key.

30 For the purpose of facilitating the manufacture of the membrane keyboard 16, the inner sheet 61 is molded by any well known technique, such as vacuum forming or injection molding. In this regard, the sheet 61 is molded into a series of parallel spaced-apart downwardly
35 depending cup-shaped valleys such as the valleys 65, 66,

and 67. Each valley is integrally connected, and has a bottom wall arranged in a common plane with like bottom walls. Each valley also terminates in an annular ridge defining a lip, such as a lip or rim 62. Each cup-shaped valley is spaced apart from adjoining valleys by a
5 rectangularly shaped receiving member, such as a member 63.

As will be explained hereinafter in greater detail, of the purpose of facilitating the bonding of sheets 51 and 61 together, each receiving member, such as the inner member 63 is complementary shaped to an associated outer valley member, such as valley member 53 to nest together. In this regard, when the keypad sheet 51 and inner sheet 61 are positioned in mating engagement for bonding
15 purposes, the valley members are received within corresponding areas of the receiving members to form the individual character key, such as keys 34-39. Thus, the individual cup-shaped valleys, such as the valley 65, form a finger-like ridge (FIG. 3) that cooperate with a
20 corresponding top wall or pad P to form a membrane character key.

As best seen in FIG. 2, the character keys of panel 33 are arranged in a series of rows, such as the rows 41 and 43. In order to facilitate arranging the rows in different heights, as shown in FIG. 9, the sheet 51 and 61 include different dimensioned keypads and valleys, such as keypad 57A and valley 67A. In this regard, for example, the keypad of character key 46 does not extend upwardly at as great a distance as keypad 57A, nor does
25 the valley 67 extend downwardly as far as the valley 67A. Thus, when the sheets 51 and 67 are positioned matingly together, the height of the character keys in row 43, such as the character key 39 will be slightly higher than the character keys in row 41, such as the character
30 key 46.
35

Considering now the keypad printed circuit board 32 and control circuit 70 in greater detail with reference to FIG. 3, and 4, the printed circuit board 32 is mounted within the left portion 22 of the housing 20, and is generally rectangular shaped with a generally flat face so that the keyboard panel 33 can be mounted thereto. In this regard, each of the valley members and receiving members, such as members 53 and 63 respectively, include a well, such as a well 54 (FIG. 3), that is adapted to be bonded to one of the surfaces of the printed circuit board 32 by any well known bonding technique, such as heat welding technique. In this regard, it will be understood by those skilled in the art, that each well, such as well 54, functions as bonding surfaces for joining the sheets 51 and 61 together, as well as for attaching the bonded sheets 51 and 61 to the printed circuit board 32.

For the purpose of controlling the sensory response of each individual character key, such as the character key 34, as shown in FIG. 4, the control circuit 70 includes a sensory control circuit 69 and an array of individual keypad circuits, such as the circuit 31A, 31B and 31C. As the individual keypad circuits, such as circuit 31A are substantially identical only circuit 31A will be described hereinafter in greater detail.

Considering now the circuit 31A in greater detail with reference to FIGS. 3 and 4, the circuit 31A includes a force sensing circuit 71 for detecting when the key 35 is pressed and a piezoelectric device 74A for producing a tactile response indicative that key 35 has been pressed sufficiently to enter a character code. To produce the tactile response, the piezoelectric device 74A includes a pulse generator 72 and a piezoelectric actuator 74. The pulse generator 72 drives the piezoelectric actuator 74 and is coupled between the actuator 74 and a tactile feedback control circuit 80 that enables a user to adjust

the amplitude or strength of the tactile response produced by the actuator 74. In this regard, a resistor pot 81 permits the user to adjust the tactile response to the individual preference of the user.

5 The piezoelectric actuator 74 and the force sensing circuit 71 are mounted to the top surface of printed circuit board 32 in relation to the valley member 65 associated with key 35. In this regard, the piezoelectric actuator 74 and its associated character
10 key 35 are mounted in close proximity to one another so that, a base or floor portion 66B (FIG. 3) of the valley member 66 abuts and contacts the actuator 74. By mounting the actuator 74 in close proximity to the key
15 will be sensed by the finger of a user resting in contact with the key 34.

For the purposes of sensing when the character key 35 has been pressed, the force sensing circuit 71 includes a force sensing resistor 75 and a control
20 arrangement including a high frequency cut-off circuit 78 and switch circuit 79. The forces sensing resistor 75 includes a silk screened polymer material having a variable conductive property. The force sensing resistor
25 75 is disposed in close proximity to the base portion 66B of the valley member 65 so that when a user exerts a downwardly directed force on the top surface of key 35, the force will be sensed to cause the electrical
conductance of the polymer material to be varied. As will be explained hereinafter in greater detail, the
30 change in conductance of the polymer material causes an electrical signal to be generated to activate the piezoelectric actuator 74 and to cause an audible sound to be produced.

In order to produce an electrical signal in response
35 to a character key 35 being pressed, the force sensing

resistor 75 is electrically coupled to the switch circuit 79 via the high frequency cut off circuit 78. The high frequency cut off circuit 78 helps to eliminate unwanted and undesired accidental multiple keystrokes by the user when the user presses the character key 34. In this regard, the circuit 78 will allow only signals to pass which occur at spaced apart intervals of one tenth of a second or longer.

In order to control the sensitivity or the amount of pressure that must be exerted by a user with reference to actuating a given character key, such as character key 35, the switch circuit 79 is coupled to a sensitivity level control circuit 84. In this regard, the sensitivity circuit 84 establishes a pressure threshold voltage reference for the switch circuit 79 so that it generates an output signal only when the desired threshold is reached. The pressure threshold voltage produced by the circuit 84 is adjustable via a resistor pot 85. This allows for incremental input detection, and the setting of a response threshold from heavy to very light finger pressures depending on the preference of the user.

Considering now the switch circuit 79 in greater detail with reference to FIG. 4A, the switch circuit 79 generally comprises a differential amplifier 79A having a feedback resistor 79B connected between its output and the input from the high frequency cut-off circuit 78. The sensitivity level control 84 is connected to the negative input of amplifier 79A to provide a reference level voltage for its operation. An analog to digital converter 79C is coupled between the output of amplifier 79A and the set input of a flip flop 79D. In this regard, whenever the flip flop 79D is set, it provides an output signal to the microprocessor 87, and the power amplifiers 72 and 89 respectively. The output of the

analog to digital converter 79C is also coupled to an inverter 79E whose output is connected to the reset side of the flip flop 79D.

In operation, whenever an output signal is generated
5 by the cutoff circuit 78, the amplifier 79A responds and produces an analog signal on its output if the signal level from circuit 78 exceeds the reference voltage level provided by the sensitivity control circuit 84. If the amplifier 79A produces an output signal, the analog to
10 digital converter 79C converts the signal into a digital signal that sets the flip flop 79D. The output from the flip flop 79D is then coupled to the pulse generator 72 enabling it to cause the device 84 to be activated. When the user removes his or her finger from the selected key,
15 the output signal from the analog to digital converter 79C goes to a logic low level causing the flip flop 79D to be reset via the inverter 79E.

As best seen in FIG. 4, the output of the switch circuit 79 has a pair of output terminals that are
20 coupled to a microprocessor 87 and a power amplifier 89, respectively, for producing character codes and audible sounds, respectively. In this regard, the microprocessor 87 is coupled to each character key, such as key 35 via a set of conductors, such as a conductor 91. The
25 microprocessor 87 in response to receiving a pulse from any given character key generates a character code that is coupled to the central processing unit 14 for processing and display purposes. In the preferred form of the present invention the character codes generated by
30 the microprocessor 87 are ASCII codes which are well known to those skilled in the art.

In order to produce an audible sound when any given character key is depressed, such as the character 34 each of the keypad circuits, such as circuit 31A, are coupled
35 to the power amplifier 89 via a data bus 92. The power

amplifier 89 is coupled to a volume control circuit 94 having a variable resistor 96 to adjusting the output signal strength of the amplifier 89. A audio speaker 97 is coupled to the output of amplifier 89 for producing a
5 audible sound in response to the output signal of the amplifier 89.

Referring now to the drawings and more particular to FIGS. 5-8 thereof, there is shown still yet another membrane keyboard construction system 110 which is
10 constructed in accordance with the present invention and which is shown in operation position with a foldable computer 112 having a liquid crystal display panel 114 for visual image displaying purposes. In this regard, its should be understood that information generated by a
15 user via the membrane keyboard system 110 is processed by the foldable computer 112 and displayed on the liquid crystal display panel 114.

Considering now the membrane keyboard construction 110 system in greater detail with reference to FIG. 5-7,
20 the system generally comprises a pair of membrane character key panels, a left panel 122 and a right panel 124 respectively, to facilitate rapid and efficient touch typing use. The system 110 also includes an electronic control unit 120 (FIG. 8) for producing ASCII character
25 codes as well as sensory control signals. The panels 122 and 124 are spaced apart and oriented at an angle to one another for helping to establish a rapid data entry interface between a user (not shown) and the foldable computer 112.

30 The left panel 122 and the right panel 124 are interconnected by a living hinge 126 that permits the left panel 122 to be folded away from the right side panel 124. The hinge 126 also causes the left panel 122 and the right panel 124 to be disposed at an angle θ
35 between their transverse dimensions when folded apart

from one another as shown in FIG. 5. In this regard, the angle θ is between about 26° and a between about 36° . A more preferred angle θ is between about 31° and about 36° , and a most preferred angle is about 31° .

5 A living hinge 127 enables the liquid crystal display panel 114 to be folded downwardly on top of the top side of the right panel 124. As best seen in FIG 5, the liquid crystal display panel 114 is mounted in a housing 116 that includes a living hinge 128. The living
10 hinge 128 permits a triangular flap or end portion 117 of the housing 116 to be folded backwardly so that a bottom edge 117A of the end portion 117 rests on the surface supporting the apparatus 110 to prop the panel 122 in a slightly backwardly inclined upright viewing position.
15 In this regard, the end portion 117 supports the housing 116 in an upright manner so that the images on the panel 114 may be easily viewed by a user. In a closed position, the housing 116 folds downwardly on top of the topside of panel 124. The end portion 117 folds
20 downwardly on top of the backside of the housing 116. The left panel 122 folds down upon the end panel 114 and right panel 124 to form a substantially thin flat configuration.

The configuration of the character keys and the
25 angular relationship between the panels 122 and 124 are more fully described in the aforementioned U.S. patent application filed concurrently herewith and incorporated herein by reference. As the construction and method of using the panels 122 and 124 is substantially similar,
30 only panel 122 will be described hereinafter in greater detail

Although in the preferred form of the present invention, the panels 122 and 124 are configured as a computer keyboard, it will become apparent to one skilled
35 in the art that the configuration and function the panels

can be varied to accommodate may different types of applications such as calculator panels, cash register panels, and the like.

Considering now the panel 122 in greater detail with
5 reference to FIGS. 5-7, panel 122 generally comprises a group of character keys, such as the character keys 134-139 which are collectively adjustable for tactile and audible responses. The character keys, such as keys 134-139 are formed from a pair of thin sheets of plastic
10 material that have been individually molded for a desired character keypad layout such as the character keypad layout illustrated in FIG. 5. In this regard, the panel 122 includes an outer keypad sheet 151 and an inner or contact sheet 161 that form a group of character keys,
15 such as a group of character keys 134-139. The keypad sheet 151 and contact sheet 14 are composed of a plastic material, such as thermoplastic material that may be easily formed into any desired configuration by any conventional forming technique, such as vacuum molding or
20 injection molding in a similar manner as the membrane panel of FIG. 1.

The inner or contact sheet 161 also defines a group of contact points such as contact point "CP" (FIG. 7), that correspond to the individual character keys, such as
25 the keys 134-139. In this regard, the contact sheet 161, establishes a communication path between the individual character keys, such as keys 134-139 and the electronic control unit 120 as will be explained hereinafter a greater detail in a manner similar to the membrane panel
30 of FIG. 1.

Considering now the outer sheet 151 in greater detail with reference to FIGS. 5 and 6, the outer sheet 151 is molded into a series of spaced apart upwardly extending rectangularly shaped pads, such as the pad 152,
35 that are integrally connected by a series of outer

contact members, such as the members 153, 154 and 155. Each contact member, such as member 153, is configured in a shape that is substantially the same as a inner contact member, such as a inner contact member 163, formed in the contact sheet 161. In this regard, when the outer and inner sheets 151 and 161 respectively are molded together, each of their respective contact members, such as contact member 153 and 163 respectively, align in an overlapping nesting relationship with one another to define a secondary contact point for bonding the sheets 151 and 161 to a printed circuit board 150 as will be described hereinafter in greater detail. Each pad, such as pad 152, is adapted to receive on its top surface, character indica, such as the character indicia 154 for helping to identify the function of the character key defined by the pad. In this regard, all of the pads in an individual row, such as pads 151 and 152, are arranged in a common plane for facilitating the construction of the panel 122.

Considering now the inner sheet 161 in greater detail with reference to FIG. 5 and 6, the inner sheet 161 is molded into a series of spaced apart cup shaped valleys, such as a valley 162 and 162A, that are integrally connected by contact members, such as the contact member 163 in a manner similar to the membrane panel of FIG. 1. As best seen in FIG. 6, the inner sheet 161 also includes a series of lips, such as annular lip or rim 164 that is intermediate of the valley and contact members, such as valley and contact members 162 and 163 respectively. Each lip, such as lip 164, defines a contact surface for bonding the outer and inner sheets 151 and 161 respectively together. In this regard, when the outer and inner sheets 151 and 161 respectively are bonded together, they form a series of cavities, such as a cavity 165, that are fluid tight.

For tactile sensory purposes, each of the cavities; such as the cavity 165, is filled with a fluid F that expands when heated thermally to cause the user to feel a slight impact as the inner and outer sheets deform slightly. The expansion of the fluid F and the outward deformation of the sheets also cause a slight audible sound to emanate therefrom.

The fluid F can be any non-conductive fluid that expands when thermally heated, such as acetone.

As shown in FIG. 8 for the purpose of causing the fluid in the individual cavities to expand in response to its key depression, each character key cavity has a conductive coil, such as a conductive coil 180 mounted therein for heating the fluid disposed inside the cavity. The individual coils are mounted within the character key cavities so that when energized they release thermal energy to cause the fluid therein to expand abruptly. With respect to mounting the coils within the cavities, each coil, such as coil 180, extend through holes (not shown) in the sheet 161, where each one of the holes are sealed in a fluid tight manner with the leads of the coils extending therethrough.

Considering now the electronic control unit 120 in greater detail with reference to FIG. 7 and 8, the electronic control unit 120 generally comprises a plurality of keypad control units, such as keypad control units 122A, 122B and 122C, for generating a character pulse signal and for causing a tactile response when a given key is depressed; and a sensory control unit 123 for permitting a user to adjust the sensory response features of the membrane keyboard 116.

Considering now the plurality of keypad control units, such as unit 122A in greater detail with reference to FIG. 8, as each of the control units are similar to one another, only unit 122A will be described hereinafter

in greater detail. As best seen in FIG. 8, the control unit 122A includes a pulse generator 168 coupled to coil 180 for producing a tactile response and a force sensing resistor 172 coupled to a high frequency cutoff circuit
5 or band pass circuit 174 and a switch circuit 176 cooperate which together to produce a sensing signal when the given character key is pressed.

Considering now the pulse generator 168 in greater detail with reference to FIG. 8, the pulse generator 168
10 is a conventional low voltage pulse circuit that produces a current pulse of approximately 250 milliamps whenever the key 137 is depressed. In this regard, the output of the pulse generator 168 is coupled to the small conductive coil 180 (FIG. 7) that is disposed in the cavity 165 and
15 that is mounted to the printed circuit board 150.

In operation when the pulse generator 168 is energized, as will be explained hereinafter in greater detail, its output current pulse is coupled to the coil 180 which cause the electrical energy to be converted to
20 thermal energy. In this regard, as the coil 180 is surrounded by a fluid that thermally expands when heated, the fluid experiences an immediate sharp rise in volume when heated, thus, causing the top of key pad 152 to move upwardly, to produce a tactile response sensed by the
25 finger of the user depressing the key 137. Because the amount of thermal energy released by the coil 180 is so small, there is little or no build-up of temperature in the fluid, even when the key 137 is rapidly depressed. In this regard, the heat of the fluid normally tends to
30 be dissipated through the inner sheet 161 and outer sheet 151.

For the purposes of causing the fluid to be directed primarily upwardly, the cup shaped valley 162 has an inverted conical or pyramid type of configuration and is
35 relatively resistant to deformation by internal pressure,

except at or about the area immediately surrounding the ridge or lip 164.

As best seen in FIG. 7, a bottom portion of each of the valleys, such as valley 162 rests directly on, or slightly above, a force sensing resistor, such as the force sensing resistor 172. In this regard, when a user depresses on the character key 137, the force is coupled to the resistor 172 which changes its conductivity in response to the exerted pressure. The high frequency cut off circuit 174 is coupled between the resistor 172 and the switch circuit 176 and function substantially the same as cutoff circuit 78. In this regard, if the key 137 is depressed for longer than a given interval the cutoff circuit 174 will generate a signal that is coupled to the switch circuit 176. As the circuit 174 and switch 176 are substantially similar to circuit 78 and switch 79 they will not be further described.

Considering now the sensory control unit 123 in greater detail with reference to FIG. 8, the sensory control unit 123 is substantially similar to control circuit 69 of FIG. 4. The control unit 122A includes a microprocessor 187 for generating appropriate ASCII character codes whenever selected character keys such as keys 134-139 are depressed. The character codes produced via the microprocessor 187 are sent to a central processing unit 198 forming part of the foldable computer 112. The control circuit 123 also includes a tactile feedback control circuit 182 having a control pot 183, a sensitivity level control circuit 184 having a control pot 185 and an audio control circuit, shown generally at 186 including a volume control circuit 187 having a control pot 188, a loud speaker 189 and a power amplifier 190. As the control circuit 123 and its various component parts are substantially similar to control

circuit 69, the circuit 123 will not be described in further detail.

While particular embodiments of the present invention have been disclosed, it is to be understood
5 that various different modifications are possible and are contemplated within the true spirit and scope of the appended claims. There is no intention, therefore, of limitation to the exact abstract or disclosure herein presented.

CLAIMS

What is claimed is:

1. A membrane keyboard, comprising:
a plurality of membrane character keys:
5 tactile means coupled to said plurality of
membrane character keys for causing individual ones of
said character keys to produce a tactile response when
depressed; and
force detecting means for generating an
10 electrical signal when individual ones of said plurality
of membrane character keys are depressed by a user.
2. A membrane keyboard according to claim 1
wherein said plurality of membrane character keys
includes:
15 key pad means defining the top surface of the
plurality of membrane keys; and
contact means bonded to said key pad means of
emerging said tactile means.
3. A membrane keyboard according to claim 2
20 wherein said keypad means includes a sheet of material
formed into a plurality of integral spaced apart
rectangularly shaped projections wherein each projection
defines a character key pad forming part of said
plurality of character keys.
- 25 4. A membrane keyboard according to claim 2
wherein the plurality of character keys are configured
into at least one row of character keys.
5. A membrane keyboard according to claim 2
wherein the plurality of character keys are configured
30 into rows and columns of individual character keys.
6. A membrane keyboard according to claim 2
wherein the individual rows of character keys are
staggered from one another.
7. A membrane keyboard according to claim 2
35 wherein at least two character keys of such plurality of

character keys have substantially different transverse heights.

8. A membrane keyboard according to claim 2 wherein the individual character keys are substantially
5 identical in size and shape.

9. A membrane keyboard according to claim 2 wherein said plurality of character keys differ from one another.

10. A membrane keyboard according to claim 3
10 wherein said sheet of material is composed of a suitable plastic material.

11. A membrane keyboard according to claim 10 wherein said plastic material is a thermoplastic material.

15 12. A membrane keyboard according to claim 3 wherein said contact means includes a sheet of material formed into a plurality of integral spaced apart upwardly extending fingers for cooperating with corresponding ones of said plurality of projection to define said plurality
20 of membrane character keys.

13. A membrane keyboard according to claim 12 wherein said upward extending fingers are configured in pairs wherein each pair of fingers cooperates with an individual one of said plurality of projections to define
25 the height of the character key defined thereby.

14. A membrane keyboard according to claim 13 wherein each pair of fingers is separated by a cup shaped valley wherein a base portion of each valley defines a contact surface.

30 15. A membrane keyboard according to claim 14 wherein each one of said valleys is filled with a fluid responsive to thermal energy.

16. A membrane keyboard according to claim 15 wherein said fluid expands in response to thermal energy.

17. A membrane keyboard according to claim 15 wherein said sheet of material forming said plurality of fingers is a plastic material.

18. A membrane keyboard according to claim 17
5 wherein said plastic material is a thermoplastic material.

19. A membrane keyboard according to claim 17 wherein said sheet of material forming such plurality of projections and said sheet of material forming said
10 plurality of fingers are bonded together to define said plurality of character keys and to seal the fluid in each respective valley.

20. A membrane keyboard according to claim 19 wherein such tactile means is electrical conductive means
15 for causing the fluid disposed in each one of said valleys to be thermally expanded to produce a tactile response.

21. A membrane keyboard according to claim 20 wherein said electrical conductive means includes a
20 plurality of electrical conductive coils, each individual one of said plurality of coils being mounted in individual ones of said valleys.

22. A membrane keyboard according to claim 1 wherein said tactile means is piezoelectric means.

23. A membrane keyboard according to claim 22
25 wherein said piezoelectric means includes a plurality of piezoelectric driver units.

24. A membrane keyboard according to claim 23 wherein each piezoelectric driver unit comprises:

30 A piezoelectric actuator for producing a tactile response; and

a power amplifier for generating an electrified signal to cause said actuator to produce a tactile response.

25. A membrane keyboard according to claim 24 further comprising:

tactile feedback control means for causing said power amplifier to generate different levels of said electrical signal to enable the tactile response of said actuator to be adjusted.

26. A membrane keyboard according to claim 1 wherein said tactile means includes fluid means for causing individual selected ones of plurality of membrane character keys to expand when depressed.

27. A membrane keyboard according to claim 1 wherein said force detecting means is force sensing resistor means.

28. A membrane keyboard according to claim 27 wherein said force sensing resistor means includes high frequency cut-off means coupled to switch means for generating electrical signals where individual ones of said plurality of membrane character keys are depressed.

29. A membrane keyboard according to claim 28 wherein said frequency cutoff means includes a plurality of high frequency cut off circuits for generating individual electrical signals when individual area of said plurality of membrane character keys are depressed.

30. A membrane keyboard according to claim 28 wherein said switch means includes a plurality of switches wherein each one of said plurality of switches is activated in response to an individual character key of said plurality of membrane character keys being depressed.

31. A membrane keyboard according to claim 1 further comprising:

audio means for producing an audible sound in response to said force detecting means generating an electrical signal.

32. A membrane keyboard according to claim 1 further comprising:

processor means for producing a coded signal in response to said force detecting means generating an electrical signal.

33. A membrane keyboard according to claim 32 wherein said coded signal is an ASCII coded signal.

34. A membrane keyboard according to claim 31 wherein said audio means includes volume control means for adjusting the decimal level of said audible sound.

35. A method of producing a sensory response from a membrane character key comprising:

filling a membrane character key with a fluid; depression said membrane character key; and expanding said fluid in response to said character by being depressed to produce a tactile response.

36. A method for producing a sensory response from a membrane character key, comprising:

coupling a membrane character key to tactile means;

depressing said character means to produce an electrical signal;

coupling said electrical signal to said tactile means to cause said character key to respond with sensory movement.

37. A foldable computer system, comprising:

housing means;

a liquid crystal panel mounted in a panel portion of said housing means;

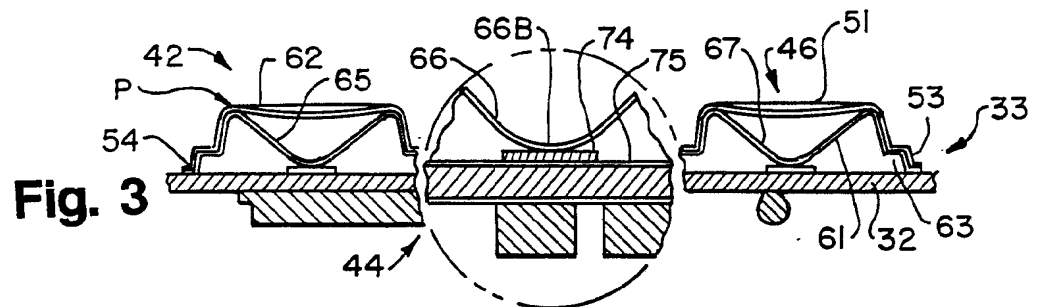
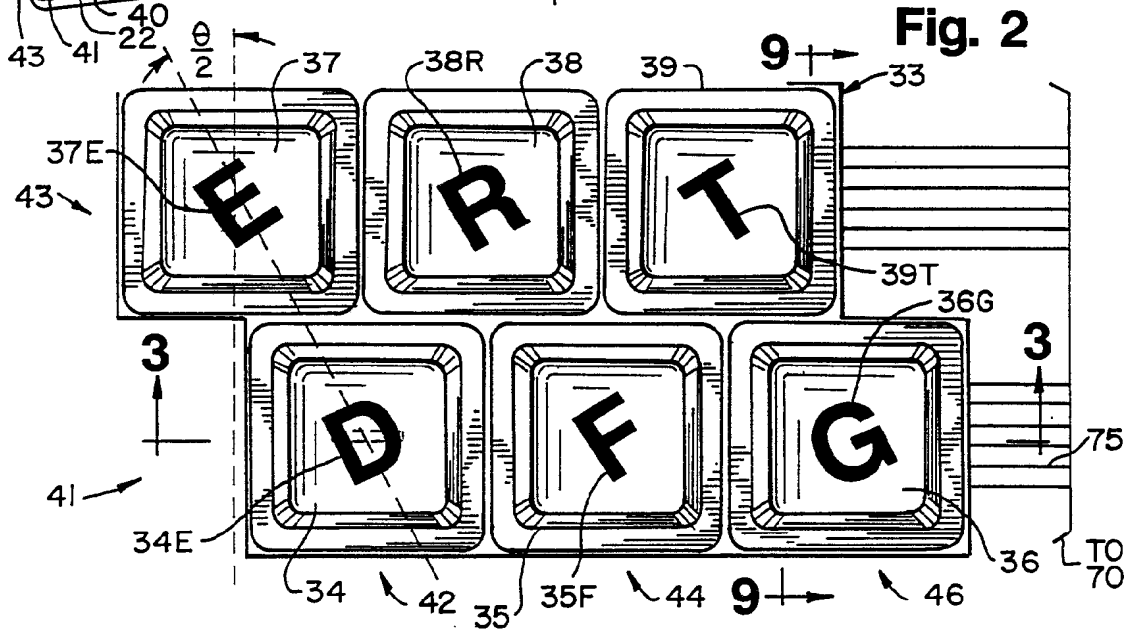
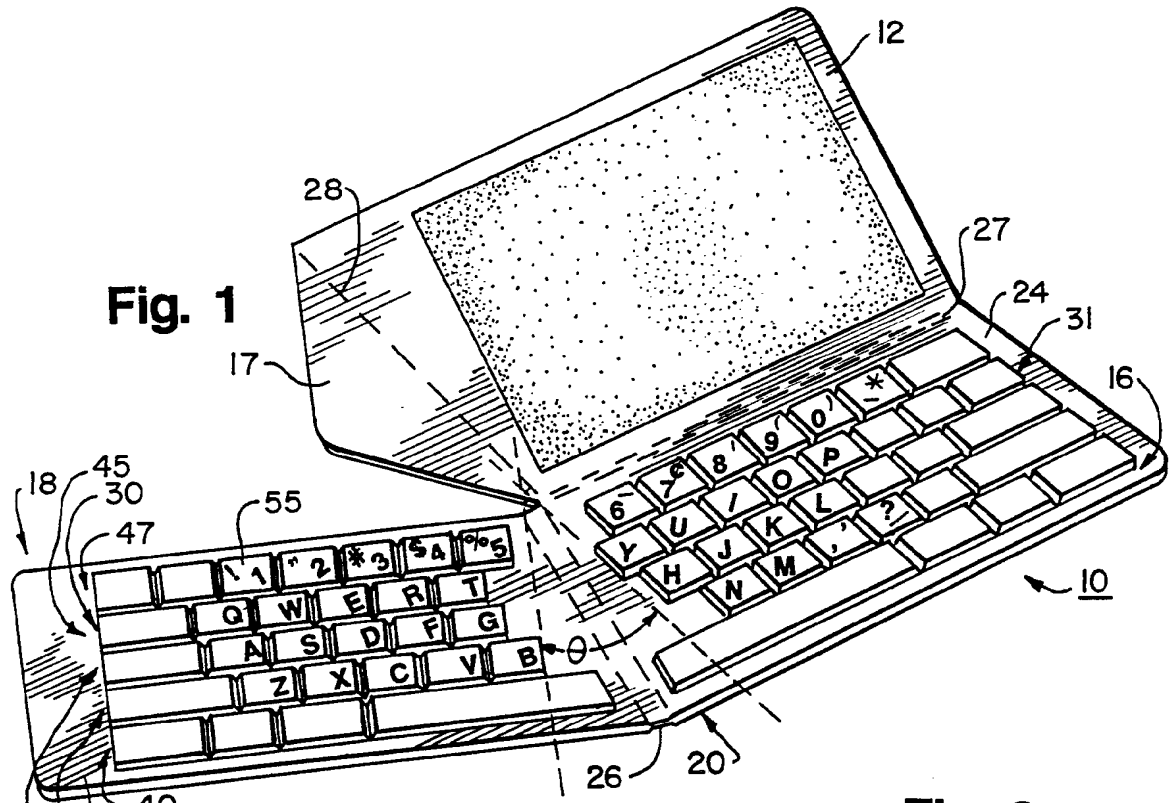
a membrane keyboard mounted in a keyboard portion of said housing means;

support means foldably attached to said housing means for helping to support said liquid crystal panel in an inclined upright manner;

said keyboard portion including a left and right keyboard portion, wherein said left portion is foldable on top of said right portion;

said support means being foldable flat against
5 said liquid crystal panel, said folded support means and said liquid crystal panel being foldable on top of said keyboard portion to form a substantial thin flat configuration.

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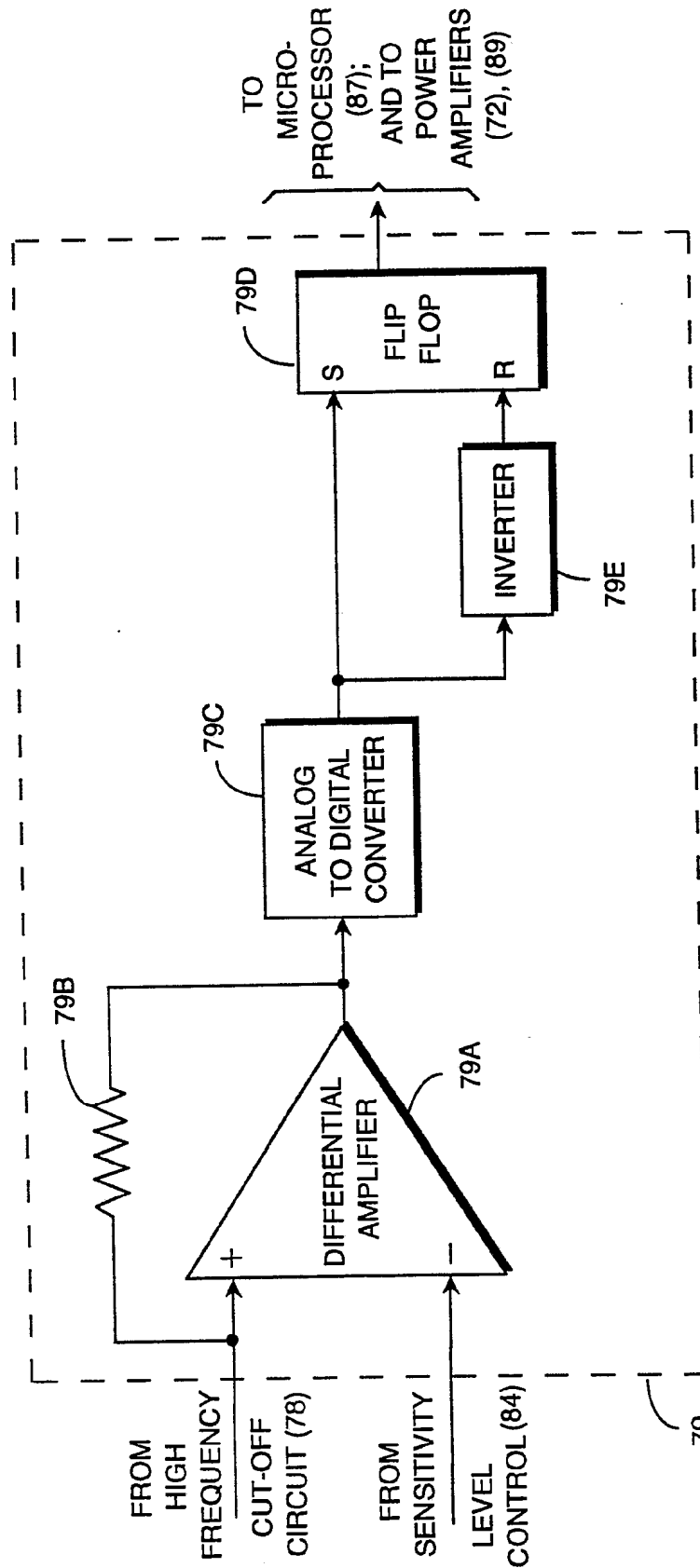


Fig. 4A

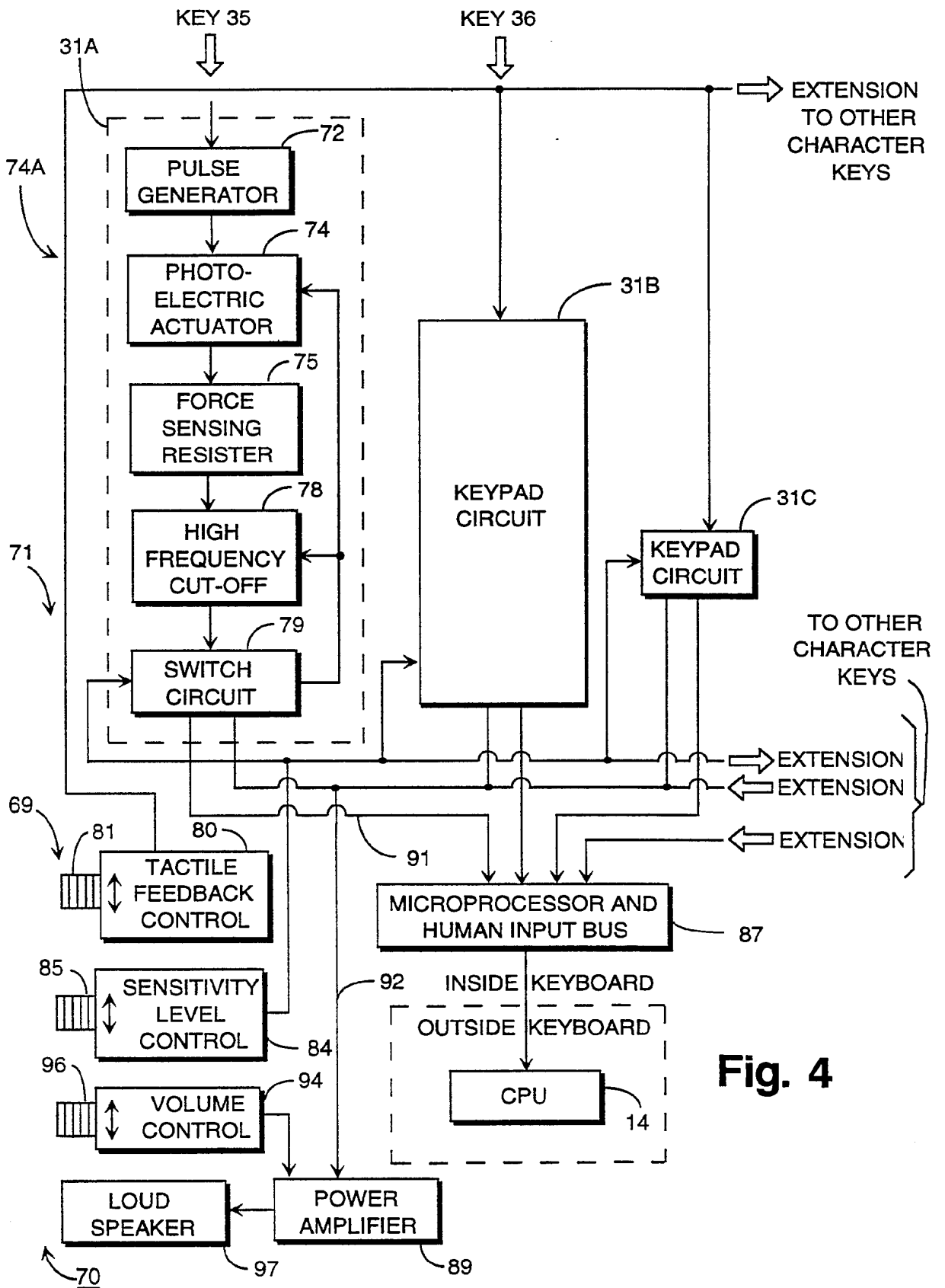


Fig. 4

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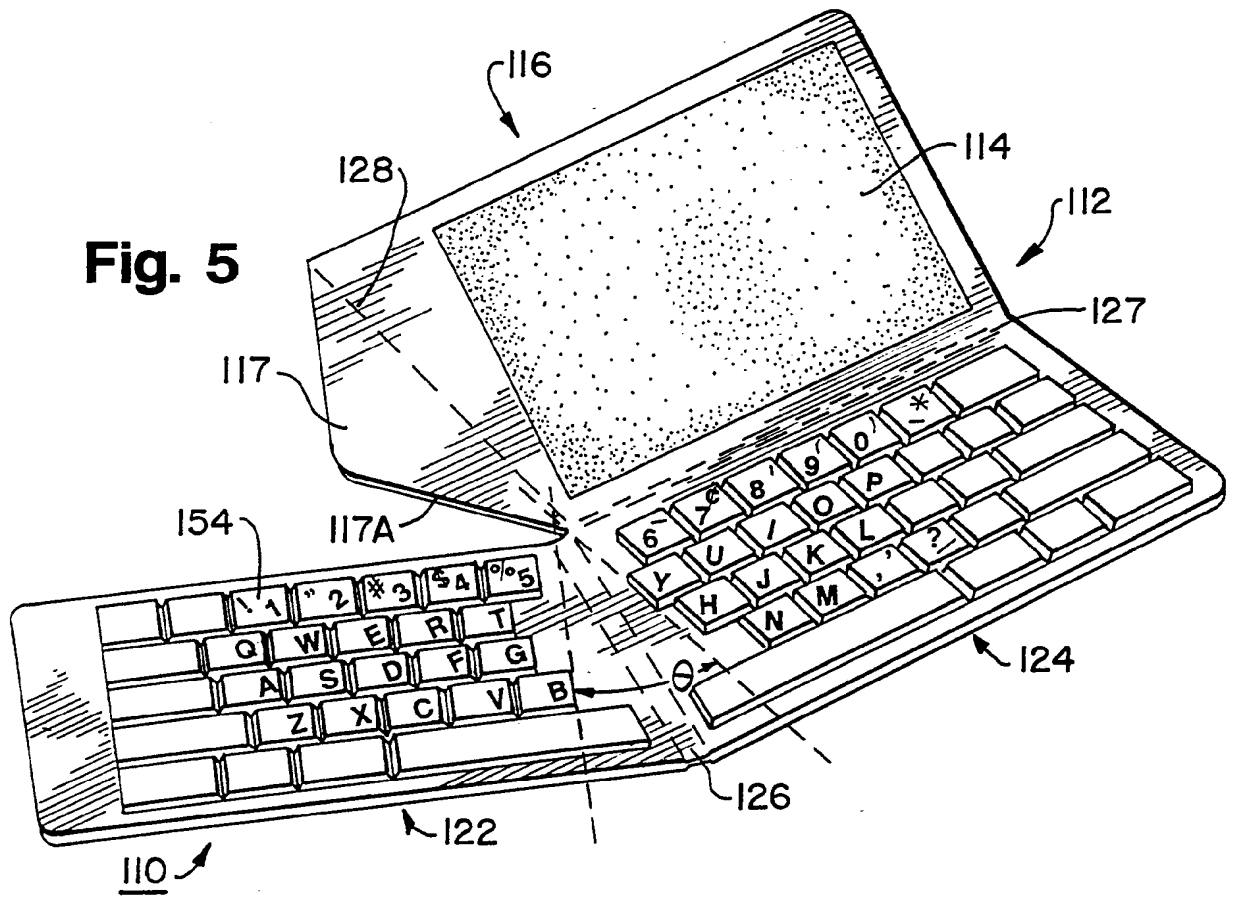


Fig. 5

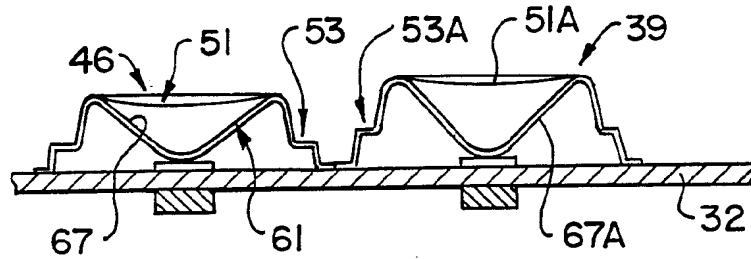
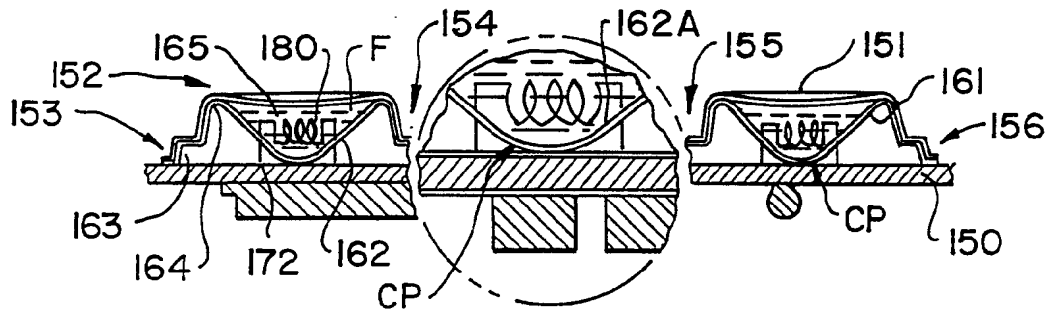
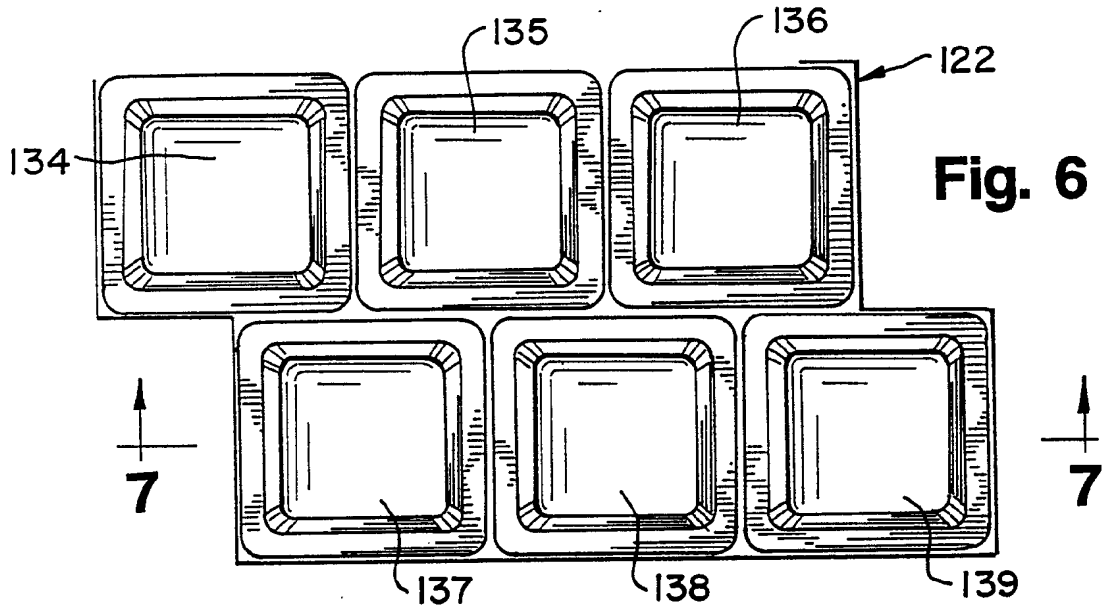


Fig. 9



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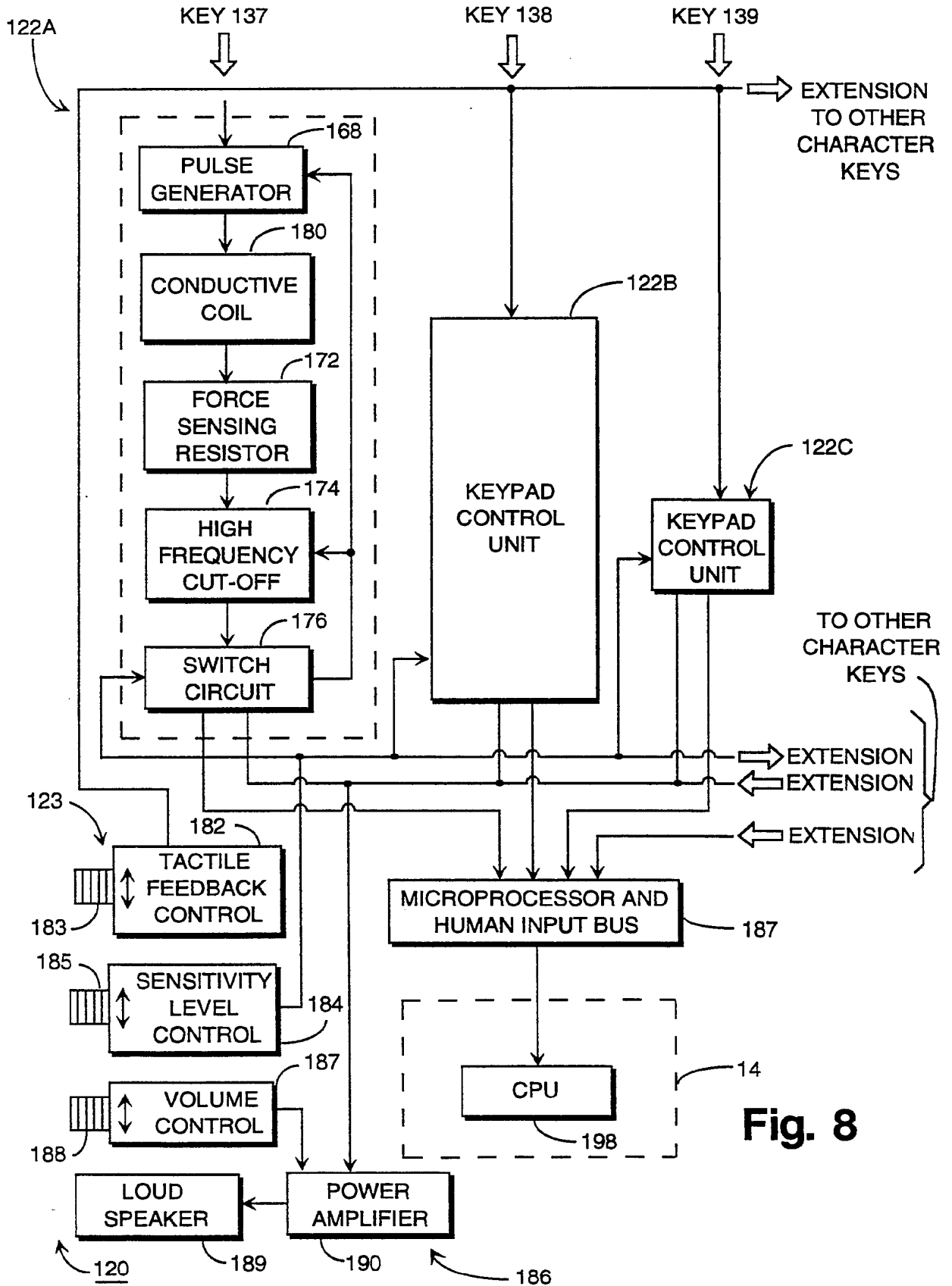
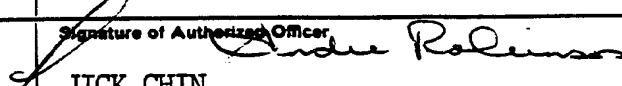


Fig. 8

INTERNATIONAL SEARCH REPORT

International Application No. **PCT/US91/09797**

I. CLASSIFICATION OF SUBJECT MATTER (if several classification symbols apply, indicate all) *		
According to International Patent Classification (IPC) or to both National Classification and IPC		
IPC(5) G09G 3/02 US Cl 340/711		
II. FIELDS SEARCHED		
Minimum Documentation Searched ?		
Classification System	Classification Symbols	
US	340/711, 700, 407; 341/21,22, 24,27; 200/5A, 511, 512, 513, 515, 516, 517, 520, 521; 248/917, 918, 919, 920, 921, 922, 923; 361/380;400/100, 472, 491.3, 680, 682, 691, 693;	
Documentation Searched other than Minimum Documentation to the Extent that such Documents are Included in the Fields Searched *		
III. DOCUMENTS CONSIDERED TO BE RELEVANT *		
Category *	Citation of Document, ** with indication, where appropriate, of the relevant passages **	Relevant to Claim No. **
X Y	US, A, 4109118 (Kley), 22 AUGUST 1978 See Fig. 4. Col. 4, lines 32-63+Col. 3, lines 49-52	1-4,8,12-14, 26,35 7,15,16
X Y	US,A, 3,860,771 (LYNN et al.) 14 JANUARY 1975 See Fig. 14, col. 2, lines 60-63, col. 3, lines 12-15 & 48-53	1-6,8-11 22-25,31-34, 27-30
X Y	US,A, 4,334,280 (McDONALD) 08 JUNE 1982 See entire document.	36 22-25,31-34
Y	US,A, 4,640,994 (KOMOKI) 03 FEBRUARY 1987 See col. 2, lines 10-12	27-30
Y	US,A, 4,028,560 (BAINTER) 07 JUNE 1977 See Figs. 1-3	28-30
Y	IBM Technical Disclosure Bulletin, Vol. 32, No. 10B issued March 1990. "Folding Computer", See pages 266-267.	37
Y	US,A, 4,113,212 (CORIDEN) 12 SEPTEMBER 1978 See Fig. 1	37
<p>* Special categories of cited documents: **</p> <p>"A" document defining the general state of the art which is not considered to be of particular relevance</p> <p>"E" earlier document but published on or after the international filing date</p> <p>"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)</p> <p>"O" document referring to an oral disclosure, use, exhibition or other means</p> <p>"P" document published prior to the international filing date but later than the priority date claimed</p> <p>"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention</p> <p>"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step</p> <p>"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.</p> <p>"&" document member of the same patent family</p>		
IV. CERTIFICATION		
Date of the Actual Completion of the International Search	Date of Mailing of this International Search Report	
09 April 1992	05 MAY 1992	
International Searching Authority	Signature of Authorized Officer	
ISA/US	 JICK CHIN	

(19) World Intellectual Property Organization
International Bureau



(43) International Publication Date
4 March 2004 (04.03.2004)

PCT

(10) International Publication Number
WO 2004/019315 A1

(51) International Patent Classification⁷: G09G 5/00

(81) Designated States (*national*): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, OM, PH, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZM, ZW.

(21) International Application Number:
PCT/US2002/022851

(22) International Filing Date: 17 July 2002 (17.07.2002)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
60/305,615 17 July 2001 (17.07.2001) US

(84) Designated States (*regional*): ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, SK, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

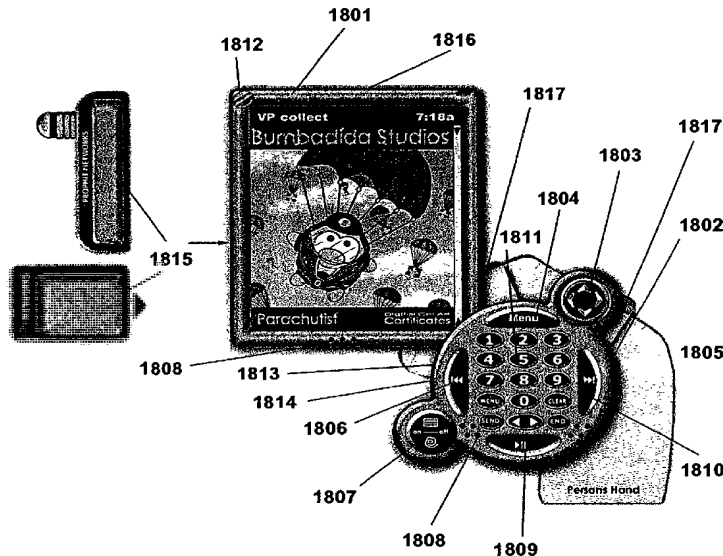
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Published:
— with international search report

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For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(54) Title: SYSTEM AND METHOD FOR FINGER HELD HARDWARE DEVICE



(57) Abstract: A finger held hardware device (1801, 1802) provides portable terminal and communicative devices and other functions in a system which can be securely braced against and/or attached to a finger or side of a user's hand, facilitating secure or one-handed operation of the device (1801, 1802). The device is flexible and modular in nature, allowing for flexible positioning of a keypad/control unit relative to a display (1801), as well as selection from among various displays and keypad/control units to suit a user's needs. A device (1801, 1802) can operate without physical function buttons or any physical buttons, and can be activated by a separate key mechanism for security. A remote control stylus allows a user to operate the device more quickly. An energy absorbing cover protects the device. A resource cradle (1816) supports portions of the device by providing power storage, network access, and other resources.

WO 2004/019315 A1

SYSTEM AND METHOD FOR FINGER HELD HARDWARE DEVICE

CROSS-REFERENCE TO RELATED APPLICATION

This application claims priority from United States Provisional Application
5 No. 60/305,615, filed July 17, 2001.

TECHNICAL FIELD

The present invention relates to personal electronic devices. More particularly, the present invention relates to systems and methods for physically supporting,
10 controlling, customizing, accessing, and protecting personal electronics devices

BACKGROUND OF THE INVENTION

Portable, personal electronics devices have become increasingly more popular as the costs to manufacture and sell them has decreased. Cellular telephones,
15 handheld computers, portable game players, and other related devices have become commonplace. Furthermore, users have become increasingly dependent on these devices, using them more and more, and for an increasing range of applications. For example, people use cellular telephones seemingly constantly. Moreover, cell phone users use their cell phones to send text messages, browse the Internet, and for many other purposes.
20 Similarly, handheld computer users not only have come to rely on these devices for keeping appointment calendars and address lists, but now use these devices for everything from casual word processing, to posting on-line transactions, to playing games

With the passage of time, the use of these devices has become better understood to the point of second nature. Users know which buttons perform which
25 functions without great mental deliberation. In fact, it is not uncommon to see an individual conduct a phone call with her cellular phone in one hand, while operating her handheld computer with another.

Unfortunately, the creators of current devices seemingly designed them with an expectation that use of these devices would be more single-minded, and that a user

would be willing to devote both hands to the task. As a result, while a user may not be intimidated by the prospect of using his cellular phone and his handheld computer at the same time, manipulating the controls on these devices might not be practical or possible. A typical cellular phone is much more easily dialed if the user cradles the phone in one hand and dials with the other. Use of a typical handheld computer also requires two hands: one is needed to support the handheld unit, while the other operates a stylus or presses keys to initiate various commands.

A similar concern is that while a handheld computer may be designed in a way in which it is well-suited for some applications, it may not be for others. For example, it may be a simple matter to access one's schedule for the day by depressing the calendar function button, then scrolling down through the day using scroll keys. This can be done with one hand while resting the handheld device on a table or desk, but is not easily done if one both tries to hold and control the device with one hand. Further, if one wants to use the handheld computer's calculator functions, because the stylus or another tapping device is required to actuate the touch-screen "buttons" of the calculator program, one cannot merely use the calculator with one hand while writing down the resulting figures with another.

Handheld devices also pose other concerns. To name one example, it is good to have a compact cellular phone so it can be carried easily; on the other hand, when viewing text, a larger display would be very helpful. Similarly, the ability to send text messages is very useful, but it would be more helpful if a more user friendly keyboard could be provided. Security is a concern when so many people store so much valuable information in various types of handheld devices. Comparably, so many people rely on their devices that if the device were damaged, the user may have suffered a tragedy. Finally, while compact devices are convenient, they often sacrifice expandability in exchange for small size; certainly, it would be helpful to be able to augment the function of these devices as needed.

Overall, what is needed is a way to make portable electronic devices more ergonomic so that even unskilled users can more easily operate them with a single hand, or

can do more with the devices while using both hands. Devices need to be better secured and protected, and to allow for upgradeability and flexibility in function.

It is to these objects that the present application is directed.

5 SUMMARY OF THE INVENTION

There are numerous general variations of the present invention.

One form of the present invention employs on a lower corner of the device a finger and thumb based support, attachment, and activation device. In this manner, a user can both support and operate the handheld device with one hand, leaving her other hand
10 free for other tasks or, at least, reducing the demand on the hand supporting the device.

A variation of the present invention features detachable and interchangeable display and button-based mechanisms. In this way, users can attach different keypads for different applications or to suit a preference of which hand to use in operating the device. Similarly, users can attach different types of displays for different applications.

15 Another variation of the present invention has no physical buttons on which all commands are initiated via a touch-sensitive display. The only physical button on this variation is a power switch to activate the device.

Another variation of the present invention has no physical buttons on which all commands are initiated via a touch-sensitive display. Because there are no physical
20 buttons, the device can only be accessed with a separate key to activate the device.

Another variation of the present invention receives input both conventionally from the pressing of function control buttons as well as pressing of touch sensitive areas on the touch screen, and from remote control signals issued by a user activating buttons on a remote control stylus.

25 Another variation of the present invention is largely covered with a gel pad to protect the device from damage that it might suffer upon being dropped or handled roughly, as well as to allow a user a better grip on the device.

Another variation of the present invention employs resource cradle for providing functional support to various sections of the device.

BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1 is a front view of one embodiment employing on a lower corner of the device a finger activated keypad and a finger attachment means.

5 Figure 2A is a front view another embodiment which features detachable and interchangeable display and keypad/control units.

Figure 2B is a front view of the embodiment shown in Figure 2A showing an alternative keypad/control unit that can attached to the display device.

10 Figure 2C is a front view of the embodiment shown in Figure 2B showing the alternative keypad/control unit attached to the display device.

Figure 2D is a front view of the embodiment shown in Figure 2A using a rotatable keypad/control unit.

Figure 2E is a front view of the embodiment shown in Figure 2A using a rotatable keypad/control unit oriented to allow a user to hold the device at a different angle.

15 Figure 2F is a front view of the embodiment shown in Figure 2A using an alternate function keypad/control unit.

Figure 2G is a front view of the embodiment shown in Figure 2A using a different display device.

20 Figure 3 is a front view of another embodiment in which the handheld device accepts commands through the touch screen device with the exception of a power switch.

Figure 4A is a front view of another embodiment in which the handheld device accepts commands only through the touch screen device, and can only be activated through the use of a key.

25 Figure 4B is a front view of another embodiment in which the handheld device accepts commands only through the touch screen device, and can only be activated through the use of a wireless access device.

Figure 5A is a front view of another embodiment in which a handheld device receives input both conventionally from the pressing of function control buttons and on the touch-sensitive screen, as well as from a remote control stylus.

Figure 5B is a bottom view of the remote control stylus shown in Figure 5A.

5 Figure 6A is a front view of another embodiment in which a handheld device is covered by a protective gel pad.

Figure 6B is an underside view of another embodiment in which a handheld device is covered by a protective gel pad.

10 Figure 6C is an underside view of a variation of the embodiment in which a handheld device is covered by a protective gel pad.

Figure 7A is a perspective view of another embodiment of a resource cradle used by the handheld device.

Figure 7B is a perspective view of a resource cradle used by a different embodiment of the handheld device.

15 Figure 7C is a perspective view of a resource cradle used by a keypad/control unit.

Figure 7D is a perspective view of a resource cradle used by an alternate keypad/control unit.

20 Figure 7E is a perspective view of a resource cradle used by a plurality of devices at the same time.

Figure 8 is a general block diagram of a finger held hardware device employing one particular design of the preferred embodiment of the present invention;

Figure 9 is a general block diagram of a finger held hardware device employing a remote control unit, network card, removable media, and wired capabilities.

25 Figure 10 is an embodiment of the present invention employed in another type of finger held hardware device.

Figure 11 is an embodiment of the present invention utilizing various forms of removable functions and capabilities of finger held hardware device;

Figure 12 is a general block diagram of a finger held hardware device employing one particular design to remove multiple portions of a device.

Figure 13 is a general block diagram of a finger held hardware device employing that enables any removable portions of a device.

5 Figure 14 is an embodiment of the present invention employed utilizing a modified version of finger held hardware device.

Figure 15 is an embodiment of the present invention employed utilizing a modified version of a viewable screen apparatus to provide a user with the same capabilities as an entire portable terminal device.

10 Figure 16 is an embodiment of the present invention utilizing a modified version of a physical button apparatus to perform the same capabilities as an entire portable terminal device, as well as its interchangeability with at least one type of portable terminal device, and/or a viewable screen device, and/or a finger held hardware device, or any other type of portable device.

15 Figure 17 is a general block diagram of at least one type of gel pad.

Figure 18 is an embodiment of the present invention employed utilizing a modified version of a viewable screen apparatus, finger held hardware device, and/or any type of portable device that does not have any physical buttons or characteristics;

20 Figure 19 is an embodiment of the present invention employed utilizing possible modified versions or variations of a viewable screen apparatus, finger held hardware device, and/or any type of portable device that does not have any physical buttons.

25 Figure 20 is an another embodiment of the present invention employed utilizing possible modified versions or variations of a viewable screen apparatus, finger held hardware device, and/or any type of portable device that does not have any physical buttons.

Figure 21 is a general block diagram of a stand device employing one particular design that supplies function to any type or component of finger held device.

Figure 22 is a general block diagram of a stand device employing one particular design that provides various types and forms of interaction.

Figure 23 is an embodiment of the present invention utilizing a modified version of finger held hardware device that employs modified versions of a viewable screen apparatus enabling the a viewable screen apparatus to be moved by the user.

Figure 24 is an embodiment of the present invention utilizing a modified version of finger held hardware device that employs modified versions of a viewable screen apparatus enabling the a viewable screen apparatus to be moved.

Figure 25 is a general block diagram of a cellular phone based finger held hardware device employing one particular design that enables any type of finger held device, with a fixed and/or removable display screen device and physical button device that can provide various functions.

Figure 26 is an embodiment of the present invention employed utilizing a modified version of finger held hardware device that employs modified versions of a cellular phone based finger held hardware device.

DETAILED DESCRIPTION OF THE INVENTION

Embodiments of the present invention are directed to providing handheld electronic devices, such as personal digital assistants, cellular phones, game players, digital cameras, and media players, with functional advantages. These advantages include improved ways of holding the devices, improved flexibility in function of these devices, and improved security, among other objectives. One skilled in the art will understand, however, that the present invention may be practiced without several of the details described in the following description. Moreover, in the description that follows, it is understood that the figures related to the various embodiments are not to be interpreted as conveying any specific or relative physical dimensions, and that specific or relative physical dimensions, if stated, are not to be considered limiting unless the claims expressly state otherwise. Further, illustrations of the various embodiments when presented by way of

illustrative examples are intended only to further illustrate certain details of the various embodiments, and shall not be interpreted as limiting the scope of the invention.

There are several general embodiments of the invention, which will be described first, as well as several more detailed embodiments of the invention.

5 A first general embodiment of the present invention is a finger held personal electronics device. Figure 1 shows a top view of a finger held device 100 supported by a user's hand 104. The finger held device generally comprises three sections: a display 108, a control unit 112, and an attachment device 116. The display device 108 provides data viewing access and/or touch screen control as is generally known with handheld computers.
10 However, as compared with conventional handheld computers which have control buttons disposed across the bottom edge of the device under the lower portion of the display, in the embodiment shown, the control buttons 120 are arrayed on a keypad 124 on the control unit 112 which can be positioned over a user's hand 104.

Positioning the keypad 124 on the control unit 112 in this way shifts some of
15 the weight of the finger held device 100 over the top of the user's hand 104 to better allow the finger held device to be supported by one hand, as compared to a conventional handheld device wherein the center of gravity would be positioned further away from the user's hand. In addition, by moving the keypad 124 over the user's hand 104, pressure applied to the keypad 124 is directed through the keypad 124 and against the user's hand 104.
20 Accordingly, depressing the keys 120 only helps to secure the finger held device 100 against the user's hand 104, rather than twist the device out of a user's hand as might happen if a user attempted to support a conventional device in this manner and depressed keys which are positioned away from the user's hand 104.

In addition, for extra security and support in allowing the user to hold the
25 device with one hand, a finger attachment device 116 allows the user to secure the device 100 about one or more fingers of the user's hand 104. The finger attachment device 116 can be a flexible strap the user can wrap around one or more of the fingers of his hand 104. Alternatively, the finger attachment device 116 can be a more rigid ring type device into which the user can slip one or more of the fingers of the user's hand 104. With the device

100 anchored to the user's hand 104 by this finger attachment device, the user need not concern himself with making sure he is hanging onto the device 100 so as to fully support its weight and the force of any force applied in operating the device 100. The finger attachment device 116 ensures the device will not fall.

5 With the keypad 124 moved over the off-centered control unit 112 and secured to the user's hand 104 with the finger attachment 116 mechanism, the user can actuate keys 120 on the keypad 124 with the thumb of the user's hand 104 without dropping the device. Even if the user chooses to use his other hand to actuate the device, the user need not concentrate on directing the muscle's of his own hand 104 to support the
10 device at that time because the application of force on an axis through the user's hand 104 coupled with the finger attachment device 116 make it much easier to support the device 100.

 Another general embodiment of the present invention shown in Figure 2A features detachable and interchangeable display 200 and keypad/control units 204. In this
15 way, users can attach different keypad/control units 204 for different applications or to suit a preference of which hand 208 to use in operating the device. Similarly, users can attach different displays 200 for different applications. Parts of the device can be exchanged with others to be able to exchange data with other users of such a system.

 In a preferred version of this embodiment, both the displays 200 and the
20 keyboard/control units 204 have resident logic systems and power supplies (not shown). Accordingly, one type of keypad/control unit 204 might have resident functions or store downloadable applications, while another might have different resident functions and store different applications. The keypad/control units 204 might be of the same form, just having different functions and applications, and their interchangeability might be comparable to
25 changing a cartridge in a handheld game system. It will be appreciated that the keypad/control units 204 can be adapted to receive such cartridges, whether they store applications, data, media files, or other helpful content in any of the embodiments disclosed in this specification.

Alternatively, as shown in Figures 2B and 2C, alternative keypad/control units 220 can be of different shapes, have keys related to different functions, or have different keypad arrangements entirely. Figure 2B shows a more linear keypad/control unit 220 to be coupled with the display as shown in Figure 2C. Moreover, keypad/control units 204, in the detachable embodiment or the previously described embodiment, can comprise rotatable keypads 124 (Figure 1). These rotatable keypads 124 allow a user to arrange the keys to suit her preferences. Similarly, the rotatable aspect of the keypad/control units 204 (Figure 2A) can allow the user to position the display 200 at different angles to the keypad/control unit 204. As shown in Figure 2A, one user might select a position where the keypad/control unit 204 is positioned more to one side of the display 200. On the other hand, as shown in Figure 2D, another user might choose to position the keypad/control unit 204 more directly beneath the display 200, or as shown in Figure 2E, the user might prefer to position the display 200 to the opposite side of the keypad/control unit 204. Further, considering the relative position of the display 200 and the keypad/control unit 204, this rotation would allow for a user to adjust the device to use it on his opposite hand.

In addition, alternative keypad/control units can have keypad arrangements targeted toward different applications. For example, if a cellular telephone is incorporated in the keypad/control unit as shown in Figure 2F, the telephone keypad control/unit 230 could have a conventional telephone keypad arrangement. A keypad/control unit for special math functions (not shown) could have calculator keys for calculation intensive applications, while another could have more typical scrolling and clicking keys. If a gaming system is incorporated in the keypad/control unit (not shown), the keys could be tailored to a specific game, or the keypad arrangement could mirror a keypad layout of a popular game controller.

Just as the keypad control units can be of different types, displays can be of different types as shown in Figure 2G. A typical handheld computer display of a few inches on a side as shown in Figures 2A through 2F might be suitable for most typical handheld computer applications or for a gaming system. A larger display (not shown) might be chosen if the device is being used for reading e-books or e-magazines.

Alternatively, if the device is being used primarily as a telephone directory and/or cellular phone/paging device, a compact display 240, which might comprise even a single-line display, might be chosen for the space and weight savings in the smaller package.

In this detachable embodiment, both the display and the keypad control unit
5 can have their own control logic, power supplies, and applications. As a result, a display used by itself can still have some resident functions which can be initiated through the touch-sensitive display. These displays, for example, may have some native functions such as calendaring and a to-do list manager. At the same time, a keypad/control unit might be added that includes a cellular telephone module and an address book function, therefore,
10 combining these devices not only adds a device for entering commands to the display, but also adds additional functionality.

Along the lines of the detachable display with its own on-board functionality, another embodiment of the present invention shown in Figure 3 is a handheld “display-only” device 300 with no physical buttons other than a power switch 304 to
15 activate the turn the device on and off. The designation “display-only” is somewhat of a misnomer because, as previously described, the display would have its own power supply and control logic. Moreover, the display-only device 300 can be controlled through touch-screen directives through designated icons 308 on the viewing area 312 of the device. Variations of this embodiment could be coupled with a keypad/control unit as previously
20 described to add different functions and user handling options. Notwithstanding, the display-only device can be a standalone device, or at least be able to function as a standalone device.

Another general embodiment of the present invention shown in Figures 4A and 4B is a handheld device 400 with no physical buttons with which all commands are
25 initiated via a touch-sensitive display 404. In a preferred variation of this embodiment, although some predefined keystroke on the touch-sensitive display 404 could activate that the device 400, it may be preferred to require the user to carry a security key 408. By issuing a physical key 408 to a user, the user can be sure that the information in the unit is secure as long as the user keeps the key 408.

It will be appreciated that the key 408 can be a physical interlocking teeth type key, as shown in Figure 4A, or other types can be used. Figure 4B, for example, shows an radio frequency identification (RFID) tag 420. With an RFID tag, which the user could wear as a charm on a chain, carry in a pocket, or hang on a key ring 424 as shown, the user need not actually insert a key into the device 400. The device 400 would poll for the presence of the RFID tag 420, and when the RFID tag 420 is in suitable proximity to the device 400, the device 400 powers itself on. Again, if the device 400 is separated from the user, the user's information remains secure as long as he still has the RFID tag 420 with him. It will be appreciated that this same sort of security can be implemented without an interlocking key using infrared, bar code scanning, or similar technologies.

Another general variation of the present invention shown in Figures 5A and 5B is a handheld device 500 which receives input both conventionally from the pressing of function control buttons on the keypad/control unit 504, through entry of commands on the touch sensitive display 508, and from a remote control stylus 512. Using the remote control stylus 512, the user can enter commands by pressing function control buttons 516 which can be received by the device 500 via infrared, RF, ultrasonic signals, or similar transmission means. The remote control stylus 512 has a stylus tip, therefore a user need not carry multiple styli. Allowing the user to enter commands via remote control stylus 512 can speed system operation in a number of ways. For one, the function control buttons 516 on the remote control stylus 512 can bear keys which trigger functions different from those on the keypad/control unit 504, giving the user more one-touch commands to use. Similarly, the function control buttons 516 could initiate macros for generating text or triggering commands the user regularly uses. Further, because the user necessarily already uses a stylus to use the touch-sensitive display 508, without moving her hands, the user has access to more one-touch commands by merely pressing down with her fingers on a device she already holds in her hand.

Figure 5B shows a reverse view of a variation of the remote control stylus 512. On a side away from the function control buttons 516, the remote control stylus 512 could support a display 524 which can display its own content, comparable to another

window in a multitasking environment. For example, while a user browses notes on the display 508 (Figure 5A) of the device 5, on the display 528 (Figure 5B) of the stylus, the user could be reminded of impending appointments. The display 528 would display content transmitted by the device 500 (Figure 5A) because, if the remote control stylus 512 can transmit to the device 500, using the same technology, the device 500 can transmit to the remote control stylus 512. It will be appreciated that the remote control stylus 512 and the device 500 can communicate using infrared, ultrasonic, RF, or similar technology. In fact, the same functions could be provided by a remote control stylus 512 coupled to the device 500 by a wired interface (not shown).

10 Another general embodiment of the present invention shown in Figures 6A, 6B, and 6C is a handheld device 600 protected by a gel pad 604. The gel pad 604 is comprised of the energy-absorbing gel type material which has become popular for shoe insoles. As shown in Figure 6A, the gel pad 604 can provide ridges 608 of thickened pockets of gel to help absorb blows to the device 600 if the device 600 should be dropped or otherwise experience shock. Figure 6B shows a rear view of the gel pad 604 installed on the device 600. Figure 6A shows how the ridges 608 extend around the perimeter of the device 600 to protect it. Moreover, it will be appreciated that these ridges 608, as well as one or more textured pads 612, can make the gel pad 604 more tacky. Increasing the tackiness of the device 600 allows a user to more securely hold the device 600. Further, if an underside of the device 600 is tacky, the device 600 is less likely to slide off of a surface on which it has been rested, further protecting the device from potential harm. Figure 6C shows another variation of the underside of the gel pad 604 showing that the textured pad 612 can be created in the form of a logo or another message. Thus, the gel pad 604 can carry the logo of the manufacturer of the device 600, or the gel pad 604 may carry personalized or personalizable content in the same way that such content is available on hard shell covers for cellular telephones. It should be noted that the content on hard shell cellular phone covers adds no tackiness to the case of the cellular phone, nor does it serve to protect the phone.

Figures 7A, 7B, 7C, 7D, and 7E show one more aspect of the present invention, a resource cradle 700 for the devices previously described. Considering the flexible aspect of the handheld devices previously described, the resource cradle 700 needs to be able to accommodate a wide range of devices and configurations. Figure 7A shows a unified handheld device 704 coupled with the resource cradle 700. Figure 7B shows a display-only handheld device 708 as previously described coupled with the resource cradle 700. Figures 7C and 7D show a keypad/control unit 712 and an alternate keypad/control unit 716, respectively, coupled with the resource cradle 700. Figure 7E shows a display-only device 708, a wireless transmission module 720, a remote control stylus 724, and an auxiliary function module 728 all coupled with the resource cradle. It will be appreciated that one resource cradle can provide multiple couplings to accommodate various devices in use in the system previously described.

The resource cradle 700 provides a variety of functions to the devices it serves. Certainly, power supplies of the devices can be recharged by the cradle 700, just as the cradle 700 can be a conduit to another computer to synchronize the device with that other computer. In addition to these expected functions, however, the resource cradle 700 also provides additional functions to the devices with which it is coupled. The resource cradle 700 can provide function to the devices without using a personal computer. The resource cradle 700 can provide a storage device (not shown) for backing up content stored on the handheld device, or for storing interchangeable content that a user can request be offloaded from the handheld device to storage, or downloaded from storage to the handheld device. As previously discussed, in the case of handheld devices with detachable display and keypad/control units, those devices have their own control logic, thus each can operate with a resource cradle 700 to exchange content. In addition, the resource cradle 700 can provide a network interface, a microphone and/or speakers for audio or telephony applications.

Turning to the more specific depictions of embodiments of the invention, Figure 8 is a front side view of a finger held hardware device(s) 8 constructed in accordance with the invention. At least one type of finger held hardware device 8 can be

designed, configured, manufactured, and sold to be utilized in providing, inputting, sending, receiving, interacting, storing all types of content, communications with any and all content, data, and information from internal means and methods, and/or from external means, and/or methods. Services can include at least one type of carrier, and/or network provider to/by/from at least one type of finger held hardware device(s) 8 with any and all content that is provided from the network(s) provider(s).

At least one type of finger held hardware device 8 can interact, receive, save, store, erase, exchange, or trade all types of content. At least one type of finger held hardware device 8 can turn ON / OFF 10 by physical means, at anytime, and/or can also be facilitated by various other means which do not require, and/or utilize at least one type of physical interface. At least one type of finger held hardware device 8 has the capability to turn ON / OFF 10 by itself, from off, sleep mode, wake mode when the user(s) receives any types of content, picks up at least one type of finger held hardware device 8, and/or becomes available based on ones location. At least one type of finger held hardware device 8 has the ability to turn OFF by itself, such as to save power resources or other purposes, and/or if the user does not engage any new content after a predetermined period of time, that is established by the user within the User Preferences of at least one type of finger held hardware device 8, and/or by setting up User Preferences from/by at least one type of carrier, and/or network provider, and/or user at the device level (hardware, software, middleware), and/or network level by many methodologies, protocols, platforms, configurations, and alike. At least one type of finger held hardware device 8 can also be designed and configured to automatically turn ON when a user connects, attaches, or come in contact with the device; such as slipping a portion of the finger held hardware device 8, such as a strap(s) 2 on to the users finger, thumb or other methodologies that determine the users presence or desire to turn ON the hardware device. The same can hold true when a user wishes to turn OFF their hardware device, by removing a finger, thumb or other methodologies that determines the users desire to turn OFF the hardware device.

At least one User can establish in the User Preferences of at least one type of finger held hardware device 8 what type(s) of content that the user wishes to receive/block

out, allowing content in pre-identified categories to be sent to/from at least one type of finger held hardware device 8, as well as blocking any and all other types of content that the user does not wish to receive, or be informed about. At least one User can save, store, view, exchange, recall, trade, delete and alike all types of content from/to/with at least one
5 type of finger held hardware device 8 internally, externally, removable media, and/or from/at/to at least one type of local and/or remote network. At least one type of content can be saved locally inside and/or outside of at least one type of finger held hardware device 8, and/or remotely that has been provided by at least one type of carrier, and/or network provider. If the user selected to save at least one type of content locally, the content could
10 be saved internally, externally, and/or be saved onto at least one type of removable media or storage means 5. At least one type of antenna could be built into/out of the side frame of at least one type of finger held hardware device 8 on the 7, 8, and 9 number area, or other areas as determined by a manufacturer, distributor, dealer, carrier, provider, and/or user. At least one purpose for the antenna is to improve the signal strength, and coverage area to
15 reduce to the furthest extent hot spots, dropouts, signal coverage stability, and/or disconnections while at least one user is operating at least one type of finger held hardware device 8.

At least one type of internal/external antenna can have the ability/capability in the hardware design, and/or software, and/or as provided by a middleware architecture to
20 provide and/or enable at least one user, carrier, provider or alike to control the signal variation strength for/from/to at least one finger held hardware device 8 based on signal strength variations, whereby at least one finger held hardware device 8 can automatically, and/or manually be adjustable to enhance signal strength at times when signal strength is not at an optimum level, and/or at times when signal strength easily attained at an optimum
25 level. In such cases, power resources, software applications, system architecture protocol, frequency variations and/or fluctuations can be utilized to maintain optimum operating environment, and can save power resources, maintain primary frequency utilization, and/or a multitude of other variations for achieving one in the same.

At least one type of finger held hardware device 8 may have the ability and expandability for at least one user to facilitate its interaction requests with At least one type of finger held hardware device 8 from at least one type of remote control device 12. At least one type of remote control device 12 can have at least one type of button, viewable screen, and the ability to be incorporated into any type of finger held hardware device 8 and have the ability to become detached. A front view 12 (a) for at least one type of remote control device 12 could be designed as illustrated, as well as the back view 12 (b) for at least one type of remote control device 12. At least one type of remote control device 12 can be designed to operate directly with at least one type of finger held hardware device 8, and/or any other type of hardware device(s), including but not limited to any type of data, information and networking communications from paging, cellular phone, wireless phone, computer devices, and/or desktop devices to name a few.

Interaction by/with/thru at least one type of remote control device 12 can provide the same or different capabilities as a manufacturer, carrier, provider, or user selects from at least one type of physical button(s) 3, 10, & 11 and can include basic navigation, to more complex functions, along with interacting with user preference settings, selection and decision of saving, deleting, recalling, viewing, exchanging, trading, any pre-stored content, stopping transmission of any type of content, selection of other categories, dialing phone numbers, sending and receiving email, text messaging services, stock ticker information, and other professional services, and/or subcategories including but not limited to phone, calendar, VP Collect, VP Gallery, email or message center, keyboard, scrolling, software categories, general section, plug-in, expansion slot, duel or split spectrum capabilities, and features.

At least one type of finger held hardware device 8 can enable at least one user with at least one type of viewable screen area 6, 7, and 9 area to review, interact, and/or interface with any and all types of virtual content. The upper part of the viewable screen area 7 may be utilized to either be a single screen design, duel screen, and/or split screen, that allows at least one type of content can be provided to the viewable screen area 9 portion, (in this example audio/visual content), while other types of content can be

provided to the viewable screen area 7 portion, (in this example text based data and information) content. By utilizing more than one viewable screen area 6, 7, and 9 for at least one purpose, at least one type of user can actively be doing one thing (in say viewable screen area 9), while data, content, information, text messaging, email and other forms of interaction can be active (say on viewable screen area 7). In this way, at least one user is able to multi-task and is able to get more things done. At least one type of finger held hardware device 8 can also provide unlimited number of other types of content, entertainment, and information such as; playing electronic games of all types, styles, and formats, digital content, music, camera, video, professional services, information content, location means, network access means, and all types of content and services that can be provided to a user(s). These different types of content can either be connected and related, and/or separate in purpose than the other. At least one type of content can be configured and/or provided as continued information, and/or from time to time in portions, pieces, segments, and alike.

At least one type of speaker and microphone can be incorporated and/or provided on any portion of a finger held hardware device 8 principally to provide sound capabilities, but can also include voice recognition capabilities thru a speaker/microphone/video camera or other. At least one type of LED and/or lighting up of at least one type of button images 3, 10, and 11 assist the user at night and dark lit locations, including at least one portion of the viewable screen area 6, 7, and 9. At least one type of LED feature could be utilized to inform the user of current power resource levels, incoming/outgoing signal strength level, an incoming call, an incoming text message, a certain time reminder event based on a software application scheduler that utilizes time as part of, or in addition to a scheduler, how long another party has been on hold on another line, as well as if the finger held hardware device 8 is ON, in sleep mode, or OFF, whether the network card device, smart card device, headphone jack and/or wired data connection capabilities 4 and/or removable media 5 is properly or improperly connected, and/or ON/OFF, whether functioning properly, and much more.

At least one type of finger held hardware device 8 can come with gel pad capabilities 13. At least one type of gel pad 13 could be located anywhere on at least one type of device, and could be utilized for unlimited purposes. At least one type of gel pad 13 design, configuration, or alike can come as part of at least one type of device, hardware device, accessory device, media device, or all other types of physical objects. At least one type of gel pad 13 can be incorporated as part of, in addition to, or other at the factory level, as an aftermarket piece from a third party provider, wholesaler, distributor, dealer, distribution organization, as a consumer any type of object. Some examples of functions and features can include; at least one type of material that can make it easier for at least one type of user to utilize and interact with a device, to reduce physical user interaction from slipping around, to protect at least one type of device from the elements, weather, use, the impact and shock from dropping at least one type of device, for holding, connecting, engaging one device and/or portion of at least one type of device with another type of device, including accessories, upgrades, and the like.

At least one type of microphone 14 can equally be incorporated, or in addition to at least one type of finger held hardware device 8 design. At least one type of finger held hardware device 8 can be converted and/or utilized for a multitude of other purposes including; a digital camera, video camera, wireless phone, cellular phone, text messaging, a pager, walki-talkie, trunk radio, PDA, music player, game player, CD player, DVD player, desktop computer, laptop computer, notepad device, as well as a host of other types of hardware device capabilities. At least one type of finger held hardware device 8 can have at least one type of headphone jack and/or wired data connection capabilities 4 on the side for users to use headphone capabilities, wired and/or wireless data transfer to name a few.

At least one type of volume control can be provided on the outside/inside of at least one type of finger held hardware device 8 and/or accessory device such as a network card, remote control unit, or other type of device that would allow at least one user to utilize such features locally, and/or remotely, and/or can be provided to a user as part of,

or in addition to at least one type of network card, smart card, remote control device 12, and/or removable media item.

At least one type of remote control device 12 can be designed at the factory level to perform at least one function, and/or be of any number of buttons, any size, any style, any design, any form, any format, any color, any shape, any material, and/or a
5 plethora of variations that has any type of image, name, or reference on any such remote control device 12. At least one type of carrier, provider, device, and/or user can configure any numerable variations for at least one button. At least one type of strap(s) 2 can be part of, and/or in addition to at least one type of finger held hardware device 8 design enabling
10 at least one type of user to have at least one means for holding, connecting, or being engaged with at least one type of finger held hardware device 8. At least one type of configuration for at least one button, but in particular for the design utilized in Figure 8, the middle buttons 3 can be utilized to provide at least one user with up, down, left, and right scrolling, navigation, directory, sub-directory, and other command sets that the
15 manufacturer, distributor, dealer, retailer, carrier, and/or provider user chooses/configures for these buttons from at least one type of hardware, software and/or middleware interface. At least one type of configuration for the middle buttons 3 can enable at least one user to play any type of game, and/or communication on the finger held hardware device 8.

At least one type of physical ON / OFF button 10 can be designed and
20 utilized to override a sleep mode configuration, as well as a wake mode configuration that may come as standard, or is offered as a feature by at least one type of network provider or carrier, or established by at least one type of user and can be established as a default setting in the finger held hardware device 8. If at least one type of user wishes, they may actively change settings, and/or override the defaulted features at any time.

25 If/when at least one type of finger held hardware device 8 is in sleep mode, a finger held hardware device 8 can automatically wake up by itself by unlimited means, including but not limited to various types of content and/or data and information triggering (actively, and passively) be provided to the user – waking up the finger held hardware device 8 to allow the user to interact with the related content. If after a certain period of

time, the user has not interacted with the finger held hardware device 8, and/or no new forms of communication, and/or content is not being provided to the finger held hardware device 8, the finger held hardware device 8 can automatically go into sleep mode to conserve power resources. At least one type of manufacturer, distributor, dealer, carrier, provider, and/or user can configure the finger held hardware device 8 so that when both sleep mode, and wake mode are commenced, the finger held hardware device 8 can provide the user with at least one type of [audio], [visual], [motion or vibration], or other means. There are multiple ways, means, and methods for at least one type of user to hold/attach/connect 2 the finger held hardware device 8 principally with at least one finger, thumb, or secondarily another part/portion of the body, or object near the body, such as clothing, a strap, a belt, necklace, or other unlimited methods on at least one hand based on any type of design, style, configuration, material, approach, methodology, reasoning, purpose, including at least one part, piece, component, unit, extension, accessory or alike, rather than a persons hand, wrist, forearm, arm, waist, leg, hip, head, neck, or other parts of the body.

At least one preferred method and style can be utilized for holding, hanging, carrying, and/or attaching at least one type and/or portion of at least one type of finger held hardware device 8. The primary purpose of demonstrating at least one method of achieving this objective, as provided in the illustration in Figure 8, at least one user can hold/attach/connect or engage 2 with at least one finger, thumb, or other portions of the body, and/or other devices or means that would allow at least one user to bring, carry, hold, or have, bring or carry at least one type of finger held hardware device 8 and/or any other type of hardware device, network card device, media device, and/or other such types of hardware devices. At least one type of button such as those found in Figure 8 located on this illustration and number as buttons 3, 10, & 11 can be designed at the factory level to be of any number of buttons, any size, any style, any design, any form, any format, any color, any shape, any material, and/or a plethora of variations that has any type of image, name, or reference on any such buttons 3, 10, & 11.

Figure 9 is a front side view of a finger held hardware device(s) constructed in accordance with the invention. At least one type of finger held hardware device 208 or expansion capabilities 201 device such as network, data and information, removable media, games, network carrier and/or provider, or accessory device to name a few. Inversely, these same functions and features can be built into and comprised of within any type of finger held hardware device 208. At least one type of carrier, and/or provider can operate and/or provide such services on at least one type of spread spectrum, split spectrum, and/or multiple spectrum, from RF, IR, lightwave, and much more. Currently, all forms of wireless hardware communications devices; from cellular mobile phones, pagers, personal digital assistants, and more are manufactured to operate only on one frequency, spectrum, or carrier network. However, at least one type of finger held hardware device 208 or expansion capabilities 201 device can be designed and configured that will allow at least one user, network, carrier, provider or other party to select, modify, change, adjust, or by means that will allow it to work, operate, communicate with, utilize more than one frequency, spectrum, protocol, architecture, network, carrier, provider, or other services. The preferred method for modifying current settings are based on embedded software, graphic utility interface, button based, voice recognition interface platform. By contrast, multiple IC designs, chip and/or chip sets can be utilized in a particular design. Other methods, structures, protocols, methodologies, platforms, and configurations can be utilized for achieving one in the same result. This feature is significant when a user travels to other towns, cities, states, and countries whereby a local carrier, and/or network provider(s) content on at least one type of spectrum from the local carrier, and/or network provider(s) defaulted network connection configuration. With this type of expansion capabilities 201 design feature, more than one network or service provider can be offered to the user.

At least one type of expansion capabilities 201 can allow and/or enable signal strength by/to/from/between any type of portable terminal hardware device and any local and/or remote location, network, carrier, provider, or frequency spectrum to fluctuate based on signal strength requirements by increasing, and/or decreasing power resources or

other methods and techniques that would enhance signal strength during or at times when any type of device is in or is about to enter into an area or commonly referred to as a hot spot, and inversely reducing power requirements and power usage or resources when any type of hardware device is in an area that provides optimum signal strength, thus reducing power usage and/or resources. This can be achieved by hardware, firmware or middleware, and/or software design at the hardware device level, and/or from a local and/or remote network, carrier, provider, and/or operator level.

At least one type of remote control device 207 can be designed with and/or to perform at least one type of feature to the user, either directly by and/or between at least one type of finger held hardware device 208, or other type(s) of hardware device or accessory device, or directly by, to, and/or thru any other type of device, network, carrier, or provider platform, architecture, protocol, spectrum, configuration, design, and/or other variations thereof. For the primary purpose of demonstrating at least one method of achieving this objective, as provided in the illustration in Figure 9, at least one user can utilize the point 206 of at least one type of remote control device as an expandable and/or retractable antenna, as a pointing device, and/or as a stylus to name a few. At least one type of physical button 202 could be utilized and incorporated into the design of a remote control device 207.

At least one type of removable media 205 could be utilized and incorporated into the design of a remote control device 207. At least one type of headphone jack and/or wired data connection capabilities 204 could be utilized and incorporated into the design of a remote control device 207. At least one type of scrolling button 203 features could be utilized and incorporated into the design of a remote control device 207 that would allow and/or provide the user to facilitate such things as quickly and remotely recalling, sending, retrieving data and information, such as text messaging or paging services from/by/to/from a network, a carrier, or provider, and/or by and between at least one type of finger held hardware device 208, and/or any other type of hardware device, accessory, network card, removable media, and/or other configuration. At least one advantage to such a feature would be for at least one user to quickly check and/or look up any type of data and/or

information without having to turn on any type of hardware device like a cellular mobile phone, PDA, pager unit, digital camera, stock quotes, music, or other, including a finger held hardware device 208 without actually having to physically interface directly turn ON a device to send, receive, look up, retrieve, store, recall, file, delete, exchange, trade, give, or other forms with at least one type of data and information.

At least one type of viewable screen area 209 could be utilized and incorporated into the design of a remote control device 207 to provide to the user at least one form of data and information such as numeric paging, alpha numeric paging, text messaging services of any type, and/or other types of services.

Figure 10 purpose is to show at least one possible design and/or configuration for what could possibly be the front side view of at least one type of finger held hardware device 308 constructed in accordance with the invention. At least one type of finger held hardware device 308 could be designed to have at least one type of monochrome viewable area design 306, 307, 308, 309. At least one type of monochrome viewable area design 306, 307, 309 design could primarily be used for paging, instant text messaging, stock ticker information, text messaging service of any type, and other text based services from at least one carrier, and/or network service provider. At least one type of finger held hardware device 308 could be utilized for all types of data and communications with any and all types of content, data, and information as provided at least one carrier, provider, or product – such as a game, software program, or other.

At least one type of finger held hardware device 308, although providing a means for at least one type of user to physically turn ON/OFF 310 the device can be incorporated into a design, the finger held hardware device 308 itself upon the user entering a physical location can automatically wake up and engage in providing any and all related type(s), style(s), format(s) of content to the user, based on the user, carrier, network provider, or other parties user preferences. At least one type of finger held hardware device 308 can have the ability to turn OFF by itself as well, to save power resources or other purposes, if the user does not engage any new content after a pre-determined period of time, in which the predetermined period of time can be established by at least one party. At least

one party can establish in the user preferences what type(s) of content that the user is allowed, wishes to receive, only enabling content in pre-identified categories to be sent/received, as well as blocking any and all other types of content that the user does not wish to receive, or is allowed to receive. At least one party (carrier, provider, and/or user) can be given the ability to save, store, view, exchange, recall, trade, delete and alike all authorized content that is provided to at least one users hardware device by actively facilitating these requests themselves on an active or passive basis. Content can be saved at the location that has been pre-selected by the carrier, provider, and/or user, whether it be at the hardware device location, locally, and/or remotely, and whether it be internally, externally, and/or removable. At least one carrier, provider, and/or user may elect to save content locally, and can utilize any type of removable media storage 305. At least one type of antenna can be built into at least one type of designed finger held hardware device 308. At least one purpose of the antenna is to improve the signal strength, and coverage area to reduce to the furthest extent hot spots, dropouts, and disconnections while the user is operating the finger held hardware device 308. At least one type of finger held hardware device 308 design can also provide unlimited number of other types of content, entertainment, and information such as; playing electronic games of all types, styles, and formats, digital content, music, media and entertainment, camera features, video, professional services, information content, location means, network access means, and all types of content and services that can be provided to a user(s). At least one type of user has the ability to save content on a local and/or remote network.

At least one type of finger held hardware device 308 can have the ability and expandability for the users to facilitate its interaction requests with the finger held hardware device 308 from a remote control unit as well. Interaction can include basic navigation, interacting with user preference settings, selection and decision of saving, deleting, recalling, viewing, exchanging, trading, any pre-stored content, stopping transmission of any type of content, selection of other categories, and/or subcategories including but not limited to phone, calendar, VP Collect, image Gallery, email, text messaging, message

center, keyboard, scrolling, software categories, general section, plug-in, expansion slot, duel or split spectrum capabilities, and features.

At least one type of finger held hardware device 308 can have the ability to provide at least one user a viewable screen area 306, 307, and 309 area to view any and all
5 content. The viewable screen area 307 could be utilized as a single screen design, or as a duel or multiple screen design, so that different forms of content can be provided to different portions of the viewable screen area 307.

One example can include stock ticker information being provided to the user in viewable screen area 309 while other types of content, such as text messaging
10 information is being provided to the screen in viewable screen area 306, while the user is interacting with any type of data and information in the middle viewable screen area 307. In this way, the user is able to multi-task several things at the same time. These different types of content can either be connected and related, or separate in purpose, function, information, and design. The user, carrier, and/or provider can also move, change, and/or
15 modify various types of content to other locations on the viewable screen area 307 at any time.

At least one type of speaker and/or microphone can be incorporated into the design of the finger held hardware device 308 to provide all types of sound capabilities. Figure 10 illustration has the speaker located on the backside of the finger held hardware
20 device 308. At least one type of LED and/or lighting up of at least one type of button 303, 310, and 311 to assist the user at night and dark lit locations. The LED features can be utilized to inform the user power resource levels, as well as if the finger held hardware device 308 is ON, in sleep mode, or OFF.

At least one type of finger held hardware device 308 can be converted and
25 utilized as a digital camera, video camera, wireless phone, cellular mobile phone, pager, PDA, music player, CD player, DVD player, video camera, game player, as well as a host of other hardware device capabilities. At least one type of finger held hardware device 308 can be designed to incorporate any type of wired connection and/or headphone jack 304. At

least one type of physical or non-physical volume control can also be configured into the design of finger held hardware device 308 for user convenience.

At least one type of strap(s) 302 can be incorporated into the design of a finger held hardware device 308 used for the user to hold, hang, attach, connect with a
5 finger held hardware device 308, or as an accessory to any such device, or accessory.

Middle buttons 303 can be configured and utilized for up, down, left, and right scrolling, navigation, directory, sub-directory, and other command sets that the manufacturer, carrier, provider, and/or user can configure chooses for these buttons. These middle buttons 303 can allow user a user to play all types of games on the finger held
10 hardware device 308. At least one type of physical ON / OFF button 10 can be utilized to override sleep mode, and wake mode features that are set as defaulted on a finger held hardware device 308. If a user wishes, they can actively change these settings, and/or override the defaulted features at any time. When the finger held hardware device 308 is in
15 sleep mode, the finger held hardware device 308 can automatically wake up by itself when a user physically moves around a building, town, city, state, or country, whereby all types of content will (actively, and passively) be provided to the user – waking up the finger held hardware device 308 to allow the user to interact with the related content. If after a certain period of time, the user has not interacted with the finger held hardware device 308, and/or no new content is being provided to the finger held hardware device 308, the finger held
20 hardware device 308 may automatically go into sleep mode to conserve power resources. The user can configure the finger held hardware device 308 so that when both sleep mode, and wake mode are commenced, the finger held hardware device 308 can provide the user with at least one type of [audible], [visual], [motion or vibration], or other means of notification.

25 Figure 11 is a front side view of a finger held hardware device 401 constructed in accordance with the invention. The monochrome finger held hardware device 401 has expansion capabilities 402 to provide to the user at least one type of carrier, network, or provider services. This feature is significant when a user travels to other towns, cities, states, and countries whereby the network provider(s) content is on a different

spectrum, or dual/split spectrum from the units defaulted network connection configuration. With such expansion capabilities 402 design feature more than one network or service provider can be offered. The purpose of the illustration in Figure 11 is to show what expansion capabilities 403 looks like when connected to at least one type of finger held hardware device 401.

Figure 12 is a front side view of a finger held hardware device 501, 502, and 503 constructed in accordance with the invention. The purpose of illustration Figure 12 is to show that at least one type of finger held hardware device 501, 502, 503 can be separated, and/or the user is able to detach at least one portion of a finger held hardware device 501, 502, 503 from another portion of a finger held hardware device 501, 502, 503 design. For the purposes of illustration, the viewable screen portion 501 of a finger held hardware device 501, 502, 503 can be removed, separated, taken away from another portion of a finger held hardware device 501, 502, 503, such as the finger held navigation buttons 502 portion of the device.

This enables at least one user to remove the viewable screen portion 501 and place, connect, interact a different viewable screen; such as a larger one, a different viewable screen with a different embedded software and system that provides characterizes or features to at least one users viewable screen apparatus to the device. At least one type of user can now send, give, trade, exchange, the viewable screen portion 501 with at least one other user.

At least one type of viewable screen portion 501 can be designed with at least one type of electromechanical technologies, circuit board design, IC design, CPU, processor, chip or chip set, sound and/or graphics capabilities, memory, hard drive and/or data storage capabilities, power resources, OS, software, middleware, any type of ports, as well as any and all other components that would allow the viewable screen portion 501 to provide any and all of the same functions as any type of other device, including but not limited to a desktop computer, laptop, notepad, PDA, cellular phone, telephone, pager, music player, camera, video device, data storage device, scanning device, reading device, and all other types of devices.

Any type of viewable screen portion 501 has the capability to provide to at least one user, any and all types of functions and features as any type of hardware device stated hereto in this patent documentation. In one particular design, the viewable screen portion 501 can be detached from the navigation button 502 portion of the original finger held hardware device 501, 502, 503, and/or other portions of a hardware device, and given to at least one other user, and for the receiving user to be able to turn ON and utilize the viewable screen portion 501 as an entire fully functioning hardware device, without requiring connection with any other type of physical hardware device, or apparatus. The same full range of services can be provided to the receiving user as with the original user.

10 Any and all types of data, information, inputting/outputting, data - viewing, storing, recalling, filing, modifying, utilization of all types of content such as; music, video, games, and photos, text based data, and all types of communications can be provided on just the viewable screen portion 501.

At least one type of finger held hardware device 501, 502, 503 can utilize at least one type of removable navigation button 502 configuration and/or apparatus to interact with at least one type of hardware device, or accessory device.

At least one type of user can utilize, send, give, trade, exchange, connect, interact, interface, and alike with navigation button 502 with at least one other user. At least one type of navigation button 502 can be designed with at least one type of electromechanical technologies, circuit board design, IC design, CPU, processor, chip or chip set, sound and/or graphics capabilities, memory, hard drive and/or data storage capabilities, power resources, OS, software, middleware, any type of ports, as well as any and all other components that would allow the viewable screen portion 501 to provide any and all of the same functions as any type of other device, including but not limited to a desktop computer, laptop, notepad, PDA, cellular phone, telephone, pager, music player, camera, video device, data storage device, scanning device, reading device, and all other types of devices.

At least one type of strap(s) 302 can be incorporated into the design of a navigation button 502 for the user to hold, hang, attach, connect with navigation button 502, and/or as an accessory to any such device, or accessory.

Any type of navigation button 502 has the capability to provide to at least one user, any and all types of functions and features as any type of hardware device stated hereto in this patent documentation. In one particular design, the navigation button 502 can be detached from the viewable screen portion 501 portion of the original finger held hardware device 501, 502, 503, and/or other portions of a hardware device, and given to at least one other user, and for the receiving user to be able to turn ON and utilize the navigation button 502 as an entire fully functioning hardware device, without requiring connection with any other type of physical hardware device, or apparatus. The same full range of services can be provided to the receiving user as with the original user. Any and all types of data, information, inputting/outputting, data - viewing, storing, recalling, filing, modifying, utilization of all types of content such as; music, video, games, and photos, text based data, and all types of communications can be provided on just the navigation button 502.

Figure 13 is a front side view of a finger held hardware device 601, 602 constructed in accordance with the invention. The purpose of illustration in Figure 13 is to illustrate or demonstrate that at least one type of viewable screen area 601, and/or navigation button 602 apparatus can be designed, configured, and made to include at least one type of capability that will provide to a user at least one type or form of removable medium 604, and 606, as well as wired data connection and/or headphone capabilities 605, and 607. One particular design and configuration for a viewable screen area 601 can also have the capability to provide the user with at least one type or form of network, carrier, and/or provider 603 means. Navigation button 602 can also be designed and configured to also have the capability to provide the user with at least one type or form of network, carrier, and/or provider 603 means. At least one type of navigation button 602 can also include a viewable screen area as part of its primary design, so that in such cases when at

least one user were to remove a primary viewable screen area 601, the navigation button 602 can still retain a viewable content area.

Figure 14 is a front side view of another modified, configured, and designed finger held hardware device(s) 708 and also shows a persons hand 701 for the express purpose of providing additional sample variations that can be constructed in accordance with the invention. This particular finger held hardware device 708 can equally be utilized in providing, inputting, sending, receiving, interacting, storing all types of content, communications with any and all content, data, and information from internal means and methods, and/or from external means, and/or methods. Services can include network(s) provider(s) medium 712 to any type of configured finger held hardware device(s)708 with any and all content that is provided from the network(s) provider(s). The finger held hardware device 708 can interact, receive, save, store, erase, exchange, or trade all types of content. User(s) finger held hardware device 708 can turn ON / OFF 710 physically at anytime.

At least one type of finger held hardware device 708 has the capability to turn ON and OFF by itself, from sleep mode, to wake mode when the user(s) receives any types of content. At least one type of finger held hardware device 708 has the ability to turn OFF by itself as well, to save power resources or other purposes, if the user does not engage any new content after a predetermined period of time, that is established by the user within the user preferences of the finger held hardware device 708, and/or by setting up user preferences by the network provider, and/or user at the network level by many methods. Users can establish in the user preferences of the finger held hardware device 708 what type(s) of content that the user wishes to interact with, allowing content in pre-identified categories to be sent to the users finger held hardware device708, as well as blocking, limiting, filtering, and/or restricting any and all other types of content that the user does not wish to receive directly, or to be sent to a remote location where the user is able to access by wired, wireless, and/or combinations thereof, such data and information at a later point in time.

At least one user can save, store, view, communicate, exchange, recall, trade, delete and alike all types of content that the finger held hardware device 708 offers to the user(s). Content can be saved locally inside and/or outside of the finger held hardware device 708, and/or remotely that has been provided by at least one carrier, and/or network provider(s). If the user selected to save content locally, the content could be saved internally, externally, and/or be saved onto removable media storage means 705. At least one type of wired connection and/or headphone jack 704 can be utilized with the finger held hardware device 708. At least one type of antenna can be built as part of or in addition to the finger held hardware device 708. The primary purpose of the antenna is to improve the signal strength, and coverage area to reduce to the furthest extent hot spots, dropouts, and disconnections while the user is operating the finger held hardware device 708.

At least one type of finger held hardware devices 708 may have the ability and expandability for the users to facilitate its interaction requests with the finger held hardware device 708 from a remote control unit as well. Interaction buttons 703, 710, & 711 can include basic navigation, interacting with user preference settings, selection and decision of saving, deleting, recalling, viewing, exchanging, trading, any pre-stored content, stopping transmission of any type of content, selection of other categories, dialing phone numbers, sending and receiving email, instant messaging services, stock ticker information, and other professional services, and/or subcategories including but not limited to phone, calendar, VP Collect, VP Gallery, email or message center, keyboard, scrolling, software categories, general section, plug-in, expansion slot, dual or split spectrum capabilities, and features.

At least one type of finger held hardware device 708 can have the ability to provide at least one user a viewable screen area 706, 707, and 709 area to view any and all content. The viewable screen area 707 could be utilized as a single screen design, or as a dual or multiple screen design, so that different forms of content can be provided to different portions of the viewable screen area 707. One example can include stock ticker information being provided to the user in viewable screen area 709 while other types of content, such as text messaging information is being provided to the screen in viewable

screen area 706, while the user is interacting with any type of data and information in the middle viewable screen area 707. In this way, the user is able to multi-task several things at the same time. These different types of content can either be connected and related, or separate in purpose, function, information, and design. The user, carrier, and/or provider
5 can also move, change, and/or modify various types of content to other locations on the viewable screen area 707 at any time.

At least one type of finger held hardware device 708 can also provide an unlimited number of other types of content, entertainment, and information such as; playing electronic games of all types, styles, and formats, digital content, music, camera features,
10 video features, professional services, information content, location means, network access means, and all types of content and services that can be provided to a user(s).

These different types of content can either be connected and related, or separate in purpose than the primary intended data and/or information. At least one type of speaker can be part of, or in addition to at least one type of finger held hardware device 708
15 design. At least one type of LED 713 and/or lighting up of at least one button 703, 710, and 711 can be utilized to assist the user at night and dark lit locations, or as a form of notification. These forms of notification can be part of the carrier, or provider network services, and/or can be configured by a user by various types of hardware and/or software configurations either directly on the finger held hardware device 708, and/or remotely by a
20 multitude of other avenues. At least one LED 713 feature can be utilized to inform the user about power resource level, as well as if the finger held hardware device 708 is ON, in sleep mode, OFF, as well as incoming data, communications, and information, or pending outgoing data, communications, and information, including file size, download, upload, and/or data transfer timeframe. At least one type of microphone can equally be incorporated
25 into the finger held hardware device 708.

At least one type of finger held hardware device 708 might have the capability to be converted and utilized as a digital camera, video camera, wireless phone, cellular mobile phone, pager, PDA, music player, CD player, DVD player, as well as a host of other hardware device capabilities. At least one type of finger held hardware device 708

can be designed with a headphone jack and/or wired data and communications plug in 704 on the device that can allow a user the ability to utilize any type of headphone, as well as wired data transfer capabilities. At least one type of volume control for the control of sound levels can also be made available internally, externally, and/or combinations thereof as part of, or in addition to a finger held hardware device 708 for user convenience.

At least one type of configurable strap 702 can be designed as part of, and/or in addition to a finger held hardware device 708. Such a feature can primarily be utilized by the user to hold onto the finger held hardware device 708 from at least one finger, and/or thumb of a users hand 701 and/or other portion of the user body, clothing, belt, or alike, and/or other means of attaching or allowing the user to bring the finger held hardware device 708 with them.

The bottom right buttons 703 in Figure 14 can be utilized for navigation, for up, down, left, and right, scrolling, directory, sub-directory, data inputs and outputs, and other command sets that the manufacturer, carrier, service provider, and/or user decides to offer, is made available, and/or selects from user preferences for operating the finger held hardware device 708, and/or other interrelated devices that can be wired, and/or wireless, such as a network card, smart card, removable media, scanning, pointing, or reading device, memory device, camera device, video device, and music device to name a few. The bottom right buttons 703 can also be utilized to allow at least one user to play all types of games on the finger held hardware device 708. Besides typical physical game cartridges, other methods can be achieved by downloading the software game by various wired and/or wireless means to an internal, and/or external data storage location that does not require and/or utilize a removable media commonly utilized within the hand held game market.

At least one type of ON / OFF button 710 can override the sleep mode, and wake mode features that are set as defaulted in the finger held hardware device 708. If the manufacturer, carrier, service provider, and/or user wishes, any can passively and/or actively change these settings, and/or override the defaulted features at any time.

If a finger held hardware device 708 is in sleep mode, the finger held hardware device 708 can automatically wake up by itself when a user physically moves

around a building, town, city, state, or country, whereby all types of content will (actively, and passively) be provided to the user – waking up the finger held hardware device 708 and allow the user to interact with the related content. If after a certain period of time, the user has not interacted with the finger held hardware device 708, and/or no new content is being
5 provided to the finger held hardware device 708, the finger held hardware device 708, the carrier, service provider, and/or finger held hardware device 708 can automatically go into sleep mode to conserve power resources. The user can configure the finger held hardware device 708 so that when both sleep mode, and wake mode are commenced, the finger held hardware device 708 can provide the user with a [audio], [visual], [motion or vibration], or
10 other means.

There are a plethora of ways, means, and methods for a user to hold onto the finger held hardware device 708 by use of the users fingers, thumb, or other means other than the entire hand. The preferred styles, as provided in the illustration, slides onto the to pointing finger of a users hand 701 at the lowest extension of the pointing finger by at least
15 one type of configurable strap 702, and could possibly also have a second on the extension of the pointing finger section of an adjustable, flexible, and configurable strap 702 to provide balance to the user while utilizing the device(s). A strap 702, can be made of any type of material(s), combination of materials, of any size, shape, color, whether fixed, or flexible by design or function, or variations thereof achieving one in the same in whole
20 and/or in part.

At least one type of physical navigation button 703, 710, & 711 can be designed at the factory level, and/or added by aftermarket products offered to a user that would be comprised of any number of buttons, any size, style, design, form, format, color, shape, that has any type of image, name, or reference on any such buttons 703, 710, & 711.

25 Likewise, these physical navigation and interaction buttons can be non-physical by design, function, and nature, and can be configurable in a plethora of platforms, configurations, protocols, and architectures utilizing various means of achieving one in the same by at least one carrier, service provider, and/or user.

Figure 15 is a front, left and right side view of another modified, configured, and designed viewable screen device 801 for the express purpose of providing additional sample variations that can be constructed in accordance with the invention. At least one type of viewable screen device 801 and/or any type of physical device can be designed with the following capabilities and features. This particular viewable screen device 801 does not have any physical navigation, or main category buttons, whereby all of these functions and features are provided to the user after the user turns ON 802 the viewable screen device 801. All buttons 804 are non-physical by design and show up in this particular example on the upper portion of the viewable screen device 801. The user can be provided information such as what category or category identification 807 they are utilizing at the moment, as well as date and time 808 information. The viewable screen device 801 can have an antenna apparatus 803 for communications with any type of external device, carrier, network, provider, or alike. At least one type of viewing area 806 can be incorporated into the viewable screen device 801. At least one type of scrolling capability 805 can also be incorporated into the design of the viewable screen device 801. At least one type of removable media 811, headphone jack 812, and/or wired data and communications plug in 813 capabilities can be incorporated into the design. At least one type of port 814 capabilities can be incorporated into the design. A right side view 810 and left side view 809 of at least one type of viewable screen device 801 is provided in this illustration.

Figure 16 is a front side view of another modified, configured, and designed viewable screen device 901 for the express purpose of providing additional sample variations that can be constructed in accordance with the invention. At least one type of viewable screen device 901 and/or any type of physical device can be designed with the following capabilities and features. This particular viewable screen device 901 can be designed with the capability to interact and/or be connected to at least one type of physical navigation button apparatus 902 that connects from the bottom, rather than the prior side portion and/or back of the viewable screen device 901 in prior Figure 8, 9, 10, 11, 12, and 13, which illustrates flexibility in design, and configuration.

At least one user is then able to utilize multiple types, forms, styles, functions, capabilities of button apparatus 902 devices for achieving the same, or different objectives and purposes. Since button apparatus 902 devices can be designed, configured, and made with all the necessary CPU, processor, chip or chip set, memory, hard drive
5 and/or data storage capabilities, software, graphic utility interface, middleware, OS, and even network accessibility, a user can utilize different types of button apparatus 902 devices to perform a specific and/or unique set of functions, or a single button apparatus 902 device to perform any and all user required functions.

Viewable screen device 903 shows what it could look like when one
10 particular design of viewable screen device 901 and button apparatus 902 are connected together.

Figure 16 is a front side, and back side view of another modified, configured, and designed viewable screen device 1006 for the express purpose of providing additional sample variations that can be constructed in accordance with the invention. At
15 least one type of viewable screen device 1006 and/or any type of physical device can be designed with the following capabilities and features. This particular viewable screen device 1006 can be designed with the capability to provide to the user at least one type of gel pad 1001, 1002, 1003, and 1004. At least one type of gel pad can be designed, configure, and applied at the manufacturing level, wholesale, distributor, dealer, user or
20 other as part of the primary viewable screen device 1006 and/or in addition to, as an accessory. A least one type of Gel pad can be applied to the back 1001, front 1003, side 1004, or middle 1001, 1002 of/to any type of device. At least one type of gel pad can include at least one type of logo, marking, icon, name, illustration, or facsimile thereof
25 1002, whether the logo or alike is gel pad based or not. At least one type or speaker/microphone 1005 can be incorporated into the design of a device.

At least one purpose for the gel pad is to provide a means for any type of hardware device not slipping around or slippery in a person's hand, on a counter, or all other forms. The gel pad provides a grip to any surface, object, or alike that is currently not available with any type of hardware device, whether it be a pager, mobile phone, cellular

mobile phone, PDA, CD player, MD player, DVD player, cassette player, camera, video player, data inputting device, portable terminal device, and all other types of devices and apparatuses. At least one other purpose for the gel pad is to provide shock protection or shock reduction in cases where a user were to drop any type of device. At least one other
5 purpose for the gel pad is to reduce the effects of heat from external and/or internal generated.

At least one other purpose for the gel pad is to make it easier for a user to hold onto any type of device. At least one other purpose for the gel pad is so that any type of device does not slide off of a surface that it has been set on; such as a counter top, table,
10 desk, or alike, which are traditionally slick and smooth surfaces.

A Gel pad can be made, comprised, configured, designed, and produced in/of at least one type and/or combination of color, size, shape, substance, material, in any form or format, procedure, technique, methodology, made to last a specified timeframe, smell, be modified from hard to soft, or soft to hard, or anything else.

15 Figure 17 is a front, left side, right side, and back side of another modified, configured, and designed viewable screen device 1101 for the express purpose of providing additional sample variations that can be constructed in accordance with the invention. At least one type of viewable screen device 1101 and/or any type of physical device can be designed with the following capabilities and features.

20 The purpose of Figure 17 is to illustrate and show at least one way of producing a viewable screen device 1101 that does not have any physical buttons at all. The viewable screen device when turned OFF can possibly look like 1101(a), illustrating that there is no external way for at least one user to utilize the viewable screen device without permission. The viewable screen device when turned ON can possibly look like 1101(b),
25 illustrating that only upon at least one user is able to turn ON the device by non-physical means are they able to gain access to navigation buttons 1104, main category 1107 information, date and time 1108 information, scrolling 1105 capabilities, and at least one type of content 1106 area. The left side 1102 and right side 1103 provides at least one possible way of designing, designing such a device.

The above function can be designed, incorporated, configured, made, and/or provided as all other forms of devices, including but not limited to - a camera, video, wireless phone, cellular mobile phone, text messaging device, a pager, walki-talkie, trunk radio, PDA, music player, a reader device, scanner device, cassette player, CD player, DVD
5 player, desktop computer, laptop computer, notepad device, computing device, data inputting device, communications device, data storage device, as well as a host of other types of hardware devices.

Figure 18 are front side views of other modified, configured, and designed viewable screen device 1201 and/or finger held hardware device 1201 for the express
10 purpose of providing additional sample variations that can be constructed in accordance with the invention. At least one type of viewable screen device 1201, finger held hardware device 1201 and/or any type of physical device can be designed with the following capabilities and features. The purpose of Figure 18 is to illustrate and show at some ways, variations, and methods for producing a viewable screen device 1201, finger held hardware
15 device 1201 and/or any type of physical device that does not have any physical buttons at all, but at least one user is able to utilize at least one method to gaining access, whether stated hereto or not.

The first example is by utilizing any type of key 1202 to gain access to any type of device. At least one type of key design or configuration can provide at least one
20 variable to access any type of device.

Another possible method may be utilizing at least one type of fob 1203 as a means to gain access to any type of device. At least one type of fob design or configuration can provide at least one variable, code, authorization technique, data and/or information, protocol, platform, or alike for access any type of device.

25 Another possible method may be utilizing at least one type of CPU (RAM, ROM, EEPROM) 1204, RFID, IRID, or ID as a means to gain access to any type of device. At least one type of CPU or ID design or configuration can provide at least one type of variable, code, authorization technique, unique code or sequence of codes, data and/or information, protocol, platform, or alike for access any type of device.

Another possible method may be utilizing at least one type of cryptic / algorithm 1207 as a means to gain access to any type of device. At least one type of cryptic / algorithm, user name, password, design or configuration can provide at least one variable, code, authorization technique, data and/or information, protocol, platform, or alike for
5 access any type of device.

Another possible method may be utilizing at least one type of voice recognition and/or biometric 1206 as a means to gain access to any type of device. At least one type of voice recognition and/or biometric design or configuration can provide at least one variable, code, authorization technique, data and/or information, protocol, platform, or
10 alike for access any type of device.

The purpose of 1205 in Figure 18 is to illustrate at least one way in which any of the above methods could look like in physical form, if a technique were to require physical interact to authorize, authenticate turning ON the device, and/or maintaining the device in ON mode, or a means of utilizing at least one type of non-physical authorization
15 and/or authentication means near and/or close in proximity to at least one type of device, and/or accessory, or send by local and/or remote network, carrier, and/or provider means.

Any and all types and techniques, whether stated hereto in illustration form or not, can utilize physical, and non-physical means for achieving one in the same effect, whether in whole, and/or part, and/or in combination with at least one other step,
20 procedure, method, configuration, procedure, protocol, algorithm, biometric sensing, scanning, reading, or other technique. At least one of the stated capabilities can be designed, incorporated, configured, made, or provided in all other forms of devices to at least one type of user, including but not limited to - a digital camera, video camera, wireless phone, cellular phone, text messaging device, a pager, walki-talkie, trunk radio, PDA,
25 music player, a reader device, scanner device, cassette player, CD player, DVD player, desktop computer, laptop computer, notepad device, computing device, data inputting device, communications device, data storage device, as well as a host of other types of hardware device capabilities.

Figure 19 is a front, side, and back view of another modified, configured, and designed viewable screen device 1301 for the express purpose of providing additional sample variations that can be constructed in accordance with the invention. At least one type of viewable screen device 1301, and/or any type of physical device can be designed with the following capabilities and features. The purpose of Figure 19 is to illustrate and show some ways, variations, and methods for at least one user to gain access to at least one type of device, and design that does not have any external physical buttons.

The first example is by utilizing any type of RFID techniques to non-physically confirm, authenticate, authorize, and approve at least one user to gain access to any type of device, and turn ON the device. At least one type of key design or configuration can provide at least one variable to access any type of device. For example purposes, the illustration in Figure 19 shows an RFID tag incorporated into say a bracelet or band design 1302, although any type of configurable means is possible that achieves on in the same, and the spirit of the stated invention. The RFID tag can be of any passive, active, or other variation, can include at least one type of antenna or not, at least one type of power source or not, at least one type of cryptic / algorithm, user name, password, design or configuration can provide at least one variable, code, authorization technique, data and/or information, protocol, platform, at least one type of other material, substance, or alike to adhere to, attach to, affix to, or alike.

Inversely, the design can incorporate at least one type of barcode, any other technology, or technique for achieving one in the same objective, and more.

Another possible method could include an apparatus that is comprised of the primary wireless communications protocol, and requirements that are built into a ring device 1303, or even a key chain 1304 device, or any other type of object.

A second possible method for turning ON and/or OFF any type of device, can be based on any type of remote signal on any wireless communications frequency spectrums, protocols, architecture, algorithms, configurations, carrier, provider, and/or platform, where at least one carrier, provider, or user can facilitate, engage, enact, request,

perform, or alike transmit, send, receive any type of signal that would turn ON any type of device.

A third possible method could be provided by at least one user placing a call, keying in any type of numbers, letters, and/or code combinations from any type of
5 wired and/or wireless telephone, mobile cellular phone through any type of carrier and/or provider network, whereby sending a signal, algorithm, cryptic/non-cryptic to turn ON any type of device.

A fourth possible method could be provided by at least one user sending, transmitting, remitting, signaling from any type of pager device, and/or text messaging
10 device, through any type of carrier and/or provider network, whereby sending a signal, algorithm, cryptic/non-cryptic to turn ON any type of device. Any other type of hardware device can be utilized in whole and/or in part, as a single unit, and/or along with any type of networking accessory device, any wired network, and/or wireless network for achieving one in the same result.

At least one type of technique or method can utilize any type of wireless
15 platform, protocol, architecture, configuration, or alike. Any and all types and techniques, whether stated hereto in illustration form or not, and/or in addition hereto, can utilize physical, and non-physical means for achieving one in the same effect, whether in whole, and/or part, and/or in combination with at least one other step, procedure, method,
20 configuration, procedure, protocol, algorithm, biometric sensing, scanning, reading, or other technique.

At least one of the stated capabilities can be designed, incorporated, configured, made, or provided in all other forms of devices to at least one type of user, including but not limited to - a digital camera, video camera, wireless phone, cellular
25 mobile phone, text messaging device, a pager, walki-talkie, trunk radio, PDA, music player, a reader device, a scanner device, cassette player, CD player, DVD player, desktop computer, laptop computer, notepad device, computing device, data inputting device, communications device, data storage device, as well as a host of other types of hardware device capabilities.

Figure 20 is a front side view of another modified, configured, and designed finger held hardware device(s) 1402 and its possible interaction with at least one type of stand device 1401 to provide additional examples of variations that can be constructed in accordance with the invention. At least one type of stand device 1401 can be utilized and
5 incorporated along with, and/or in addition to at least one type of finger held hardware device(s) 1402, or any other type of hardware device, or accessory device of any kind that will allow and/or provide by/thru/to/from a multitude of functions, services, and features to at least one user, carrier, and/or network provider. At least one type of viewable area, keyboard, stylus, touch or voice recognition capabilities, hard drive, memory, or other data
10 storage capabilities can be added to any type of stand device 1401.

In the first aspect, at least one type of stand device 1401 can provide and/or allow at least one user to conveniently place / rest any type of finger held hardware device(s) 1402, a viewable screen portion 1403 of any type of device, a physical button portion 1404, or other button based design 1405 and/or any type of device, or any other
15 configuration, design, style, or design, including network device 1407, remote control type of device 1408, or removable media 1406 capabilities.

Other advantages can include, but are not limited to, providing power resources, data storage or hard drive capabilities, wired and/or wireless data and communications, uploading, downloading, inputting and outputting of all types of data and
20 information, printing capabilities, and any other capabilities that can be found, offered, provided made possible, including but not limited to, by any type of desktop computer device, laptop, notepad, digital camera, video camera, wireless phone, cellular mobile phone, text messaging device, a pager, walki-talkie, trunk radio, PDA, music player, a reader device, a scanner device, cassette player, CD player, DVD player, stereo system,
25 computing device, data inputting/outputting device, communications device, data storage device, as well as a host of other types of hardware device capabilities, including internal, and/or external data storage, and/or removable media means of any type.

Figure 21 is a front side view of another modified, configured, and designed stand device 1501 and its possible interaction with other types of devices, networks,

carriers, providers, and users to provide additional examples of variations that can be constructed in accordance with the invention.

At least one type of stand device 1501 can be designed, configured, assembled, and incorporated and designed with at least one type internal, external, and/or removable type of primary and/or secondary board, IC design, processor, sound and/or graphics capabilities, chip or chip sets, CPU, memory, data storage or hard drive capabilities, power resources, OS, software, middleware, any type of ports, ability to provide any type of viewable screen area, any type of keyboard, stylus, or other forms of data input capabilities, microphone, speakers, as well as any and all other components that would allow the stand device 1501 to provide any and all of the functions as any type of computing device, player device, including but not limited to a desktop computer, laptop, notepad, PDA, cellular phone, scanning device, reading device, telephone, pager, music player, camera, video device, data storage device, and all other types of devices can provide to at least one type of user, as well as any of these types of devices having the ability to utilize at least one type of stand device 1501 design.

At least one type of stand device 1501 can be designed, configured, assembled, and incorporated to at least one type of viewable screen based device 1502. The Stand device 1503 shows a top view of at least one possible design, configuration, or layout, and shows at least one possible apparatus location 1504 that could be designed into any such type of stand device 1501 that would allow direct physical contact to facilitate a multitude of functions for at least one user.

At least one type of stand device 1501 can be designed, configured, assembled, and incorporated to at least one type of antenna 1505, 1512 to assist in any and all types of communication with at least one other type of device, carrier, network, and/or provider.

At least one type of stand device 1501 can be designed, configured, assembled, and incorporated to at least one type of adjustable coverage settings 1506 that can be adjusted, tuned, and modified by physical and/or non-physical means based on the installation location requirements, as well as adjusting for humidity, power resources, and

other external factors that can effect the performance to assist in any and all types of communication with at least one other type of device, carrier, network, and/or provider. At least one type of stand device 1501 may have at least one type of adjustable coverage settings 1506 to control the angel of dispersion, angle scattering, and/or cone shaped dispersion for the signal transmission of a content delivery device(s). At least one type of stand device 1501 may have at least one type of internal external, and/or removable power resources 1507. At least one type of stand device 1501 can perform its communication 1508 functions based on a wired, wireless, and/or combination thereof.

At least one type of stand device 1501 can run on, in, out, thru, by, between, from, to any type of or combination of [wired or wireless] platforms, or networks. At least one type of path, bandwidth allocation, protocol format, and/or other transmission means, such as wired transmission, (such as over a phone line, cable line, laser, photonic, copper or fiber means, power lines, local or remote network server, computer system, telephone, digital or analog wired network, local area network, optical fiber interface or network, cable network(s), or bi-directionally amplified coaxial cable interface digital subscriber lines (DSL), D1 or T1 line copper or all other types of line network or alike), and/or wireless transmission (such as over a cellular mobile phone, paging, trunk radio, laser, (RBS) radio base station network(s), satellite uplink, and/or downlink, digital or analog wireless network, WLAN, wireless cellular, paging, trunk analog or digital platforms or RF signal transmitter, satellite), whether it be analog or digital, whether it be cryptic, non-cryptic, whether it be spread spectrum, split spectrum or duel or multiple spectrums, whether it be in RF, IR, UWB, lightwave, Meghertz, Gigahertz, or any other type of frequency or spectrum utilized in providing and/or retrieving any type of data and/or information.

At least one type of stand device 1509, 1511 can be designed, configured, assembled, and incorporated to have at least one type of hardware device 1510 of any shape, design, function, purpose, and alike that can be attached and/or removed from any type of stand device 1501, 1509, 1511 or any other type of hardware device, such as a camera, video camera, wireless phone, cellular phone, text messaging, a pager, walkie-

talkie, trunk radio, PDA, music player, CD player, DVD player, desktop computer, laptop computer, notepad device, as well as a host of other types of hardware device capabilities.

At least one type of stand device 1501 can be designed, configured, assembled, and incorporated to allow remote control units, network cards, removable
5 media, camera, music player and other types of accessory item slots as part of at least one type of stand device 1501 design as well.

At least one type of stand device 1501 can be designed, configured, assembled, and incorporated and designed with at least one type of wired, wireless, and/or combination thereof capabilities from/by/to/between at least one type of carrier, network
10 provider, service provider, or alike on any type of environment.

This means that at least one type of stand device 1501 has the capability to allow at least one type of user to interface and interact by sending, receiving, inputting, outputting, recalling, storing, filing, arranging, and alike any type of data and information
15 from at least one type of local and/or remote network, provider, and/or user hardware device.

At least one advantage to such a structure will allow at least one user to preview a certain type of data and information and have it sent directly to its stand device 1501 so that the user does not have to carry around such data files and information with them. At least one user can at any point in time by wired and/or wireless means interface
20 and interact with the stand device 1501 to view, recall, download, arrange, move around, modify, or interact with any such data and information.

At least one other advantage to such a structure will allow at least one user to utilize a stand device 1501 as its primary, and/or secondary data storage or hard drive location, where from time to time, at least one user can add directly or indirectly any type
25 of data and information, as well as retrieve any type of data and information.

At least one type of hardware device, whether it fixed or mobile by design, are able to communicate and interact with all types of data and information that is on at least one type of stand device 1501, including but not limited to any type of computing device, player device, desktop computer, laptop, notepad, PDA, cellular mobile phone,

scanning device, reading device, telephone, pager, music player, camera, video device, data storage device, and all other types of devices and apparatuses.

Currently, there are many different types of cradle or stand devices on the market that allow and/or enable at least one type of cellular mobile phone, pager, Personal Digital Assistant, scanning device, reading device, camera device, music player device, video device, and other types of gadgets by they only provide the capability to (1) recharge power resources, or (2) transfer data and information capabilities primarily by wired means, but in some cases by wireless means from/thru/by/between - to another hardware device such as a desktop computer device, laptop device, or alike. But these capabilities stop here.

10 With the above stated invention, a user is now able to utilize any type of cradle or stand device to provide more functions, features, and services to at least one user than just power or data transfer capabilities.

Now a user can utilize a cradle or stand device as a primary hard drive or data storage device. A user then does NOT require any type of computer device (such as a desktop computing device, laptop, pad device or alike) to interact, interface, store, arrange, file, recall, modify, delete, or alike. A user can send any type of data and information to the cradle or stand device by wired and/or wireless means at any time, and from anywhere. A user does not have to acquire and save such data and information to say a mobile device, removable media device, or alike, then carry it with them back to physically input the data and information into the cradle or stand device to store and data.

20 An example of this is related to Cellular Mobile Phones, PDA's, or Pager devices. Say the user is running around a city area. They find some kind or type of data and information that they like, but it takes to long to download the data and information onto their hardware device, or removable media device, or the device does not have any or very little data hard drive capabilities inside of it, or it will use up to much of the persons hardware devices power resources to facilitate such a request. Now the user can simply have it sent to their cradle or stand device and keep going through life. The user can access this information at a later point in time by wired means, when they have time to do so,

when they have access to another device that is wired to plentiful power resources, or a larger size hardware device such as a desktop, laptop, pad device, or other.

Figure 22 the purpose is to show an alternative preferred embodiment of the present invention employed utilizing a modified version of finger held hardware device that employs modified versions of a viewable screen apparatus enabling the a viewable screen apparatus to be moved around horizontally by the user, and configured at various locations, angles, degrees, and alike constructed in accordance with the invention. At least one type of finger held hardware device could be designed that would allow a user to move, adjust, modify, arrange, change, or alike to various positions, angles, degrees, and alike from the far left of the finger held hardware device 1603, to the far right of the finger held hardware device 1604, or in the middle portion of the finger held hardware device 1602.

Flexibility in design, and configuration of at least one type of finger held hardware device will allow and enable the device to be more personalized by its user.

At least one type of physical button apparatus 1601 of at least one type of finger held hardware device design can also be flexible in design to allow the user of the device to move, replace, twist, turn, rotate, spin, push, pull, arrange, modify, change, the location of each physical button, or by changing and establishing a new set of command sets applied to each physical button when the user touches each button. This can come on the form of physical adjustments, by replacement of the entire physical button apparatus, by software applications that are available on the finger held hardware device, the screen portion, or on the replaced button apparatus, from a local and/or remote network, carrier, or provider, by removable media, by wired or wireless communications or connections, or other means.

Figure 23 the purpose is to show an alternative preferred embodiment of the present invention employed utilizing a modified version of finger held hardware device that employs modified versions of a viewable screen apparatus enabling the a viewable screen apparatus to be moved around vertically by the user, and configured at various locations, angles, degrees, and alike constructed in accordance with the invention. At least one type of finger held hardware device could be designed that would allow a user to move, adjust,

modify, arrange, change, or alike to various positions, angles, degrees, and alike vertically up and down from the left side of the finger held hardware device 1701, or vertically up and down from the right side of the finger held hardware device 1702, or there locations, and configurations.

5 Flexibility in design, and configuration of at least one type of finger held hardware device will allow and enable the device to be more personalized by its user.

Figure 24 the purpose is to show a general block diagram to the preferred embodiment of the present invention employed utilizing a cellular phone based finger held hardware device employing one particular design that enables any type of finger held
10 device, with a fixed and/or removable display screen device and physical button device that can provide cellular phone, (PDA) personal digital assistant, paging, text messaging, camera, music player, game player, internet access, and other capabilities as part of or in addition to of the preferred embodiment of the present invention and alike constructed in accordance with the invention..

15 At least one type of cellular phone based finger held hardware device can utilize at least one type of display screen 1801 apparatus, or physical button 1802 apparatus, as part of a single unit design, or as part of a multiple, comprising of more than one, removable and interchangeable configuration. At least one type of single unit design, or multiple component or sectional unit can utilize any type of flexible design 1811 that
20 would allow a user to move, adjust, rotate, twist, slide, modify, arrange, or alike to various positions, angles, degrees, or other configurations to the display, buttons, and other portions, or functions of any particular display, buttons, or other portions of the device.

At least one type of cellular phone based finger held hardware device could utilize at least one type of navigation or scrolling button 1803 configuration, at least one
25 type of menu 1804 selection configuration, at least one type of physical cellular phone button 1805 configuration, at least one type of music player capabilities with menu 1804 selection, rewind 1806, fast forward 1810, play/pause/stop 1809, at least one type of microphone 1808, speaker 1812, power connector 1813, head phone plug in 1814, at least one type of On/Off, main and sub-category 1807 to day timers, calendar, things to do list,

addresses, internet access, paging, text messaging, and other configurations to name a few, at least one type of connection point for a cradle or stand 1816, and at least one type of flexible or adjustable strap 1817, or material configuration enabling user to hold onto the device with at least one finger, or thumb.

5 Figure 25 the purpose is to show an alternative preferred embodiment of the present invention employed utilizing a modified version of finger held hardware device that employs modified versions of a cellular phone based finger held hardware device employing one particular design that enables any type of finger held device, with a fixed and/or removable display screen device and physical button device that can provide cellular
10 phone, (PDA) personal digital assistant, paging, text messaging, camera, music player, game player, internet access, and other capabilities as part of or in addition to of the preferred embodiment of the present invention and alike constructed in accordance with the invention.

At least one type of cellular phone based finger held hardware device can
15 utilize at least one type of display screen 1901 apparatus, or physical button 1902 apparatus, as part of a single unit design, or as part of a multiple, comprising of more than one, removable and interchangeable configuration. At least one type of single unit design, or multiple component or sectional unit can utilize any type of attachment in the design 1911 that would allow a user to attach the display screen portion to the physical button
20 portion and operate in accordance to the design.

At least one type of cellular phone based finger held hardware device could utilize at least one type of navigation or scrolling button 1903 configuration, at least one type of microphone 1908 and speaker 1912, 9 at least one type of physical cellular phone
25 button 1904 configuration, at least one type of On/Off button 1906, at least one type of main and sub-category 1907 selections to day timers, calendar, things to do list, addresses, internet access, paging, text messaging, and other configurations, at least one type of microphone 1908, speaker 1909, power connector 1910, head phone plug in 1911, at least one type of network capabilities, removable media, and games capabilities 1912, ,at least

one type of connection point for a cradle or stand 1914, and at least one type of flexible or adjustable strap 1913, or material configuration enabling user to hold onto the device with at least one finger, or thumb.

At least one type of finger held hardware device, viewable screen area,
5 and/or physical button device can be utilized in providing, inputting, sending, receiving, interacting, storing all types of content, communications with any and all content, data, and information from internal means and methods, and/or from external means, and/or methods. At least one type of finger held hardware device can be utilized as a cellular
10 phone hardware device, a personal digital assistant device, pager, an electronic game, or game device, a music player or other player device, camera device, video device, radio device, tracking device, scanning device, reading device, remote control device, and interaction with home appliances, office equipment of all types and styles including desktop computers, laptops, printers, scanners, radio device, paging device, and all other
15 forms, any types of combinations, types, styles, formats, and kinds of hardware devices. At least one type of finger held hardware device can be utilized to communicate and interact with anyone, anywhere, at any time, on a single, dual, and/or multiple frequency, spectrum, and/or at least one network service provider, or multiple network service providers on any wired, wireless, and/or combination platforms thereof.

Any and all functions, and features in whole and/or in part can be
20 incorporated into any such designed finger held hardware device and/or any type of hardware device, portable terminal device, or computing device.

From the foregoing it will be appreciated by one skilled in the art that, although specific embodiments of the invention have been described herein for purposes of illustration, various modifications may be made without deviating from the spirit and scope
25 of the invention. Accordingly, the invention is not limited except as by the appended claims.

CLAIMS

1. A personal handheld electronics device, comprising:
 - at least one control logic system, the control logic system comprising a processor and a system memory;
 - a display coupled with the control logic system; and
 - a keypad unit, the keypad unit being coupled with the control logic system and further comprising:
 - an array of function control keys coupled with the control logic system;
 - a finger held base, the finger held base resting against at least one finger of a user's hand and supporting the function control keys, the finger held base extending outside a perimeter of the display so that applying pressure to the function control keys causes pressure to be exerted against the at least one finger of the user's hand to facilitate a grip on the device; and
 - a finger attachment device coupled with the finger held base, the finger attachment device extending from the finger held base and wrapping around the at least one finger of the user's hand to support the grip on the device.

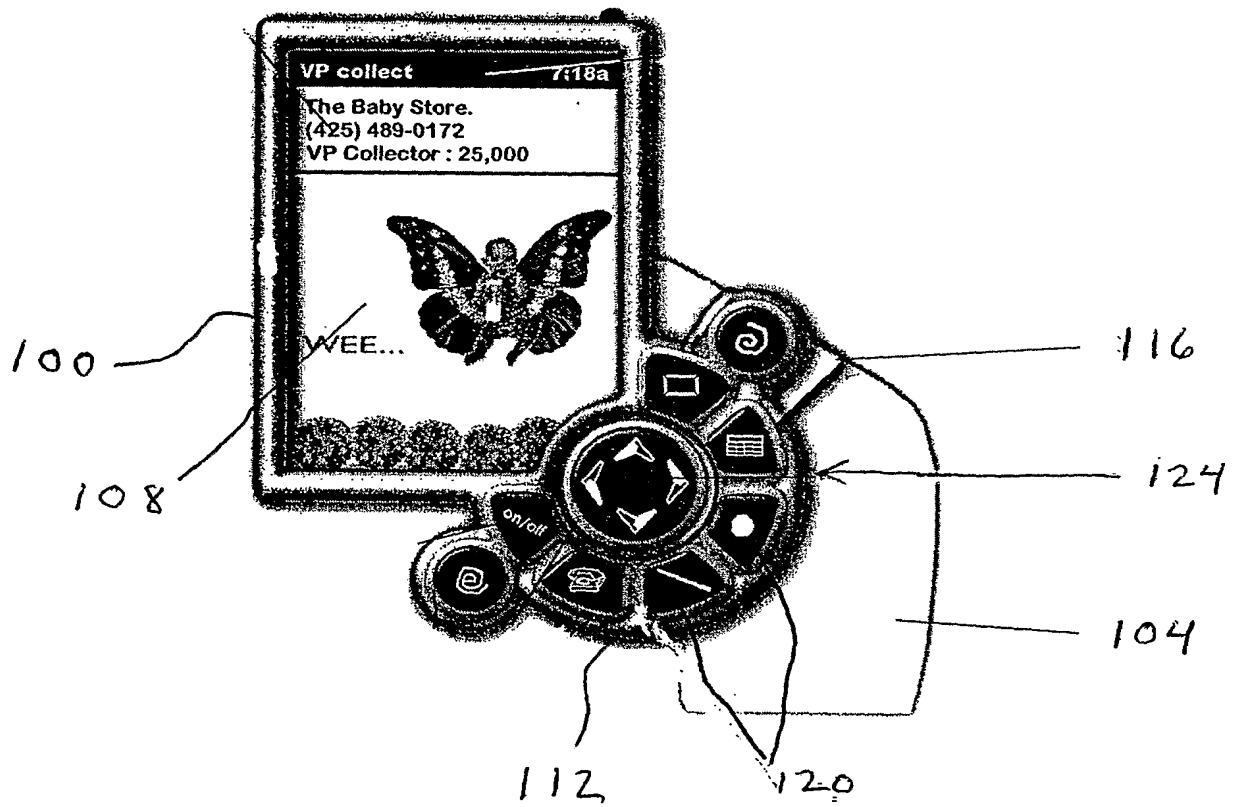


FIG. 1

FIG. 2A

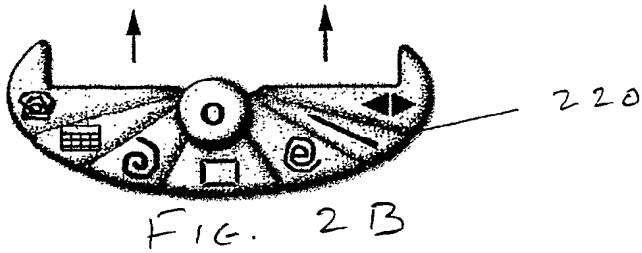
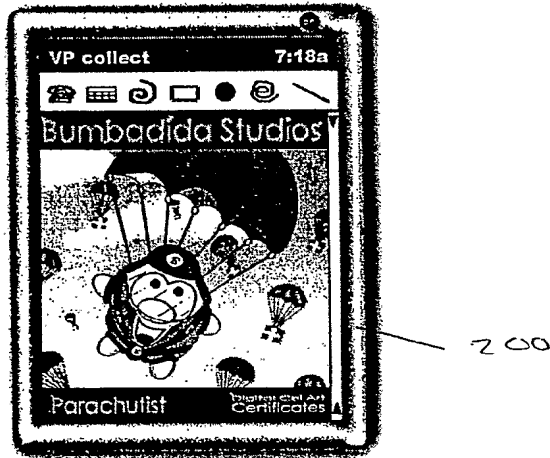
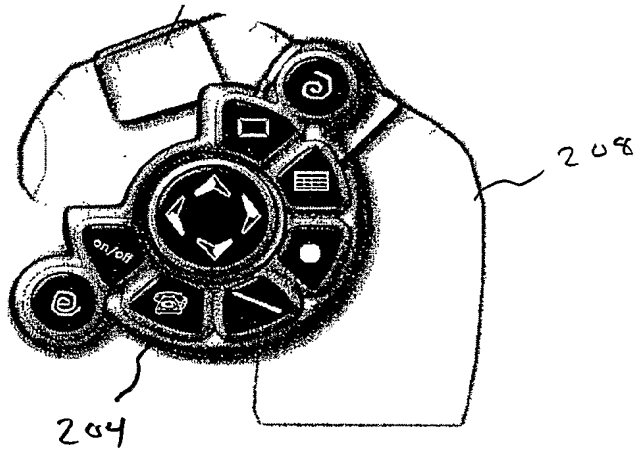
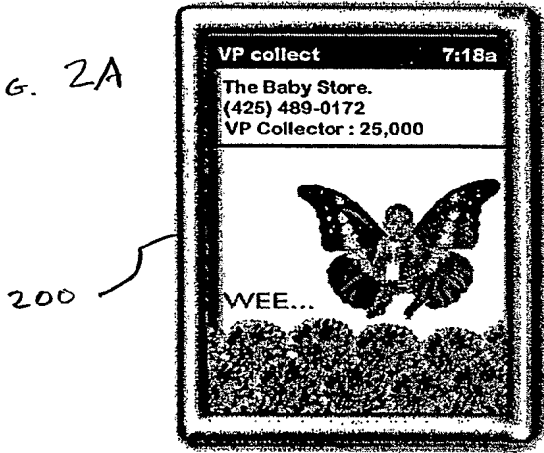


FIG. 2B

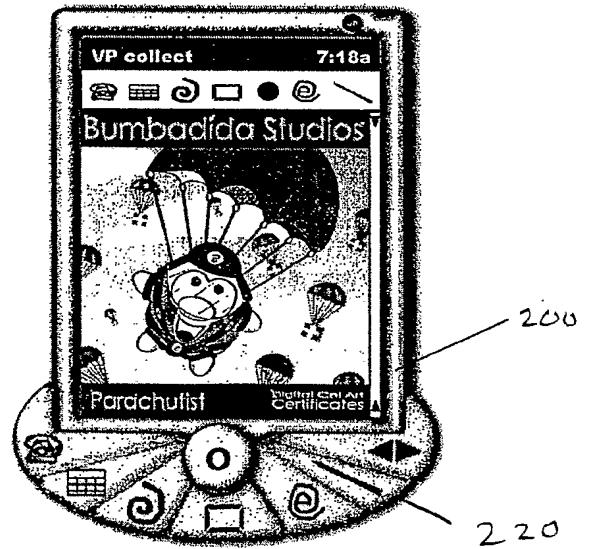


FIG. 2C

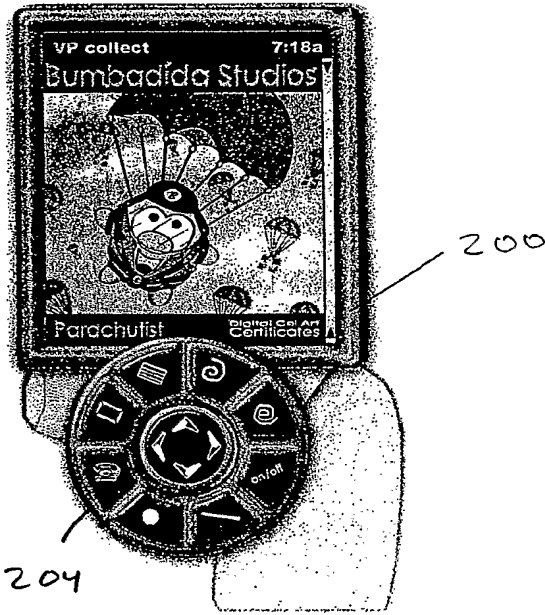


FIG. 2D

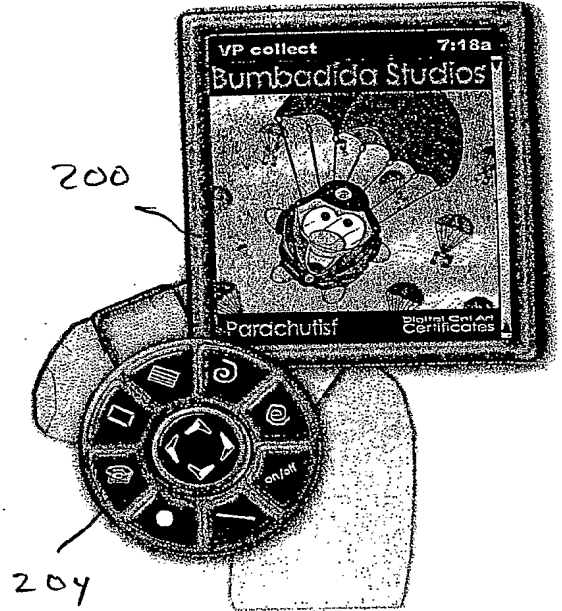


FIG. 2E

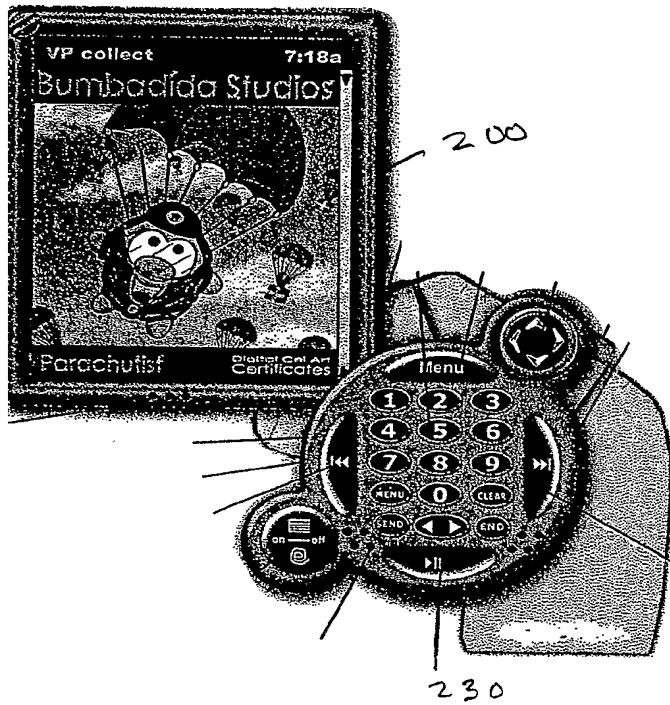


FIG. 2F

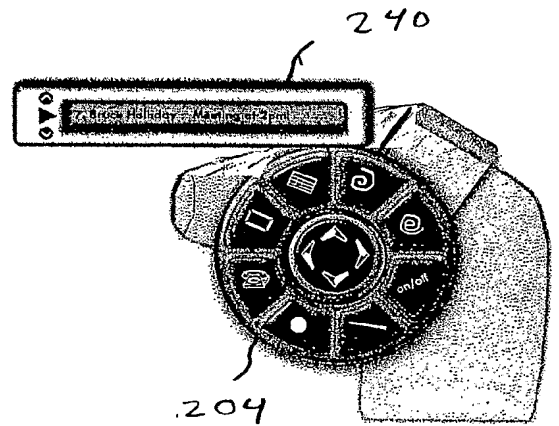


FIG. 2G

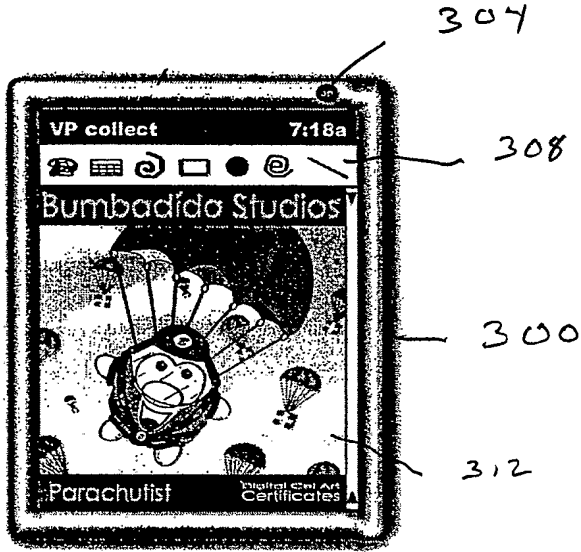


FIG. 3

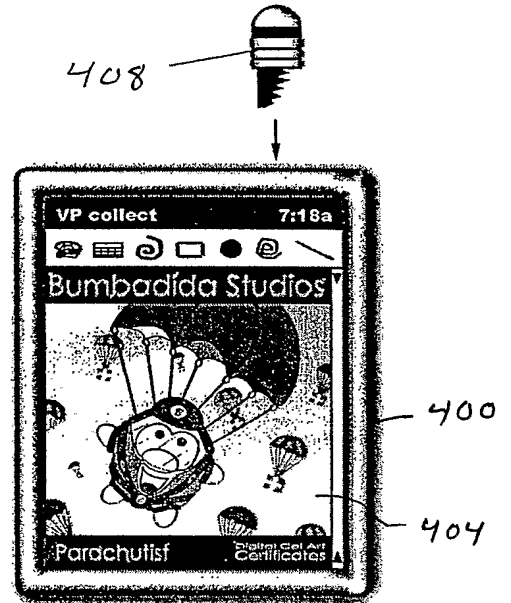


FIG. 4A

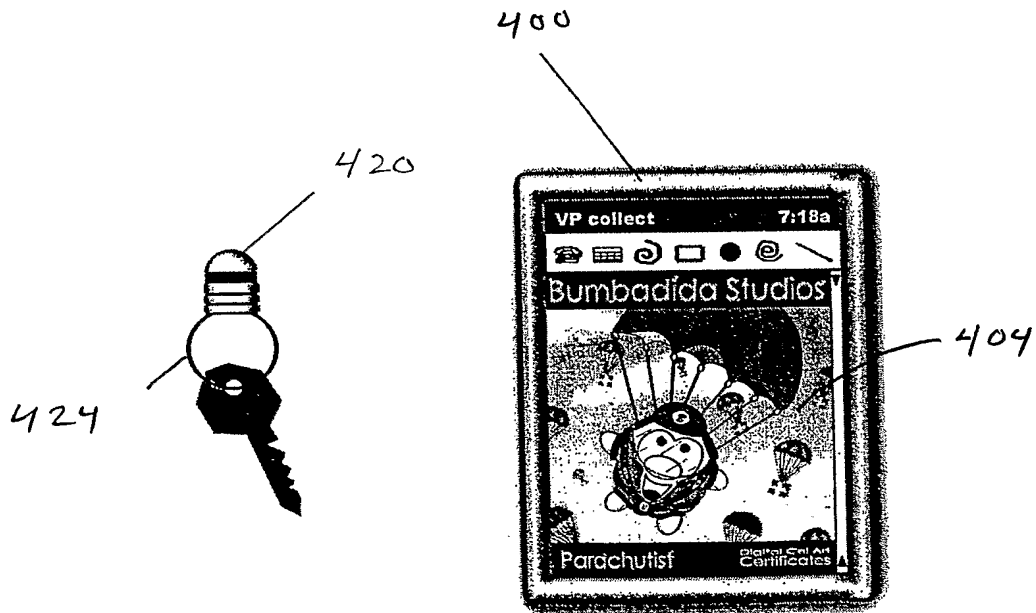


FIG. 4B

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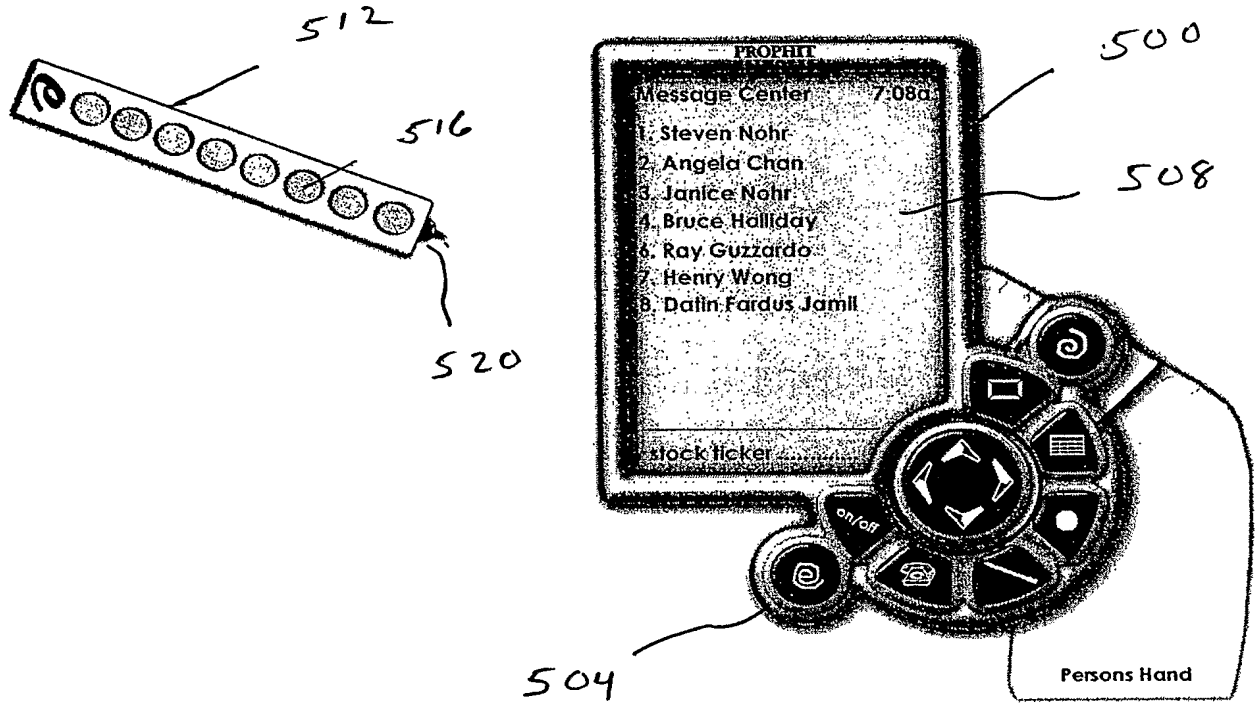


FIGURE 5A

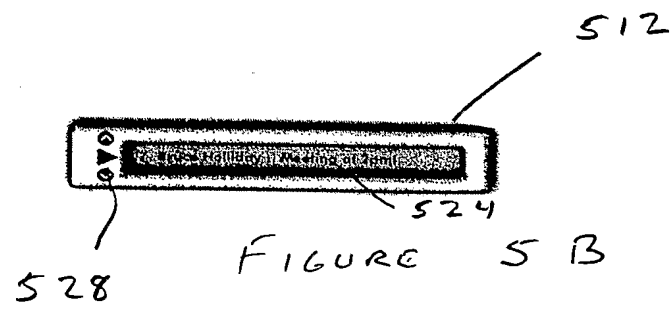


FIGURE 5B

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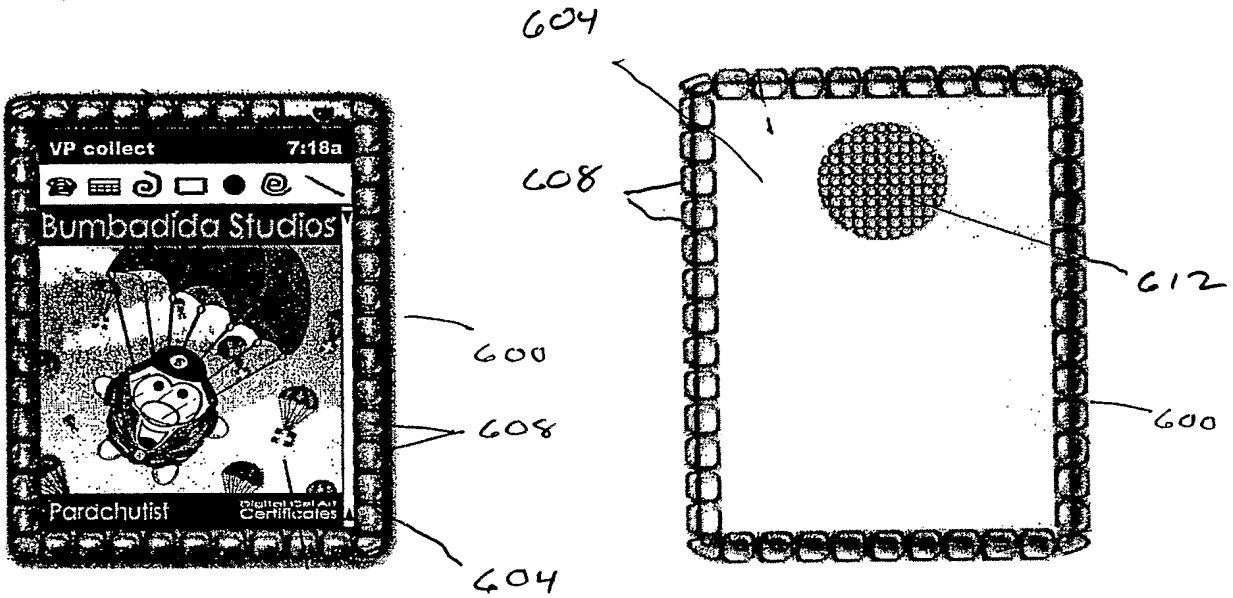


FIG. 6A

FIG. 6B

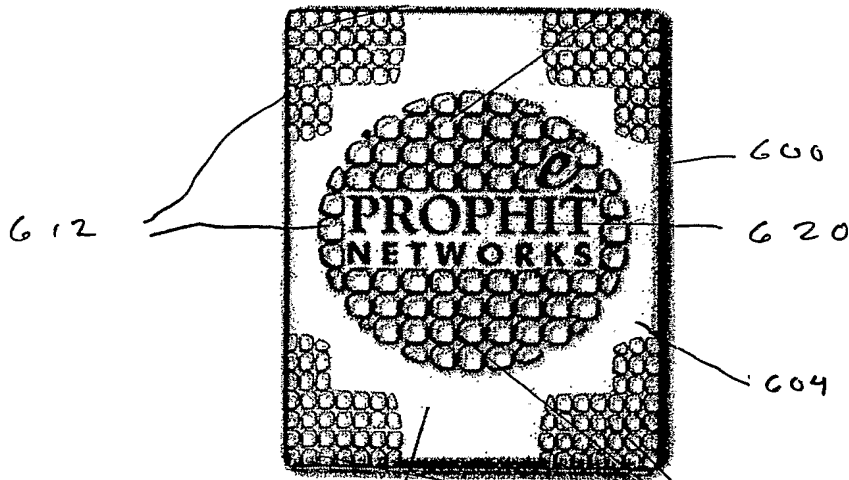


FIG. 6C

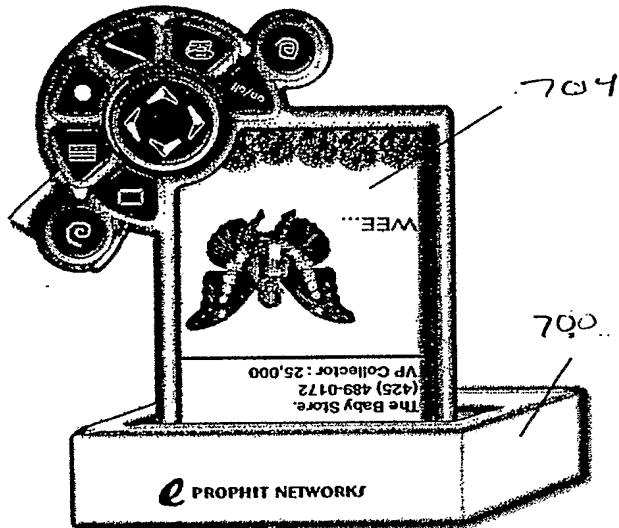


Fig. 7A

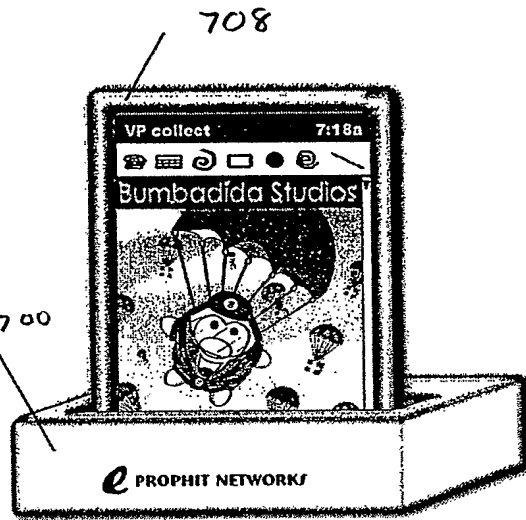


Fig. 7B

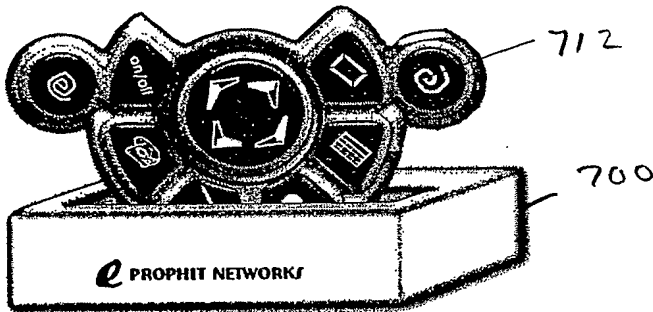


Fig. 7C

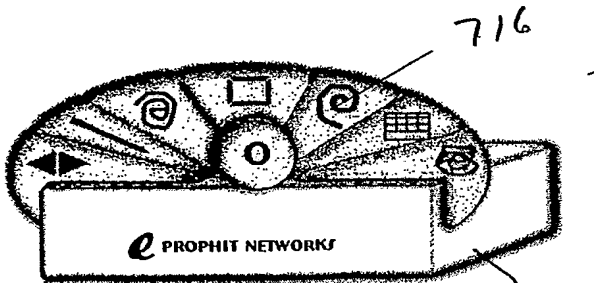


Fig. 7D

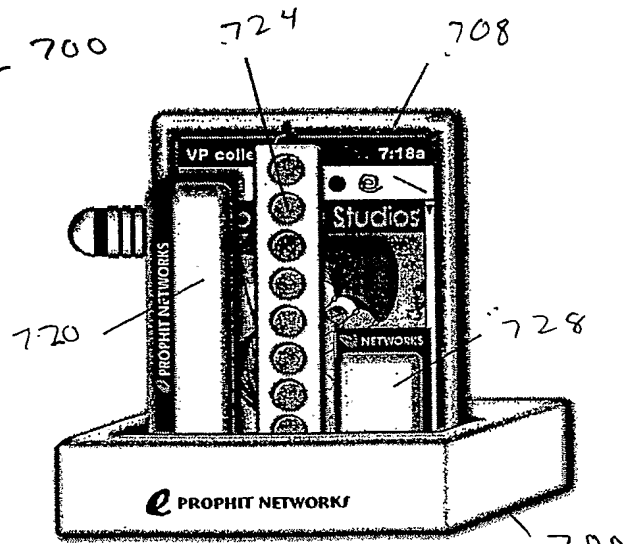
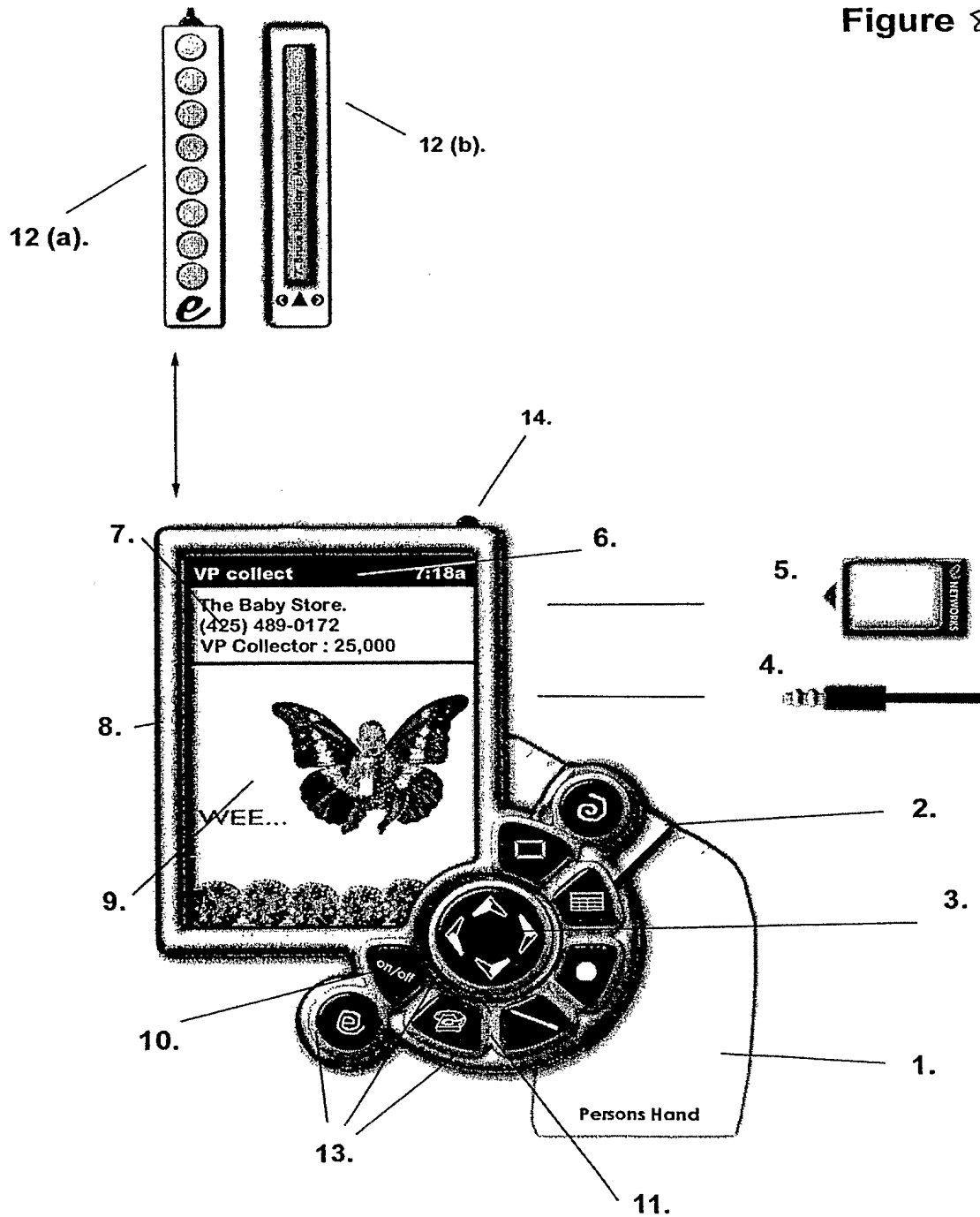


Fig. 7E

Figure 8



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Figure 9

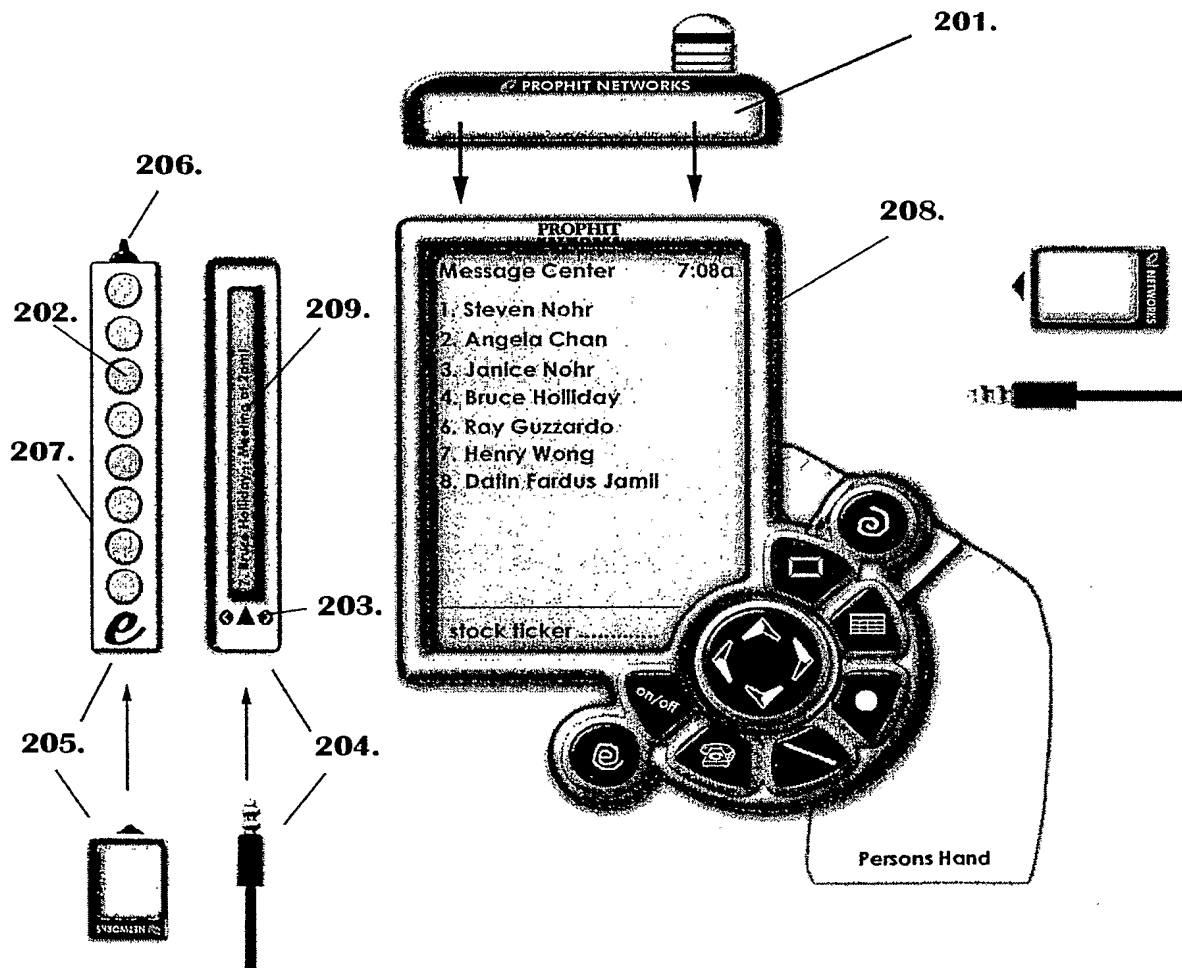
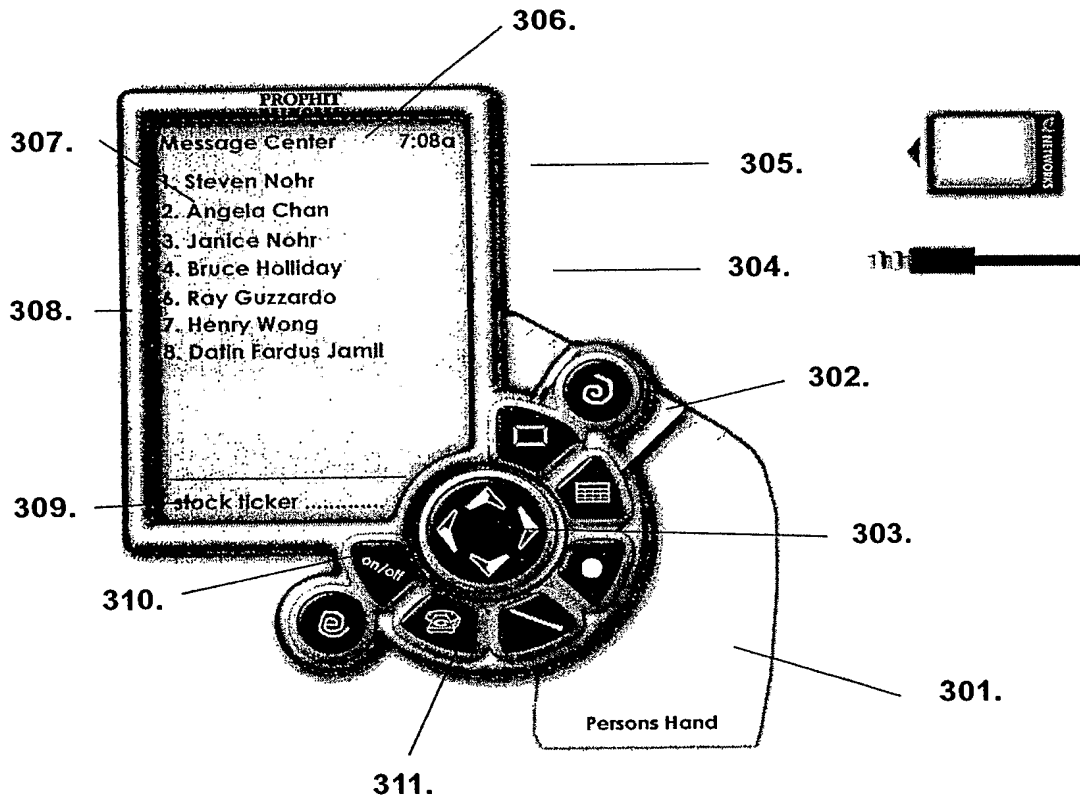
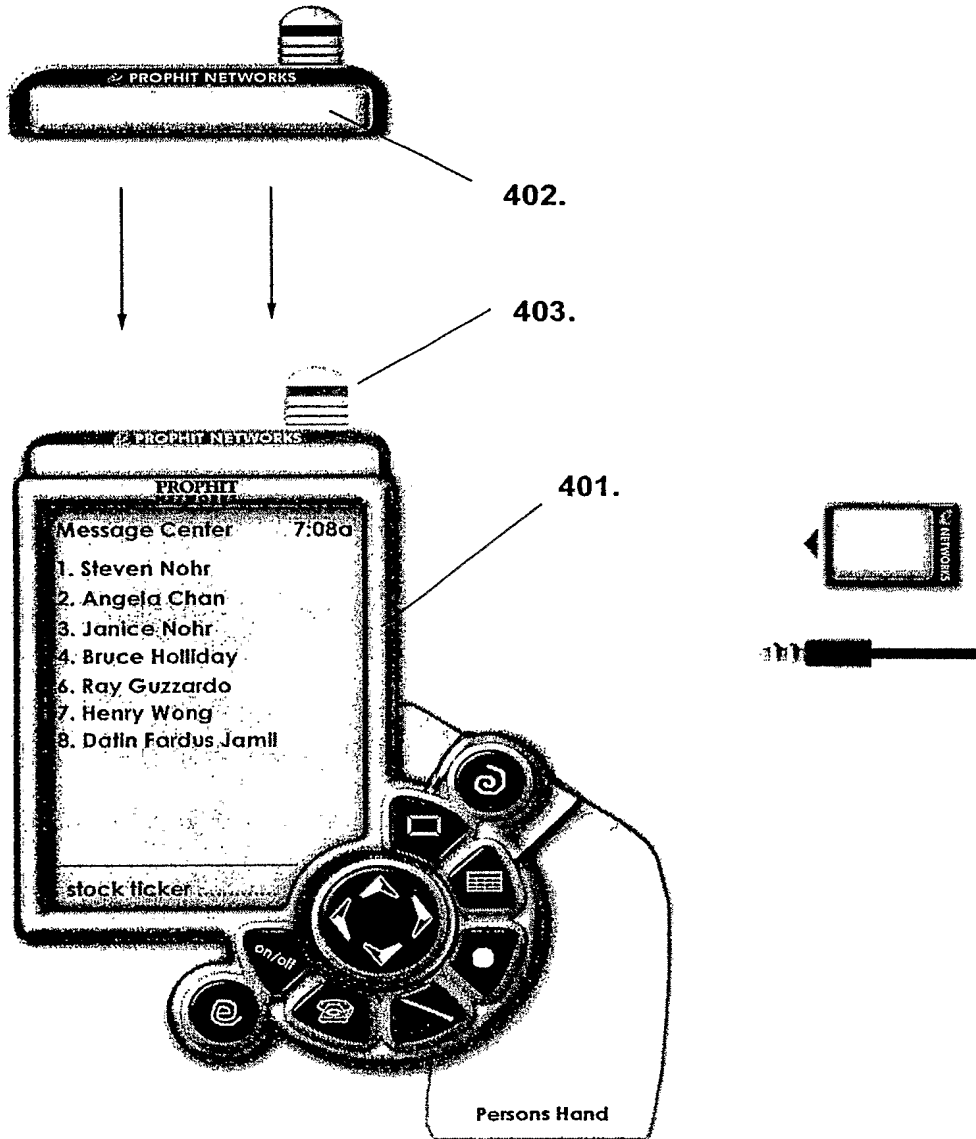


Figure 16



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Figure 11



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Figure 12

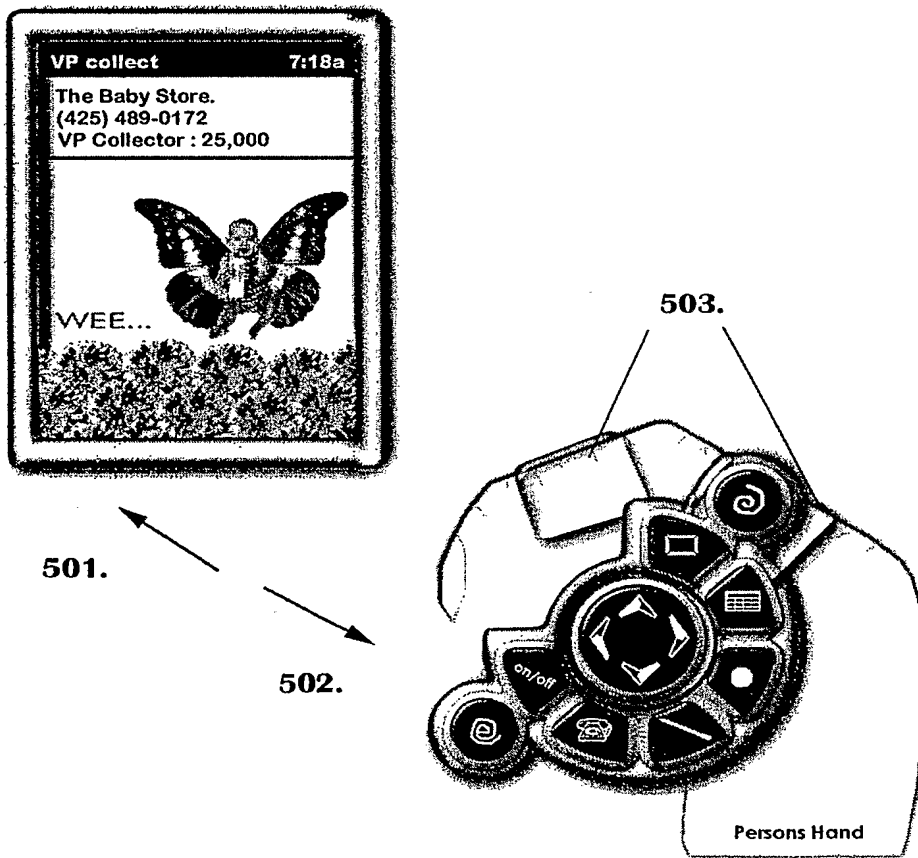


Figure 13

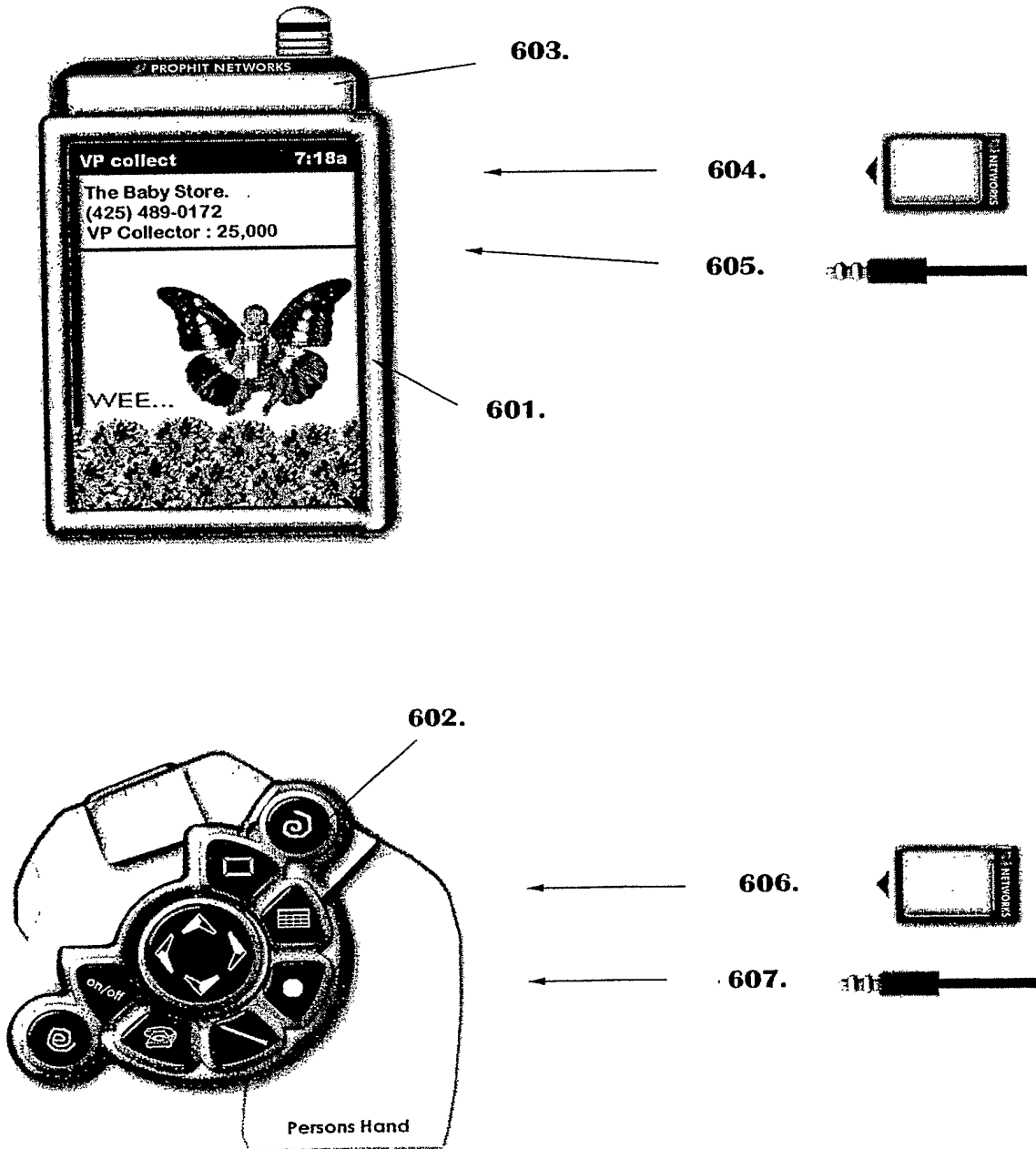


Figure 14

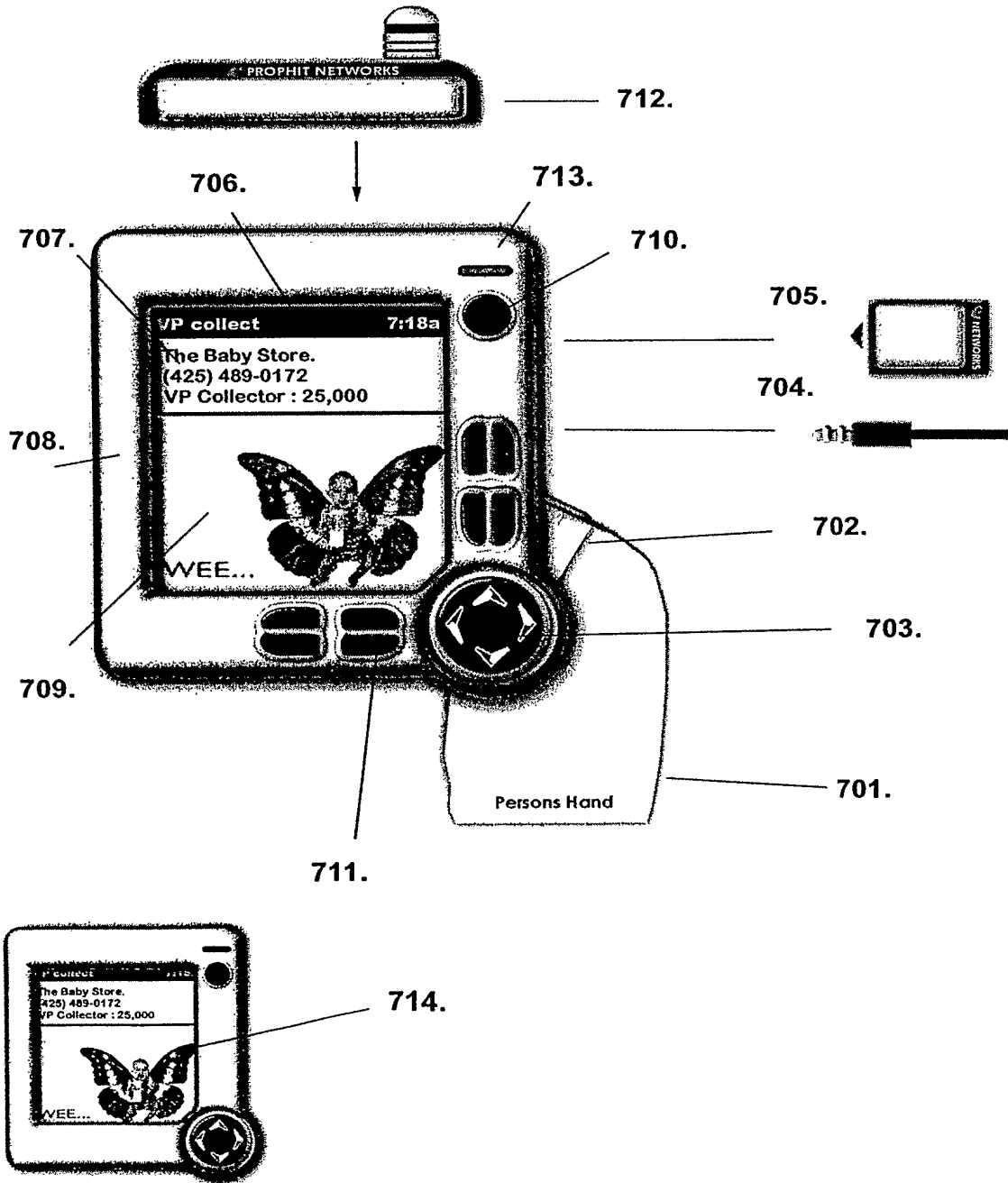


Figure 15

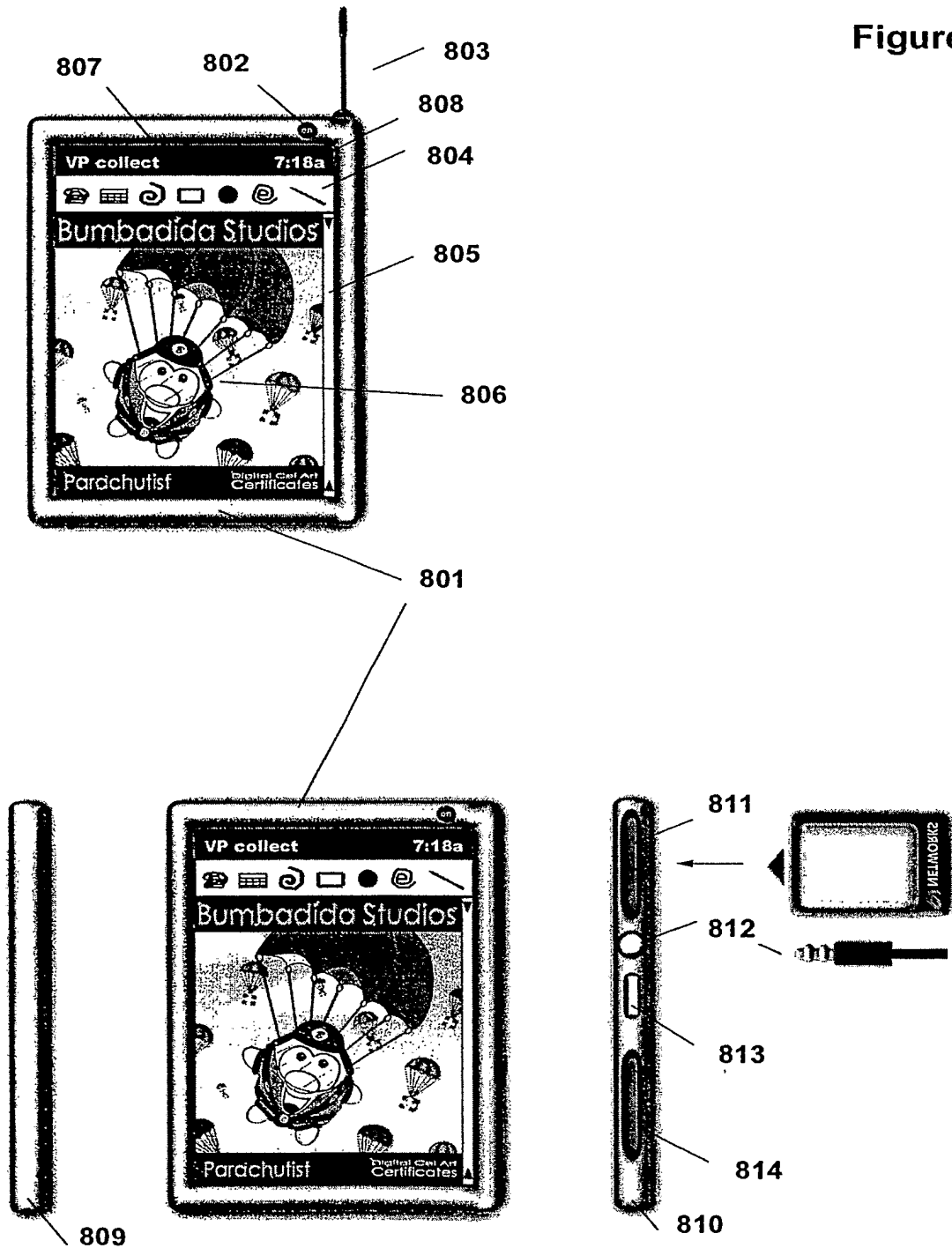


Figure 16

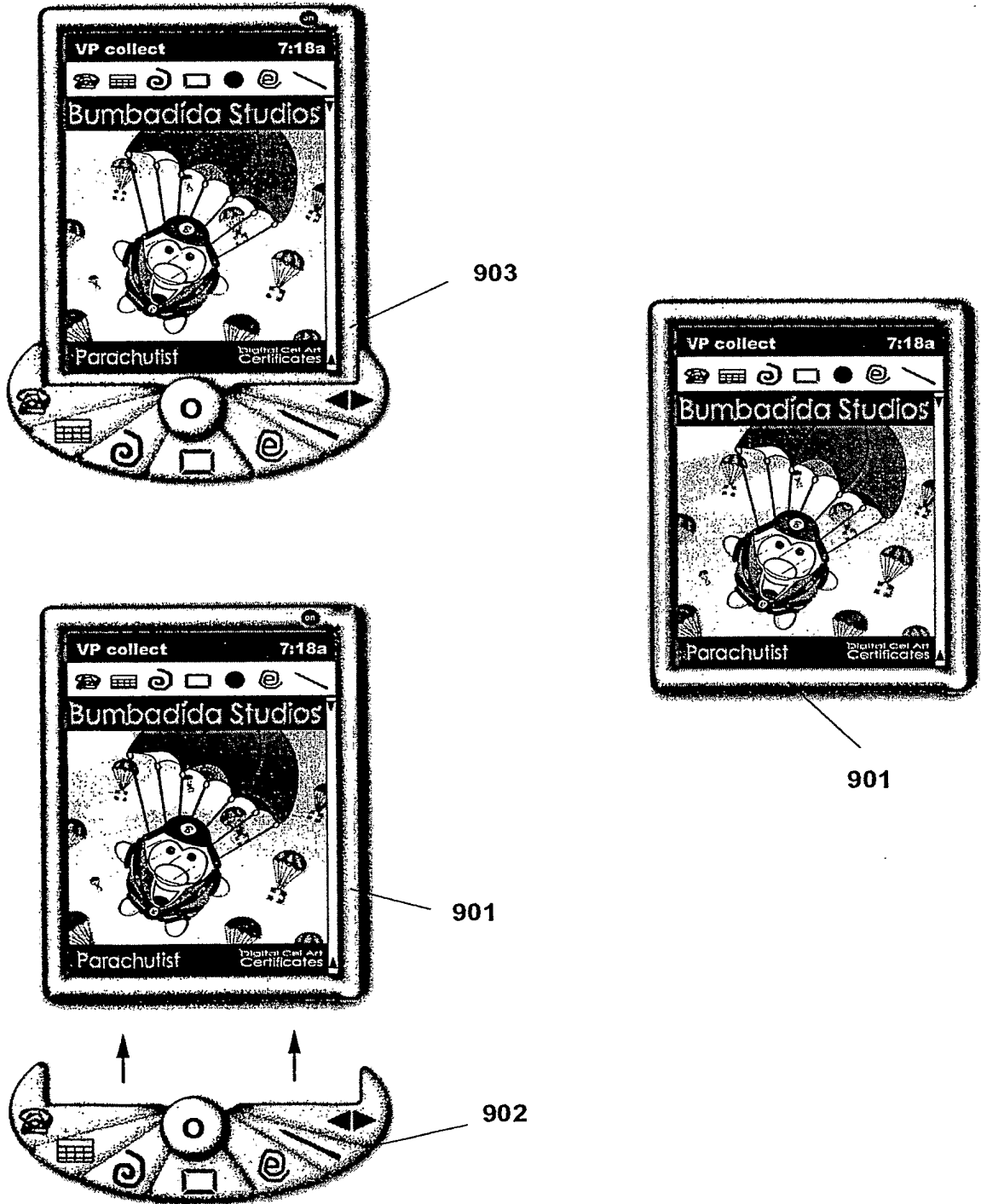


Figure 17

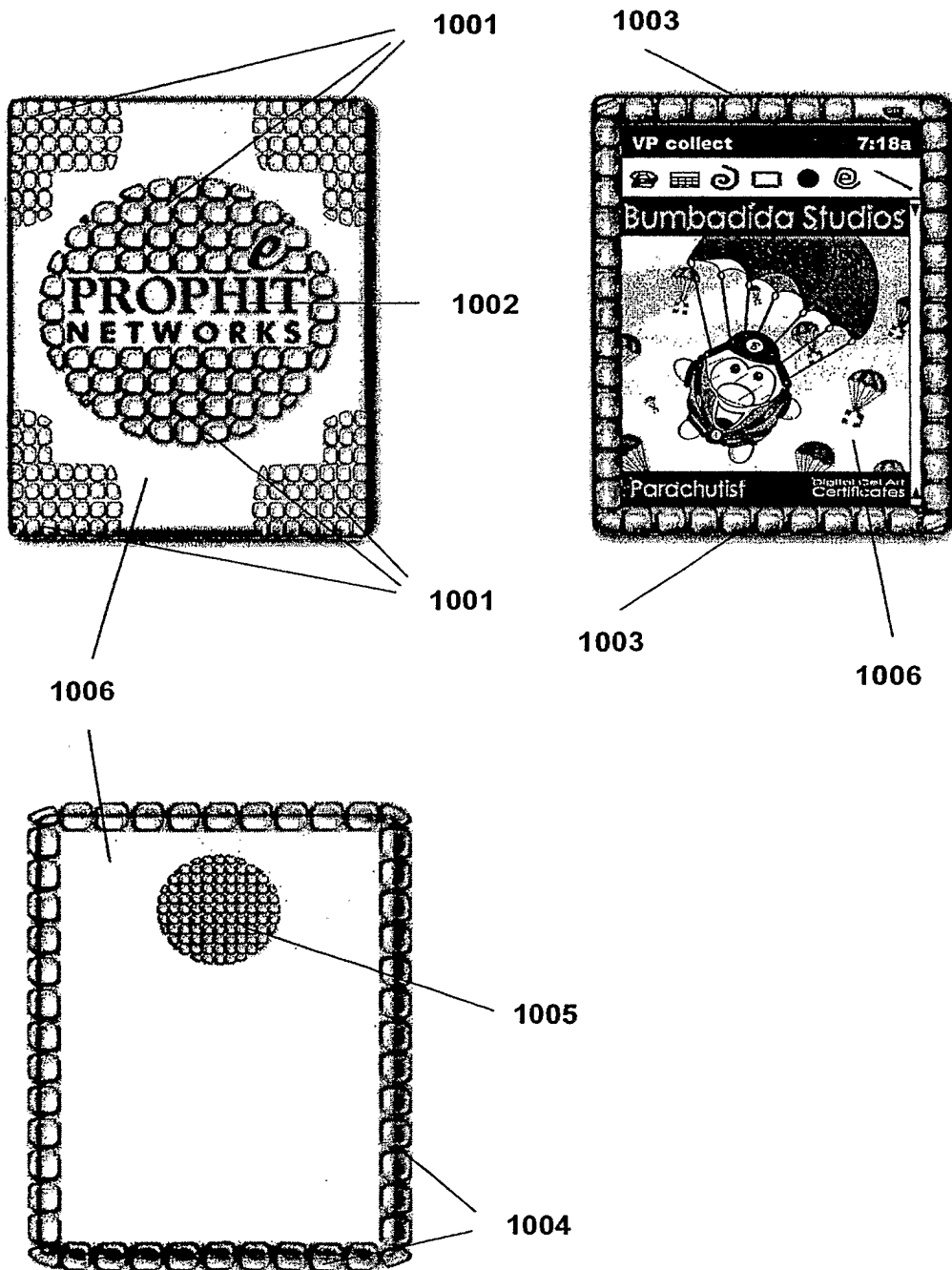


Figure 18

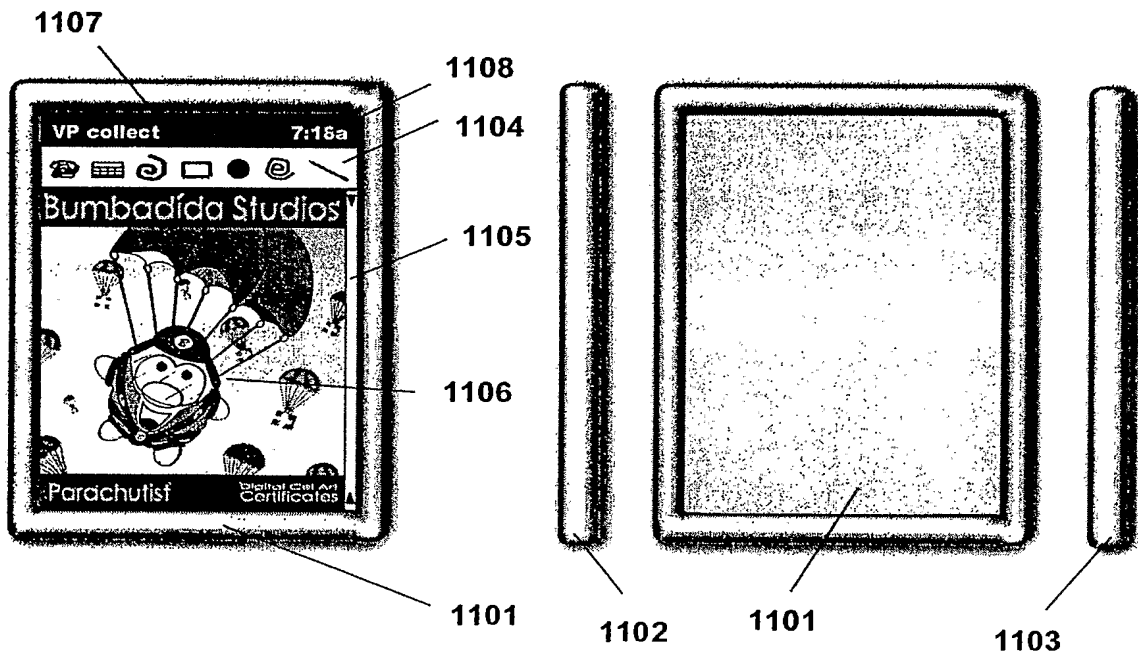


Figure 19

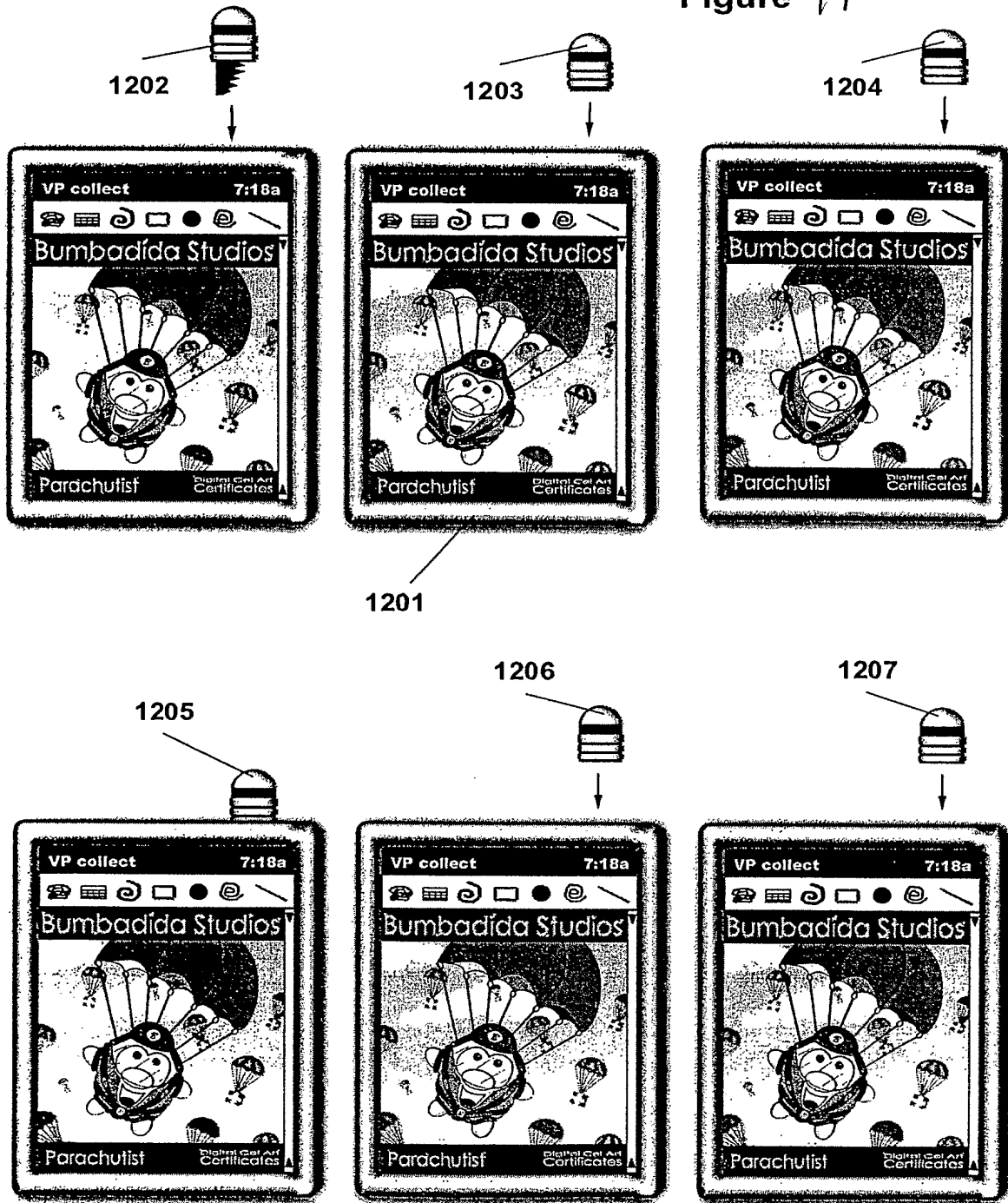


Figure 20

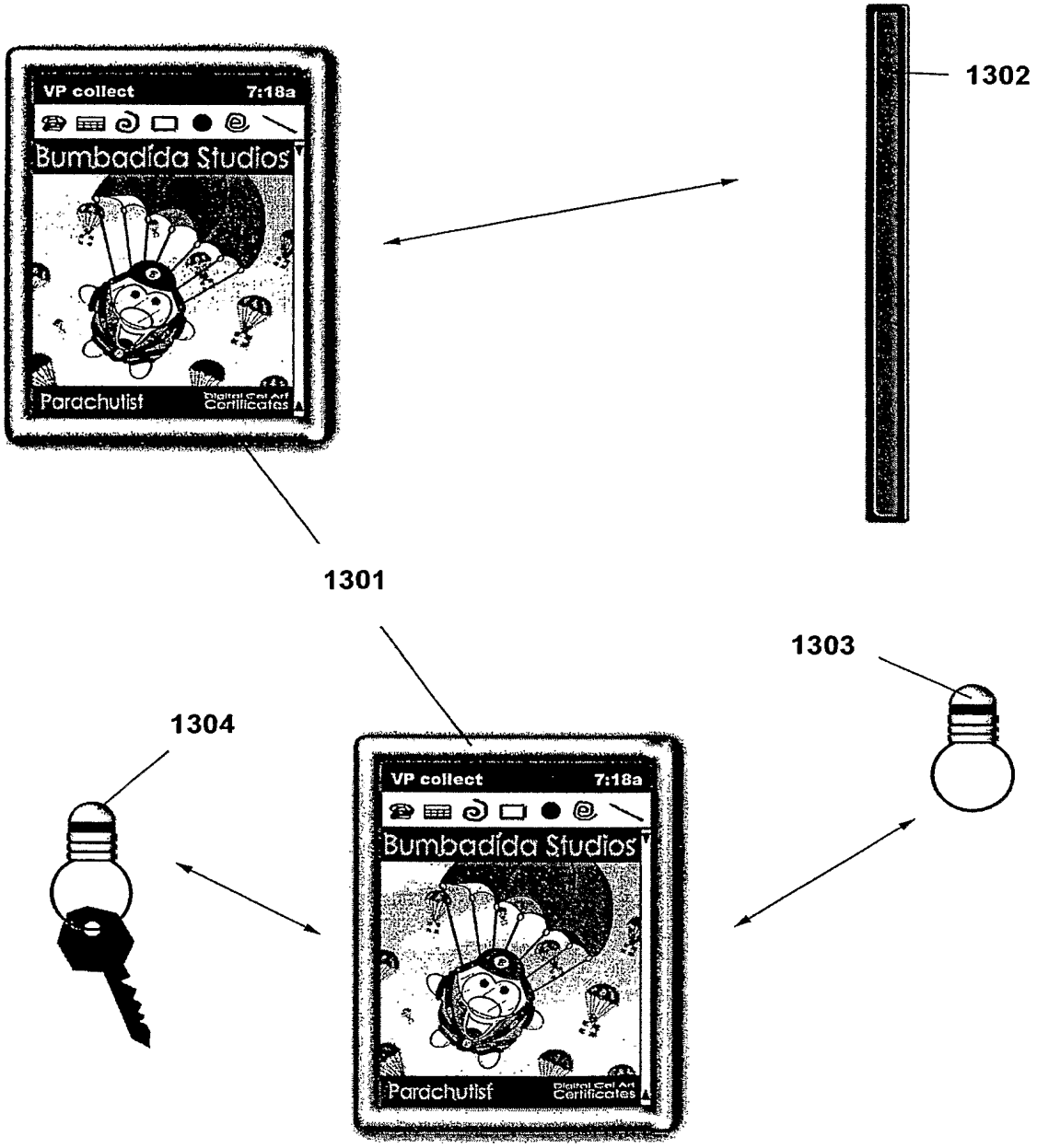


Figure 21

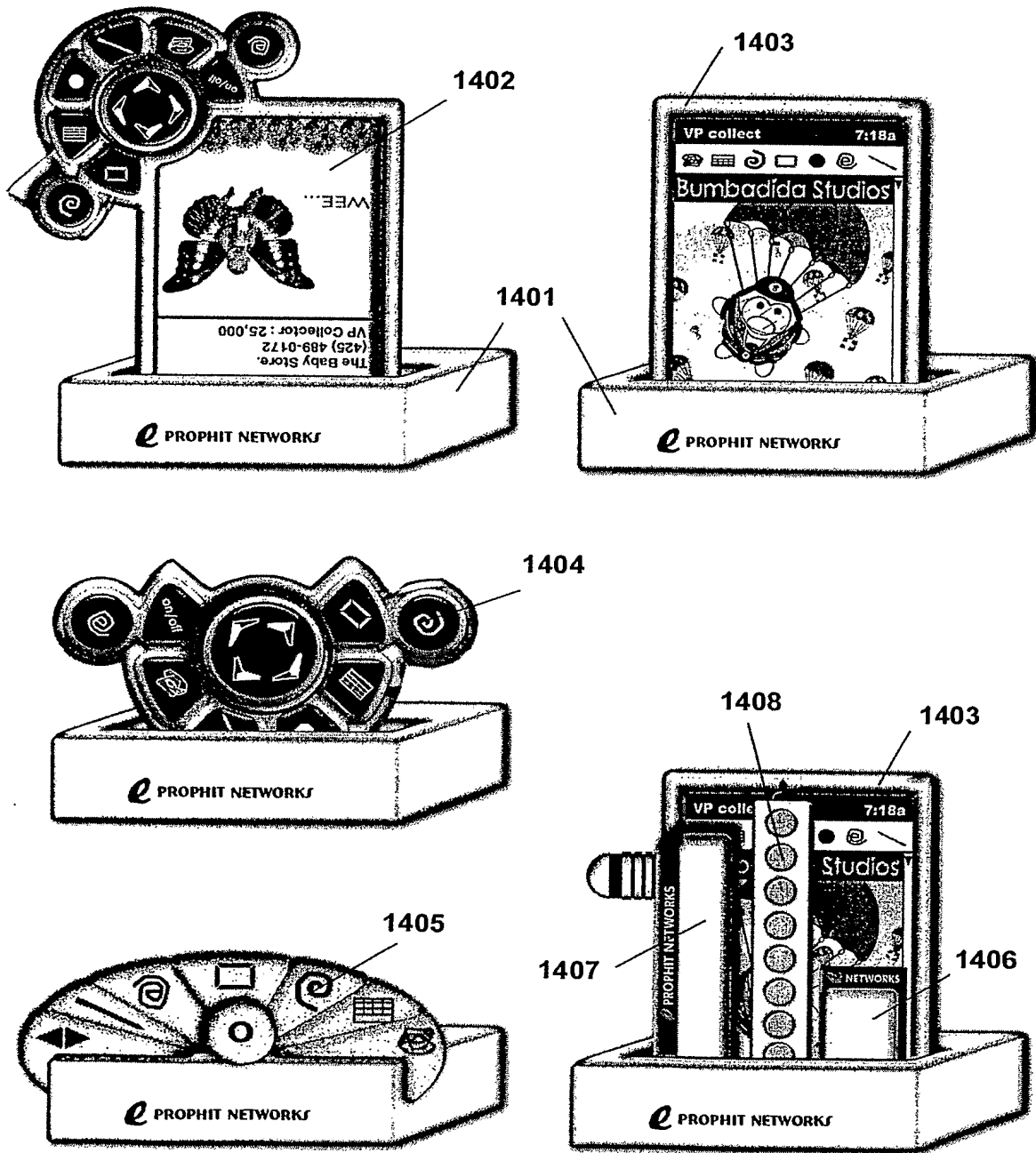


Figure 22

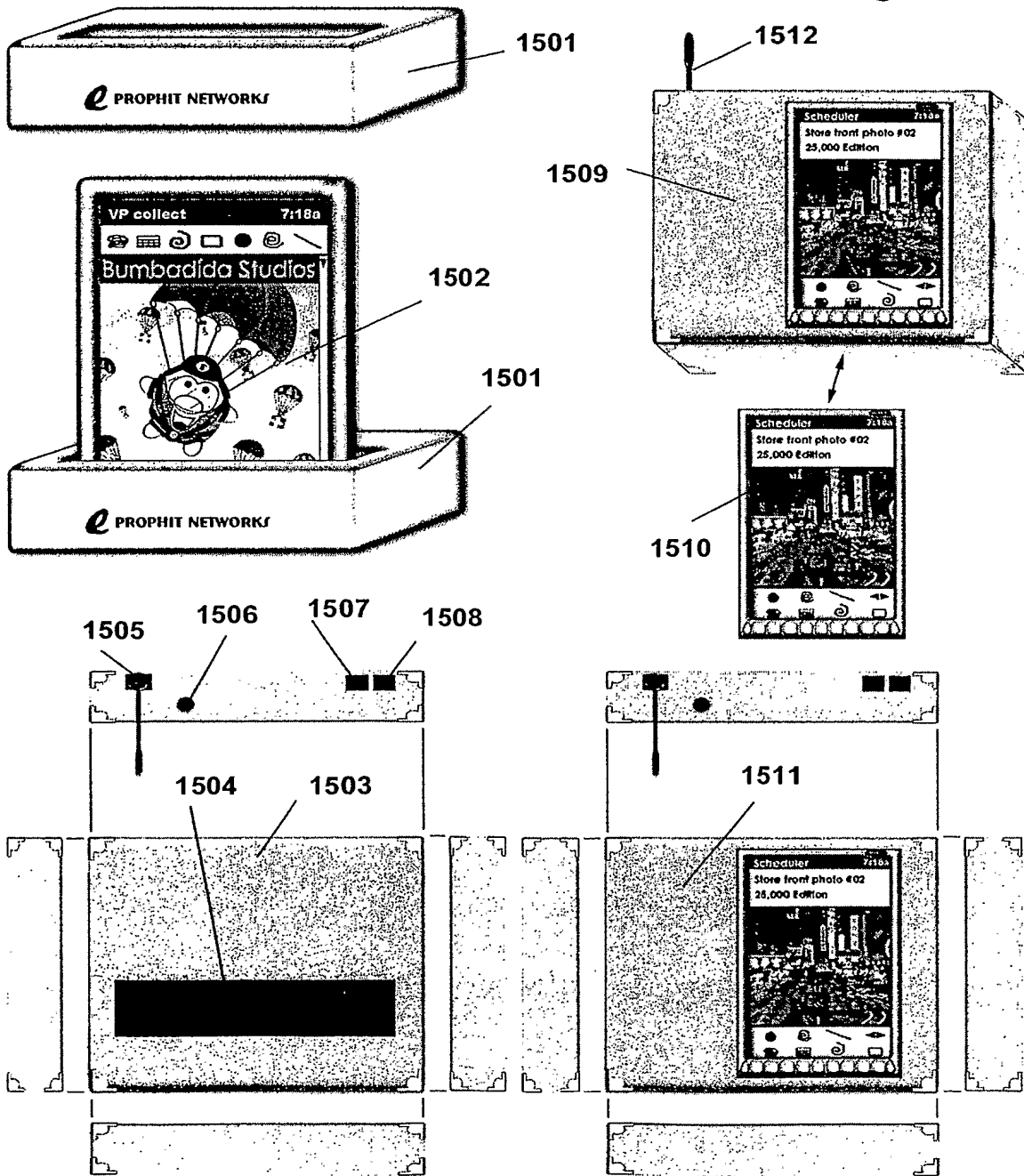


Figure 23

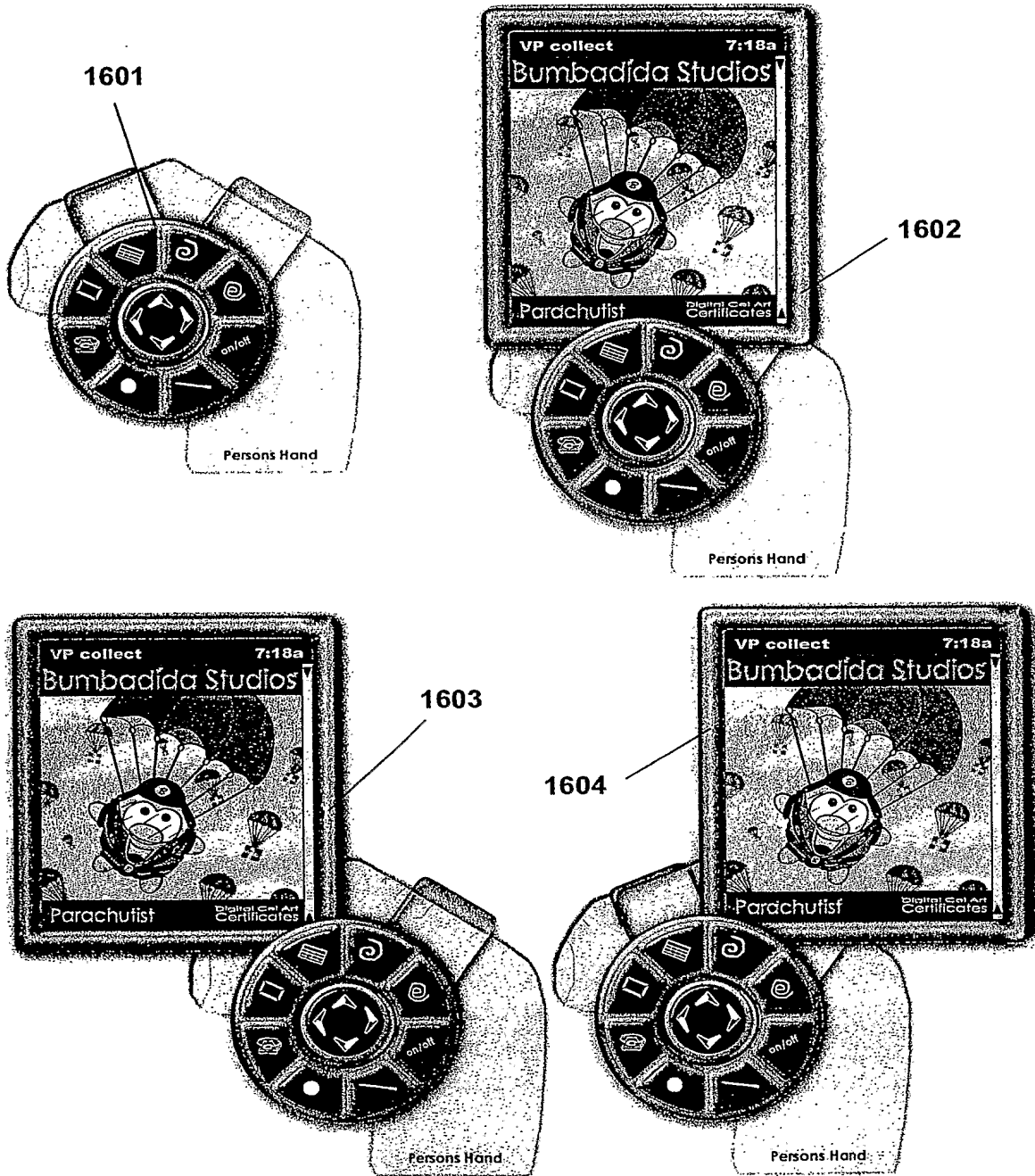


Figure 24

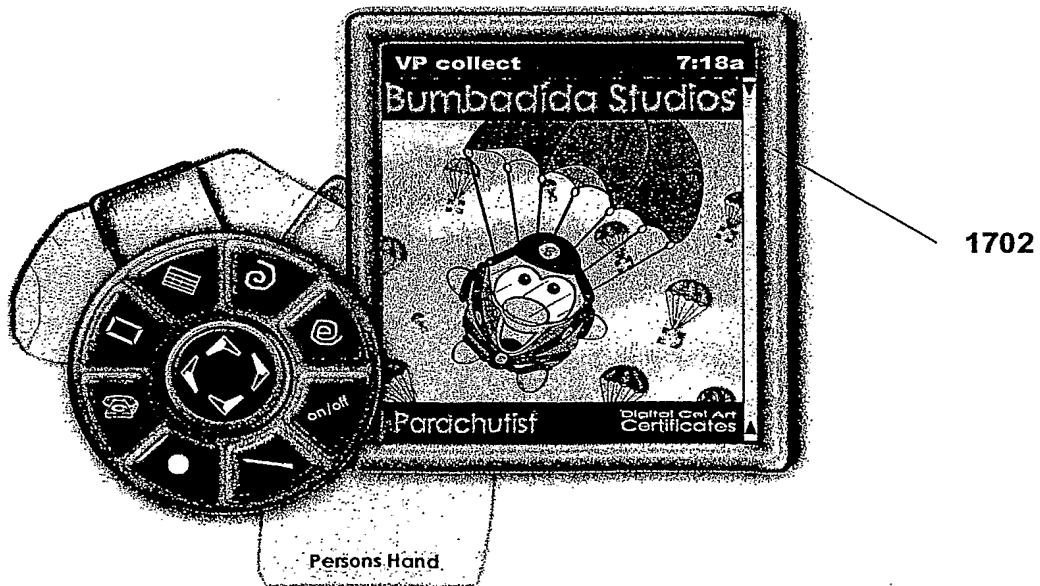
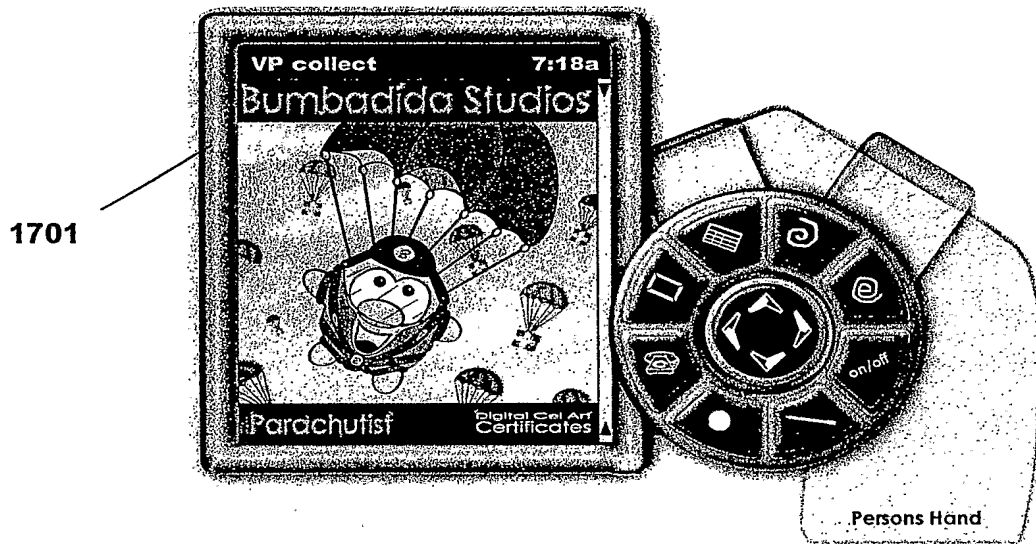


Figure 25

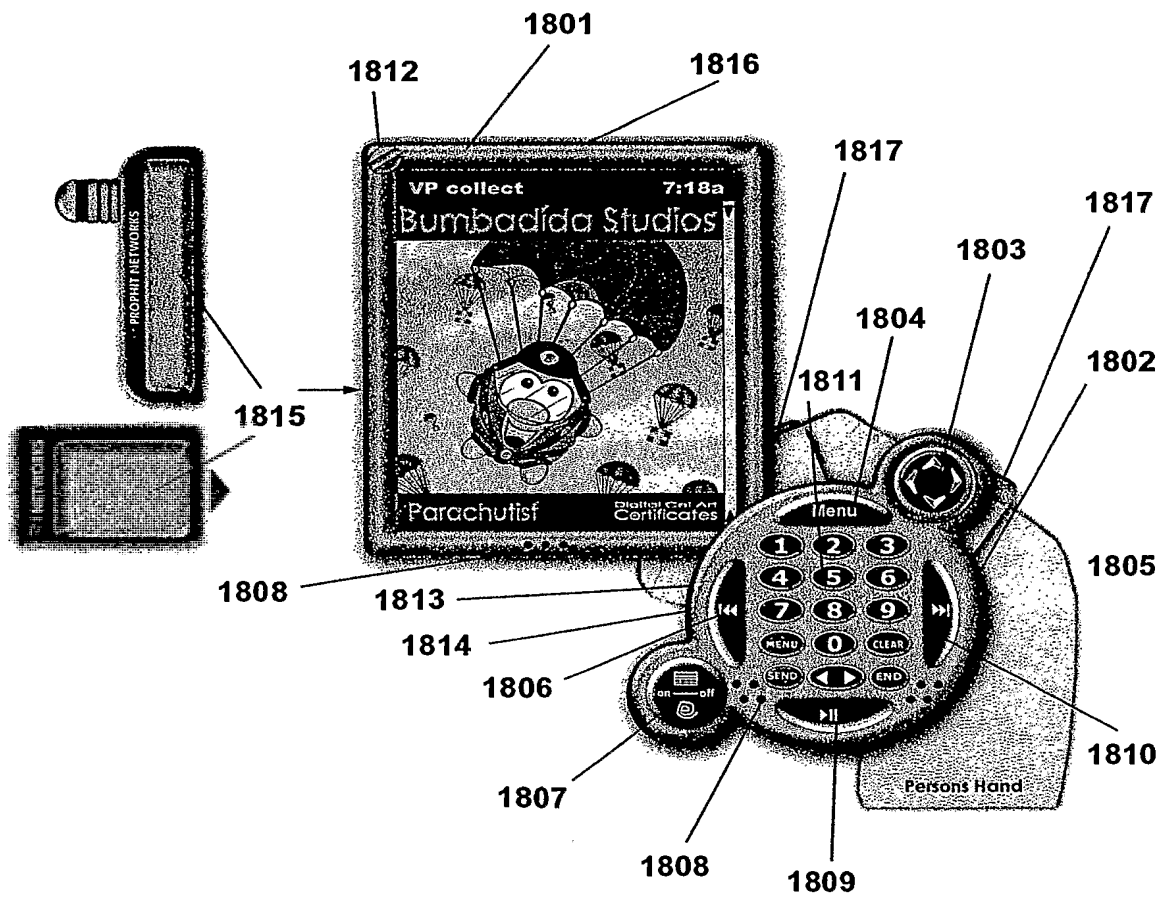
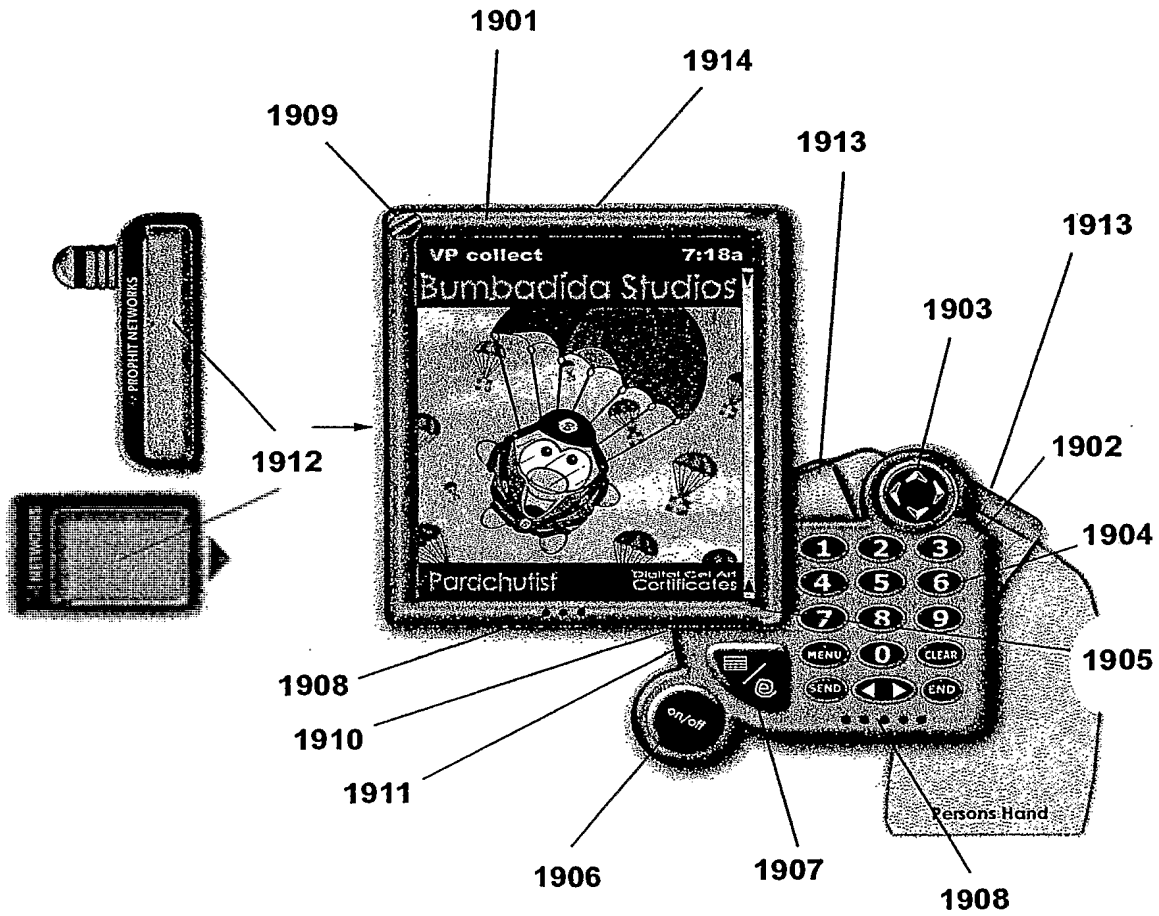


Figure 26



INTERNATIONAL SEARCH REPORT

International application No.

PCT/US02/22851

A. CLASSIFICATION OF SUBJECT MATTER		
IPC(7) : G0G9 S/00 US CL : 345/169, 864		
According to International Patent Classification (IPC) or to both national classification and IPC		
B. FIELDS SEARCHED		
Minimum documentation searched (classification system followed by classification symbols) U.S. : 345/169, 864, 173, 156, 168, 179, 182, 901, 902; 341/21, 22, 23; 361/679, 680, 681		
Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched		
Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)		
C. DOCUMENTS CONSIDERED TO BE RELEVANT		
Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 6,177,926 B1 (KUNERT) 23 January 23, 2001 (23.01.2001), column 8, lines 9-41.	1
A	US 5,949,643 A (BATIO) 07 September 1999 (07.09.1999), column 5, lines 20-54.	1
A	US 6,331,867 B1 (EBERHARD et al) 18 December 2001 (18.12.2001), column 3, lines 40-63.	1
A	US 6,335,725 B1 (KOH et al) 01 January 2002 (01.01.2002), column 5, lines 15-53.	1
<input type="checkbox"/> Further documents are listed in the continuation of Box C. <input type="checkbox"/> See patent family annex.		
* Special categories of cited documents:		
"A" document defining the general state of the art which is not considered to be of particular relevance "E" earlier application or patent published on or after the international filing date "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified) "O" document referring to an oral disclosure, use, exhibition or other means "P" document published prior to the international filing date but later than the priority date claimed	"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art "&" document member of the same patent family	
Date of the actual completion of the international search		Date of mailing of the international search report
13 November 2002 (13.11.2002)		24 JAN 2003
Name and mailing address of the ISA/US Commissioner of Patents and Trademarks Box PCT Washington, D.C. 20231 Facsimile No. (703)305-3230		Authorized officer <i>Chanh Nguyen</i> Telephone No. (703) 308-6603

INTERNATIONAL SEARCH REPORT

International application No.

PCT/US02/22851

Box III TEXT OF THE ABSTRACT (Continuation of Item 5 of the first sheet)

The technical features mentioned in the abstract do not include a reference sign between parentheses (PCT Rule 8.1(d)).

NEW ABSTRACT

A finger held hardware device (1801, 1802) provides portable terminal and communicative device and other functions in a system which can be securely braced against and/or attached to finger or side of a user's hand, facilitating secure or one hand operation of the device (1801,1802). The device is flexible and modular in nature, allowing for flexible positioning of a keypad/control unit relative to a display (1801), as well as selection from among various displays and keypad/control unit to suit a user needs. A device (1801, 1802) can operate without physical function buttons or any physical buttons, and can be activated by a separate key mechanism for security. A remote control stylus allows a user to operate the device more quickly. An energy absorbing cover protects the device. A resource cradle (1816) supports portions of the device by providing power, storage, network access, and other resources.

(19) World Intellectual Property Organization
International Bureau



(43) International Publication Date
26 June 2003 (26.06.2003)

PCT

(10) International Publication Number
WO 03/052948 A1

- (51) International Patent Classification⁷: **H04B 1/38**
- (21) International Application Number: PCT/IB01/02809
- (22) International Filing Date:
18 December 2001 (18.12.2001)
- (25) Filing Language: English
- (26) Publication Language: English
- (71) Applicant (for all designated States except US): **NOKIA CORPORATION** [FI/FI]; Keilalahdentie 4, FIN-02150 Espoo (FI).
- (72) Inventor; and
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CH, CN, CO, CR, CU, CZ (utility model), CZ, DE (utility model), DE, DK (utility model), DK, DM, DZ, EC, EE (utility model), EE, ES, FI (utility model), FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, PH, PL, PT, RO, RU, SD, SE, SG, SI, SK (utility model), SK, SL, TJ, TM, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZW.

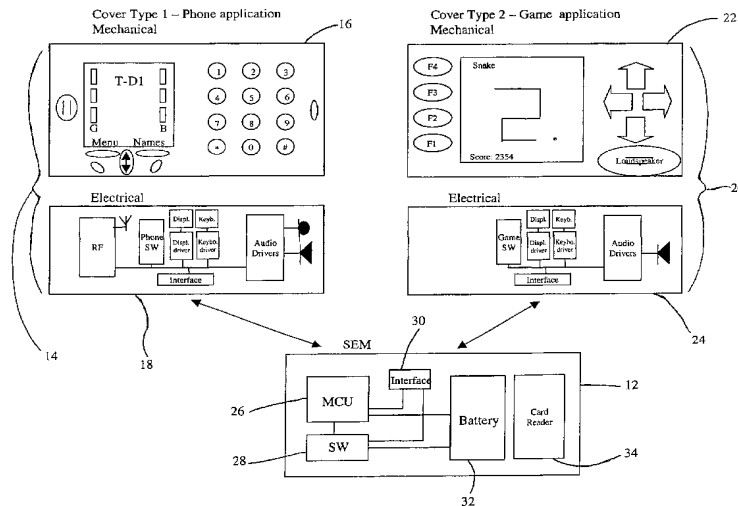
- (84) Designated States (regional): ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Published:
— with international search report

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

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- (81) Designated States (national): AE, AG, AL, AM, AT (utility model), AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA,

(54) Title: REMOVABLE HOUSING COVER FOR A PORTABLE RADIO COMMUNICATION DEVICE



(57) Abstract: The invention provides an electronic mobile communications/entertainment device capable of a plurality of modes of operation, comprising a basic module (12) having circuitry common to the operation of the device in said plurality of modes of operation, and a plurality of supplementary modules (14, 20), each supplementary module being provided in the form of a housing cover for the device and including controlling means configured to provide for a corresponding mode of operation when coupled to the basic module (12), the supplementary modules (14, 20) being interchangeably attachable/detachable to the basic module (12) so as to provide respective modes of operation, and the device only being operational when one of said plurality of supplementary modules (14, 20) is attached to the device.



WO 03/052948 A1

Removable housing cover for a portable radio communication device

- 5 The present invention relates to a portable radio communication device, and more particularly to a suite of removable covers therefor.

Removable covers, such as that disclosed in the Applicant's UK patent number 2, 324, 929, afford an end-user of a mobile phone disclosed in the said patent the
10 facility to swap the front housing cover of the mobile phone with a different front housing cover selected by the user as he or she wishes. In this way, the end-user is empowered to replace the housing cover if he or she wishes to change the appearance of the mobile phone, or to substitute a broken or scratched housing cover, without having to employ the services of a skilled technician.

15

Another type of replaceable housing cover is disclosed in Applicant's co-pending patent application number GB 0030048.3 (published as GB 2,362,071). The invention that is disclosed in GB0030048.3 relates to a removable housing cover that is adapted to be detachably connectable to a mobile phone. In one embodiment the
20 removable cover carries some form of embedded data chip, which data chip is designed to be read by a reader on the mobile phone which results in the alteration of the operating characteristics of the mobile phone, e.g. such as a ringtone or a screensaver.

- 25 Against this background, the present invention in one aspect provides a removable housing cover adapted to be detachably connectable to a portable radio communication device, said removable housing cover being a user selectable one of a range of different removable housing covers having different respective functionalities, the arrangement being such that when a removable housing cover is
30 connected to the portable radio communication device the device is operationally enabled in accordance with the functionality associated with the connected removable housing cover, and when the removable housing cover is disconnected from the portable radio communication device the device is operationally disabled.

Expressed alternately, the present invention resides in a removable housing cover for a portable radio communication device, said removable housing cover being a user selectable one of a range of different removable housing covers having different respective functionalities, the removable housing cover having a control means, the control means providing the operational instructions for enabling the operation of the portable radio communication device in accordance with the functionality associated with the connected removable housing cover, the operational instructions being arranged to be read by a reader associated with the portable radio communication device, whereby the presence and absence of the removable housing cover in relation to the portable radio communication device renders the device active and inactive respectively.

Conveniently, the operational instructions of the removable housing cover are provided on a memory chip, and said memory chip is used as a memory extension for the portable radio communication device when the removable cover is present on the portable radio communication device. In this sense, the operational instructions are not read by a reader as such, but are interfaced with the memory of the portable radio communication device.

By means of this invention, the absence of presence of the removable housing cover in relation to the portable radio communication device determines whether or not the device can be used. Thus, the user of the portable radio communication device is able himself/herself not only to change the outward appearance of the phone, but also to enable/disable the device, which because this requires the presence/absence of a physical component of the device (i.e. the removable housing cover), the invention leads to increased security for the user against unauthorised use of the device. Also, the portable radio communication device can be economically produced, as it implements only limited common functionalities and customisation is achieved with the removable housing cover.

In one form of the invention, the control means that is carried by the removable housing cover comprises a processor for the portable radio communication device, whereby when the removable housing cover is placed on the portable radio communication device, the processor co-operates with the electronic circuitry of the device thereby to provide for an operational device.

In a further embodiment, the device is without an operating system and/or application software, and the removable housing cover includes an operating system and/or application software for the device. In this way, the connection of the removable housing cover with the device renders the device operational.

5

The removable housing cover may include the RF circuitry for the communication device, in which case the RF circuitry would not be present in the device.

In general terms, the approach taken in the present invention is as follows. The removable housing cover is equipped with one or more application specific elements to provide some given functionality; the application elements may be embodied in a readable software module, or connectable electronics hardware. When the user wishes to change the user interface, or the type of application, he/she removes the housing cover currently attached to the phone, for example by using the releasable attachment means described in the Applicant's patent referenced above, the releasable attachment aspects of which are incorporated herein by reference. Then the new housing cover that the user wishes to install onto the phone is located onto the phone and secured in position, again making use of the releasable attachment means. Once in place, the application elements of the removable housing cover interface in a way that co-operates with a corresponding interfacing element provided on the device. When the interfacing element on the device senses the presence of the application element of the removable housing cover, this enables the device to be activated and to operate in accordance with the application element of the removable housing cover.

25

For instance, a user may purchase a removable housing cover with games software functionality. On connecting the housing cover to the phone, the phone is enabled with the ability to allow playing of the particular game. In this way, the phone conveniently is accompanied with a dedicated User Interface that is adapted to game playing.

30

In another aspect, the invention provides an electronic mobile communication/entertainment device capable of a plurality of modes of operation, comprising

a basic module having circuitry common to the operation of the device in said plurality of modes of operation, and
a plurality of supplementary modules,
each supplementary module being provided in the form of a housing cover for the
5 device and including controlling means configured to provide for a corresponding mode of operation when coupled to the basic module,
the supplementary modules being interchangeably attachable/detachable to the basic module so as to provide respective modes of operation,
and the device only being operational when one of said plurality of supplementary
10 modules is attached to the device.

This alleviates the problem experienced when using conventional personal communication devices which typically offer a variety of different applications, but in which any one particular User Interface (UI) cannot facilitate all functionalities
15 corresponding to the different applications in an optimal manner.

In addition, since the basic module includes only a base level of common circuitry and the attachable/detachable supplementary modules contain much of the componentry required to support the particular application, the cost of the basic
20 module can be relatively modest.

Hence, this aspect of the invention offers the possibility to purchase a basic module for a comparatively low price, and add to this, at the choice of the user, one or more supplementary modules in the form of housing covers, thereby providing for
25 applications and functions that the user wishes to have. This aspect of the invention further benefits in that because for a given application the attached housing cover provides a UI that is specially dedicated to that application, the user is able to use the application in the most convenient and user friendly way. Furthermore, any particular housing cover may provide some very basic functionalities for other applications.

30
In order to aid a more detailed understanding of the present invention, various embodiments of the invention will now be described. These should not be construed as necessarily limiting the invention but merely as examples of specific ways of putting the invention into effect. In particular, the invention will be described with
35 reference to the accompanying drawings in which:

- Figure 1 illustrates one embodiment of the invention;
Figure 2 illustrates a second embodiment of the invention;
Figure 3 illustrates a third embodiment of the invention;
Figure 4 illustrates a fourth embodiment of the invention;
5 Figure 5 illustrates a mechanical form of the invention;
Figure 6 illustrates a further embodiment of the invention and
Figure 7 illustrates a further mechanical form of the invention.

Figure 1 shows an embodiment of the present invention comprising a basic module
10 12 in the form herein termed a Standard Entertainment Module (SEM) which in and
of itself is inoperative. Figure 1 also shows a first supplementary attachable module
14 in the form of a removable housing cover 16 which is provided with an application
controller 18 providing phone functionality. When the removable cover 16 is
15 attached to the SEM the application controller 18 interfaces with the SEM so as to
render it operative in accordance with the application controller, thereby to provide
standard phone functionality. Figure 1 further shows a second supplementary
attachable module 20 in the form of a removable housing cover 22 which is provided
with an application controller 24 providing games functionality. When the removable
cover 22 is attached to the SEM the application controller 24 interfaces with the SEM
20 so as to render it operative in accordance with the application controller, thereby to
provide games functionality. Thus it can be seen that the removable housing covers
16 and 22 can be interchangeably attached to the SEM to provide for phone and
gaming functionalities respectively.

25 The features of the SEM 12 include:

- Microprocessor MCU 26,
- Software storage SW 28,
- Interface 30
- 30 - Battery 32,
- Card Reader 34.

It is preferred to include the card reader 34 in the SEM because this may be
constructional more practical than placing the card reader in the housing cover. The

card reader 34 of the SEM might also be useful for taking other kinds of memory cards for memory extension and the like.

5 The SEM may contain other components and circuitry common to the different modes of operation of the SEM. For instance, the SEM may include RF circuitry for a particular cellular communication mode of operation. Equally, the SEM may include fewer components than those described above if certain components can be dispensed with. For instance, the RF circuitry may be absent from the SEM in which case the SEM is adapted to operate in different telecommunication protocols by
10 connecting different covers having for instance GSM, TDMA, UMTS capabilities.

As indicated above, the first supplementary attachable module 14 takes the form of a removable housing cover 16 which is provided with an application controller 18 providing phone functionality. Because the removable cover 16 is designed to
15 provide phone functionality, the User Interface (UI) of the removable cover consists of features necessary for carrying out phone operations. Thus the UI includes a microphone and earpiece, a keypad, a display and menu and control buttons. The application controller 18 associated with the removable cover 16 has components necessary for making and receiving calls, both voice and data, and thus includes e.g.
20 RF circuitry, baseboard software, drivers etc. When the removable cover 16 is snapped onto the SEM 12 the components of the application controller 18 connect up and cooperate with the components of the SEM to enable phone functionality.

Also as indicated above, the second supplementary attachable module 20 takes the
25 form of a removable housing cover 22 which is provided with an application controller 24 providing games functionality. In this case because the removable cover 22 is designed to provide games functionality, the User Interface (UI) of the removable cover 22 consists of features necessary for carrying out gameplay operations. Thus the UI directions keys (or a joystick), a display, and other control buttons. The
30 application controller 24 associated with the removable cover 22 has components necessary for playing computer/video games, and thus includes e.g. memory for games software, drivers etc. When the removable cover 22 is snapped onto the SEM 12 the components of the application controller 24 connect up and cooperate with the components of the SEM to enable games functionality.

35

Turning to Figure 2, there is shown a second embodiment of the invention in which there is an SEM 12 of the type described above, along with two supplementary modules 36 and 38 which can be interchangeably attached to the SEM 12. Supplementary module 36 comprises a removable housing cover 40 which is provided with an application controller 42 providing browsing functionality, so that when the removable cover 40 is attached to the SEM 12 the application controller 42 interfaces with the SEM so as to provide for browsing of the internet. Thus, the removable cover 40 has a UI designed for allowing user friendly browsing, and hence may include a wide display and a QWERTY keypad, as well as control keys. The application controller 42 correspondingly includes browser software and RF circuitry, etc.

Supplementary module 38 comprises a removable housing cover 44 which is provided with an application controller 46 providing combined games and pager functionalities, so that when the removable cover 44 is attached to the SEM 12 the application controller 46 interfaces with the SEM so as to allow for gaming and pager functions. Thus, the removable cover 44 has a UI designed for allowing user friendly gaming and pager messaging, and hence may include a display, games control keys, etc. The application controller 46 correspondingly includes gaming software and pager componentry, etc.

Supplementary modules that provide for combined applications may be advantageous in particular circumstances, for example for a child who is allowed by his parents to use the SEM with a games cover may find a pager functionality useful for receiving short messages (e.g. "Lunch is ready, come home !"). Analogously, in another embodiment, a music application cover might also offer some basic phone functionalities to handle phone calls.

Figure 3 illustrates a further embodiment of the invention in which there is an SEM 12 of the type described above, and two supplementary modules 48 and 50 which can be interchangeably attached to the SEM 12. Supplementary module 48 comprises a removable housing cover 52 which is provided with an application controller 54 providing music functionality, so that when the removable cover 52 is attached to the SEM 12 the application controller 54 interfaces with the SEM so as to provide music applications. Thus, the removable cover 52 has a UI designed for allowing user

friendly music controls, and hence may include control keys such as PLAY, SKIP, EDIT, MP3, RADIO etc. The application controller 54 correspondingly includes a broadcast radio receiver, MP3 software and storage, etc.

5 Supplementary module 50 is a further example of a combined application module which comprises a removable housing cover 56 with an application controller 58 that is capable of providing both games and phone functionalities, so that when the removable cover 56 is attached to the SEM 12 the application controller 58 interfaces with the SEM so as to allow for gaming and phone functions. Thus, the removable
10 cover 56 has a UI designed for allowing user friendly gaming and call handing, and hence may include a display, games control keys, etc. The application controller 46 correspondingly includes gaming software and mobile phone componentry, etc.

Figure 4 illustrates a further embodiment of the invention in which there is an SEM 12
15 of the type described above, and two supplementary modules 60 and 62 which can be interchangeably attached to the SEM 12. Supplementary module 60 comprises a removable housing cover 64 which is provided with an application controller 66 providing music and phone functionality, so that when the removable cover 64 is attached to the SEM 12 the application controller 66 interfaces with the SEM so as to
20 provide music and phone applications. Thus, the removable cover 64 has a UI designed for allowing user friendly music and phone controls, and hence may include control keys such as PLAY, SKIP, EDIT, MP3, RADIO, as well as an earpiece and loudspeaker etc. The application controller 66 correspondingly may include a broadcast radio receiver, MP3 software and storage, RF circuitry, baseboard
25 software etc.

Supplementary module 68 is a general representation of an unspecific module which illustrates the mechanical and electrical sub components of a module.

30 In use there are possibilities of overlap of functionality. For example, the phone function cover might provide a convenient way of storing phone numbers in a phonebook that could be stored in a memory of the SEM. The internet cover offers a convenient keyboard for adding names to the phonebook entries which may also be stored on the SEM. When the user elects to use the music application cover he
35 might be content just to access the phonebook with some keystrokes and choose a

name for dialling and making a phone call. Also the covers may allow for voice dialling which enables to make phone calls without having a keyboard for number/name selection while using the games or music cover.

- 5 Referring to Figure 5, there is shown a schematic arrangement for connecting a supplementary module 72 to the basic module 74. In this arrangement the supplementary module receives the basic module within a cavity or recess 76 that is defined by the walls of the removable cover supplementary module.
- 10 Figure 6 illustrates a further variant of the invention; in this variant the SEM is modified in that it also includes a radio transceiver 78 which is desirable for a user who wishes to have communication possibility always enabled. In this case the supplementary attachable modules do not require to have transceiver, but may simply have UI features that allow use sending and receiving calls. Thus Figure 6
- 15 illustrates two supplementary modules 78 and 80 both of which (although separately providing Internet/PDA and Music applications) can be used to place and receive calls. Supplementary module 78 is an Internet/PDA removable cover optimised in its design for Browsing and PDA operations. This is particularly advantageous because the QWERTY keyboard preferred for internet browsing also provides good capability
- 20 for entering text and other PDA software functions and therefore it is beneficial to add PDA functionality to the cover because a user might wish to use the device for calendar applications, extended phone book function, document control and other functions associated with a PDA. The SEM may contain basic phone SW, while the application SW of the phone for internet browsing and aural communication is
- 25 conveniently provided in the cover.

The embodiment of Figure 6 has a bus structure like connection between the modules in the SEM which provides for more simplified interconnection. The interface between cover and SEM can be named Application Programming Interface

30 API. The SEM interfaces the removable housing cover through a dedicated Application Programming Interface (API). The API specifies how the functionalities of the removable housing cover and the standard functionalities provided by the SEM work together in order to form a product that operates according to the users needs. The API may consist of a set of pre-defined messages that can be exchanged

between the SEM and the removable housing cover in order to access the provided functions in the SEM and cover.

5 Furthermore, in the embodiment of Figure 6, there is a block labelled "Memory" which corresponds to the blocks labelled SW in the SEM of the embodiments of Figures 1 to 4. This indicates that the "Memory" of the SEM of the Figure embodiment, without an attached cover, may not contain SW as such, but instead provides the storage capacity for the SW from the cover. The same can apply to all the previously described embodiments, meaning that rather than storing SW in a memory, they provide only memory which can be loaded with SW from the attached cover. Additionally, it is, in further variants, possible for the SEMs to contain no memory as such, since in such variant it is possible for the MCU of the SEM to access the SW in the cover through the API, in which case the API is a hardware interface comprising a wired connection between the MCU of the SEM and the memory chip in the cover. In such a variant the SW API is a portion of a more extensive hardware and software interface.

20 The SEM may also comprise a display and in this case the removable covers simply provide the display lens. This is illustrated in Figure 7 which shows a display 82 being provided with the SEM 84, and a display lens 86 being provided with the removable cover 88. Alternatively, the SEM might also contain a display with an integrated lens, in which the housing cover does not cover the display and merely has an aperture configured for alignment with the lens.

25 For all embodiments, it may be that the SW relating to an attached cover is erased from the SEM memory upon removal of the cover.

30 Thus, it can be seen that the SEM holds functionality common to a wide variety of different applications, while the removable cover adds specific functionality that adapts the SEM plus cover to the user's needs.

In another form of the invention, the application controller comprises in a memory chip patch that carries data associated with the particular removable cover. The memory chip patch may be embedded during manufacture in the inside surface of the removable cover.

When a new removable cover is installed onto the SEM and secured in position, the memory chip patch of the removable housing cover are brought into registration with a sensor in the form of a reader provided in the SEM. This reader detects the memory chip patches of the removable housing cover and proceeds to read data
 5 from it.

Hence, the reader reads information of the memory chip and certain predefined functionality is transferred to a controller/processor of the SEM. This transfer of data causes the SEM to become operational in accordance with the data transferred from
 10 the chip patch.

Thus, it can be seen that a user can personalise and customise the SEM by the means of choice of removable cover. By combining the SEM with a given cover, the user can generate a usable product that meets his/her particular current requirements. In
 15 addition to the embodiments described above, further examples include:

SEM + cover with ITU-Keypad (Phone Keypad) Phone centric usage

SEM + cover with Joystick dedicated for playing games
 20

SEM + cover with SENSORS dedicated for special purposes

Depending on the sensor, there will be a dedicated design and dedicated SW to process the sensor data. Some examples include:

25 Noise meter- Special design of the cover and special functionality to perform noise measurements,

Distance meters- Special design and functionality to perform distance and area measurements; may be useful for builders and architects,

30 Humidity, Temperature, Air Pressure- Wearable weather station,

GPS Sensor- For navigation, this may require to have a dedicated display for map display,

Sunshine Intensity sensor- personal device to measure the exposure to UV-Rays to prevent sunburn.

- | | | |
|----|---|--|
| 5 | SEM + cover with specific Memory Device | Memory Extension (e.g. for MP3) |
| | SEM + cover with ROM (Game inside) | Cover + Game inside as a bundle |
| 10 | SEM + cover with extra MCU + Memory | Extension of device functionality
This provides a flexible and substantially future-proof variant of the SEM.
The MCU allows the cover to execute its applications without exposing any load to the SEM Microcontroller. |
| 15 | SEM + cover with Adaptation unit | Smart Adapter
The adaptation unit may be for example some means for connecting to other devices such games consoles, PCs, PDAs, TVs, USBs etc. |

In an advantageous embodiment, a cover may contain some functionality that entitles the user do download applications or games from a remote server/service, e.g. Club Nokia. Thus, the SEM may be equipped to download data e.g. from the Internet and transfer this data to a supplementary module application controller. E.g. it may be possible to download a JAVA applet into a Virtual Machine in the Cover MCU. The grant to download of applications may be included in the purchase of the cover. In this case the user can customise his device via the Web.

25 Thus, according to the invention, the user can build up a suite of removable covers relating to the different applications which the user is interested in owning.

The present invention may be embodied in other specific forms without departing from its essential attributes For instance, the mobile phone covers could comprise 30 touchscreen keys rather than a keypad. Reference should thus be made to the appended claims and other general statements herein rather than to the foregoing description as indicating the scope of invention.

35 Furthermore, each feature disclosed in this specification (which term includes the claims) and/or shown in the drawings may be incorporated in the invention

independently of other disclosed and/or illustrated features. In this regard, the invention includes any novel feature or combination of features disclosed herein either explicitly or any generalisation thereof irrespective of whether or not it relates to the claimed invention or mitigates any or all of the problems addressed.

5

The appended abstract as filed herewith is included in the specification by reference.

CLAIMS

1. An electronic mobile communication/entertainment device capable of a plurality of modes of operation, comprising:
 - 5 a basic module having circuitry common to the operation of the device in said plurality of modes of operation, and
 - one or more supplementary modules,
 - each supplementary module being provided in the form of a housing cover for the device and including controller means configured to provide for a corresponding
 - 10 mode of operation,
 - the supplementary modules being interchangeably attachable/detachable to the basic module so as to provide respective modes of operation,
 - and the device only being operational when one of said plurality of supplementary modules is attached to the device.
- 15 2. A device according to claim 1, wherein the controller means of a supplementary module includes a mobile phone application for a telecommunications mode of operation.
- 20 3. A device according to claim 1, wherein the controller means of a supplementary module includes an electronic gaming application for a gaming mode of operation .
4. A device according to claim 1, wherein the controller means of a
- 25 supplementary module includes an internet browsing application for a browsing mode of operation.
5. A device according to claim 1, wherein the controller means of a supplementary module includes a pager application for a pager mode of operation.
- 30 6. A device according to claim 1, wherein the controller means of a supplementary module includes a music application for a music mode of operation.
7. A device according to claim 1, wherein the controller means of a
- 35 supplementary module includes a PDA for a PDA mode of operation.

8. A device according to claim 1, wherein the controller means of a supplementary module comprises one or more control elements for multi-functional modes of operation corresponding to two or more combinations of the control means
5 of claims 2 to.7
9. A device according to any preceding claim, wherein the basic module includes a microprocessor, a memory, a battery and a reader.
- 10 10. A device according to any preceding claim, wherein the supplementary modules have a user interface dedicated to respective modes of operation.
11. A device according to claim 1, wherein the controller means is configured to download a mode of operation from a remote server/service.
15
12. A housing cover for an electronic device,
the housing cover being adapted to be removably detachable with respect to the electronic device, the device having means for interfacing with the housing cover and being inoperative when a housing cover is not attached to it,
20 said housing cover being a user selectable one of a range of different housing covers having different respective functionalities;
each housing cover having a respective control means, such that when a housing cover is coupled to the electronic device the control means of the housing cover couples with means for interfacing of the electronic device, whereby the electronic
25 device is caused to be operational in accordance with the functionality associated with the coupled housing cover.
13. An electronic mobile communication/entertainment device capable of a plurality of modes of operation, and adapted to be couplable to a housing cover of
30 claim 12.
14. An interface module for the electronic mobile communication/entertainment device of claim 1.

15. An electronic mobile communication/entertainment device substantially as hereinbefore described with reference to and/or as shown in the accompanying drawings.
- 5 16. A removable housing cover substantially as hereinbefore described with reference to and/or as shown in the accompanying drawings.

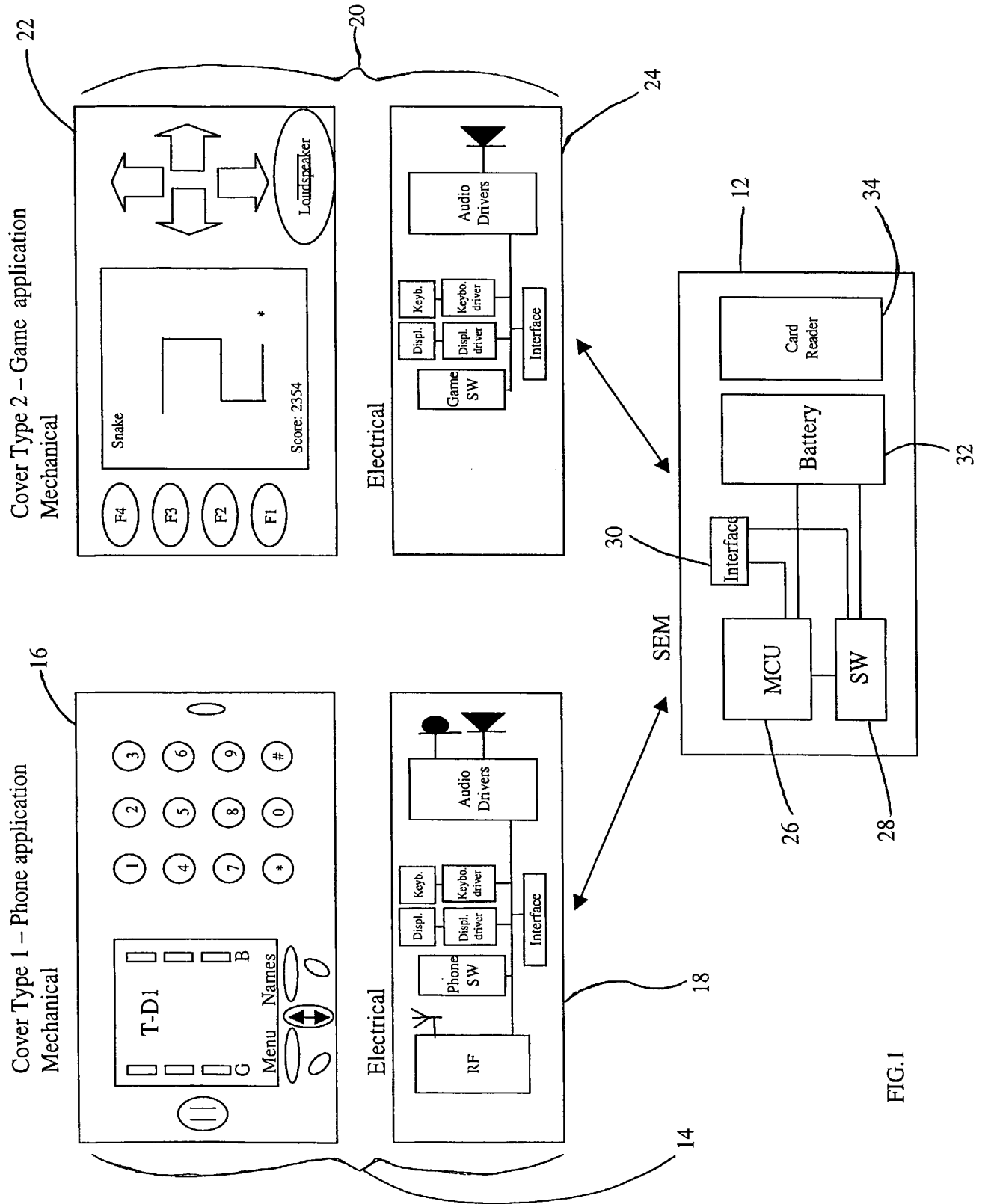


FIG.1

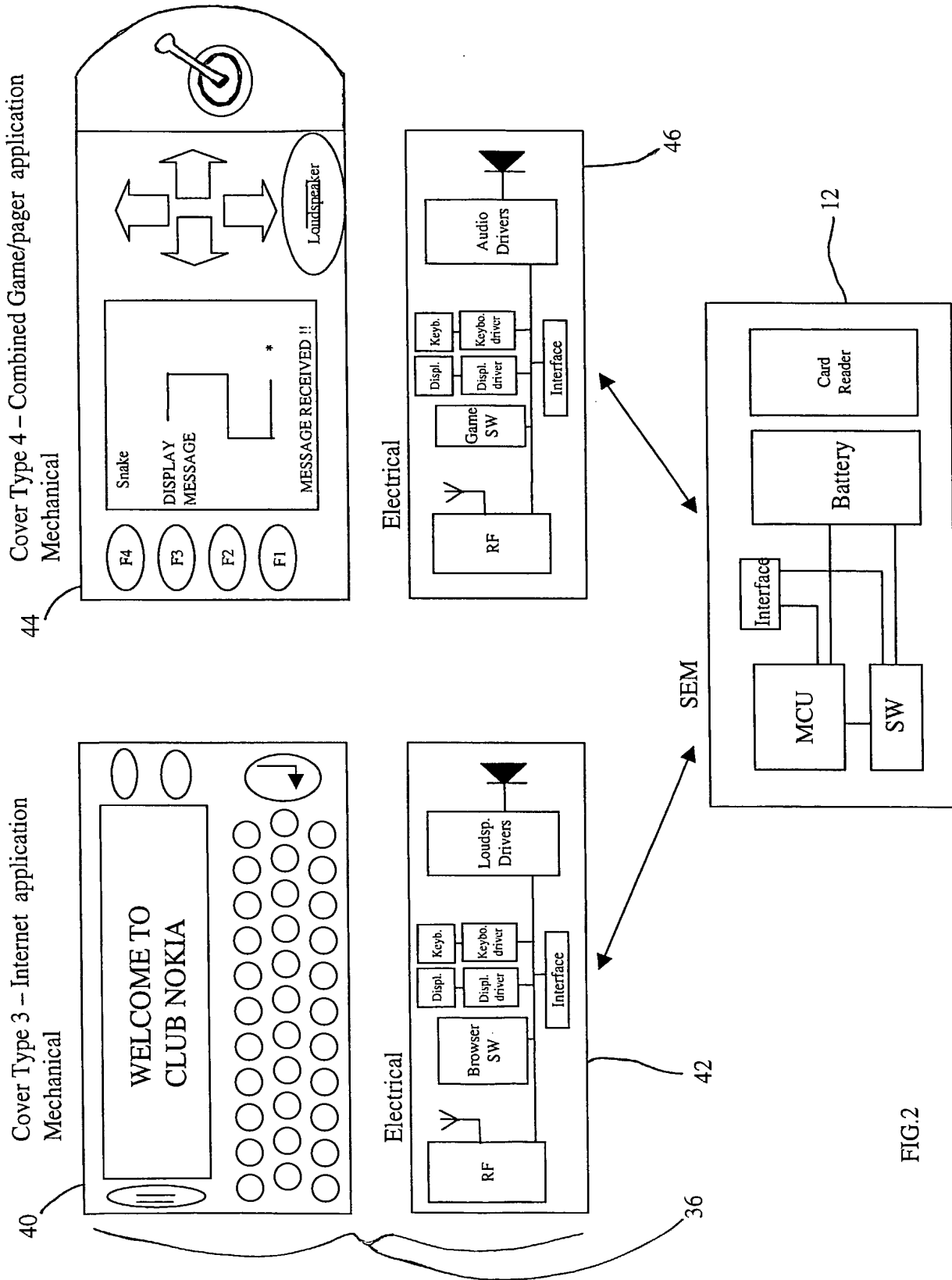


FIG.2

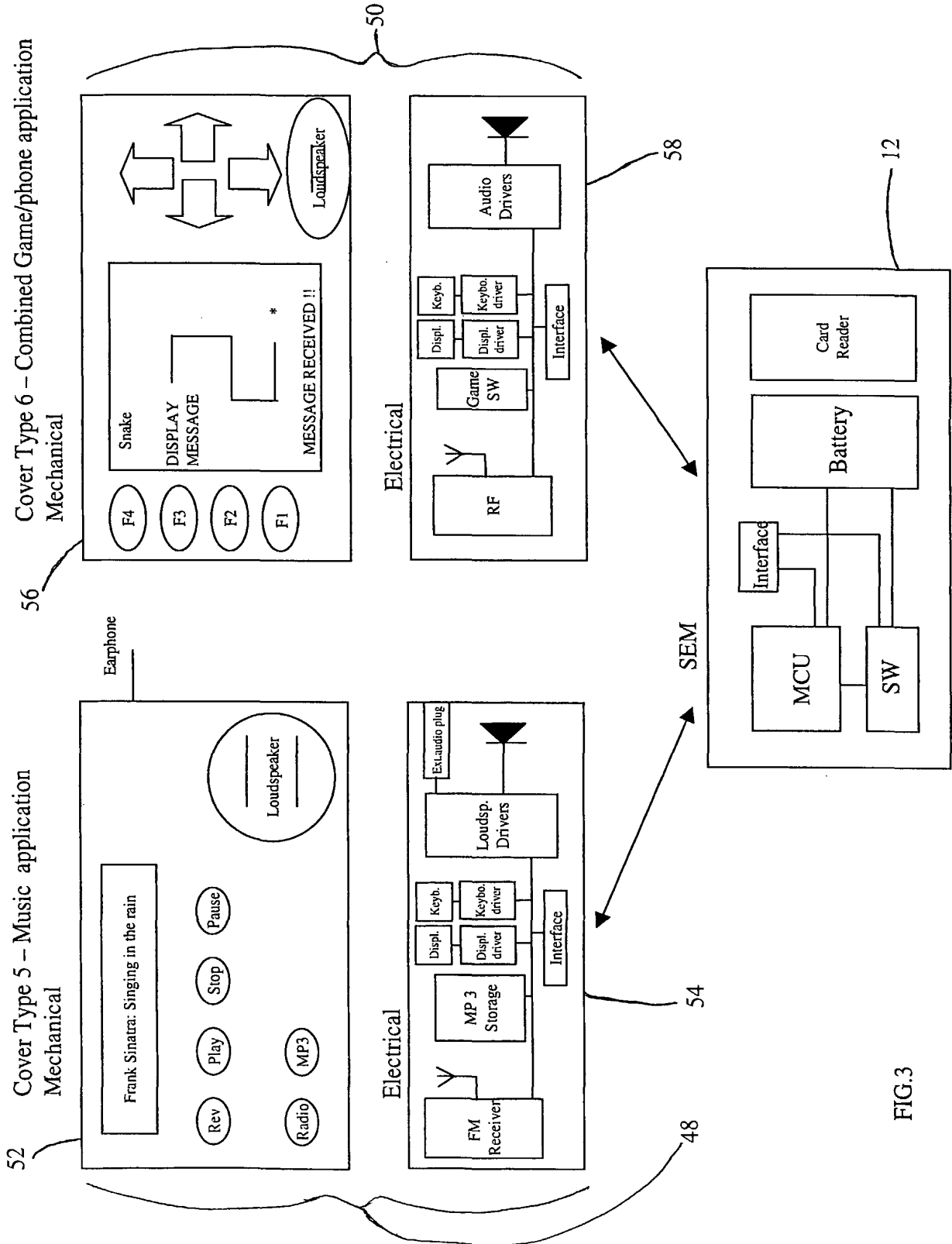


FIG.3

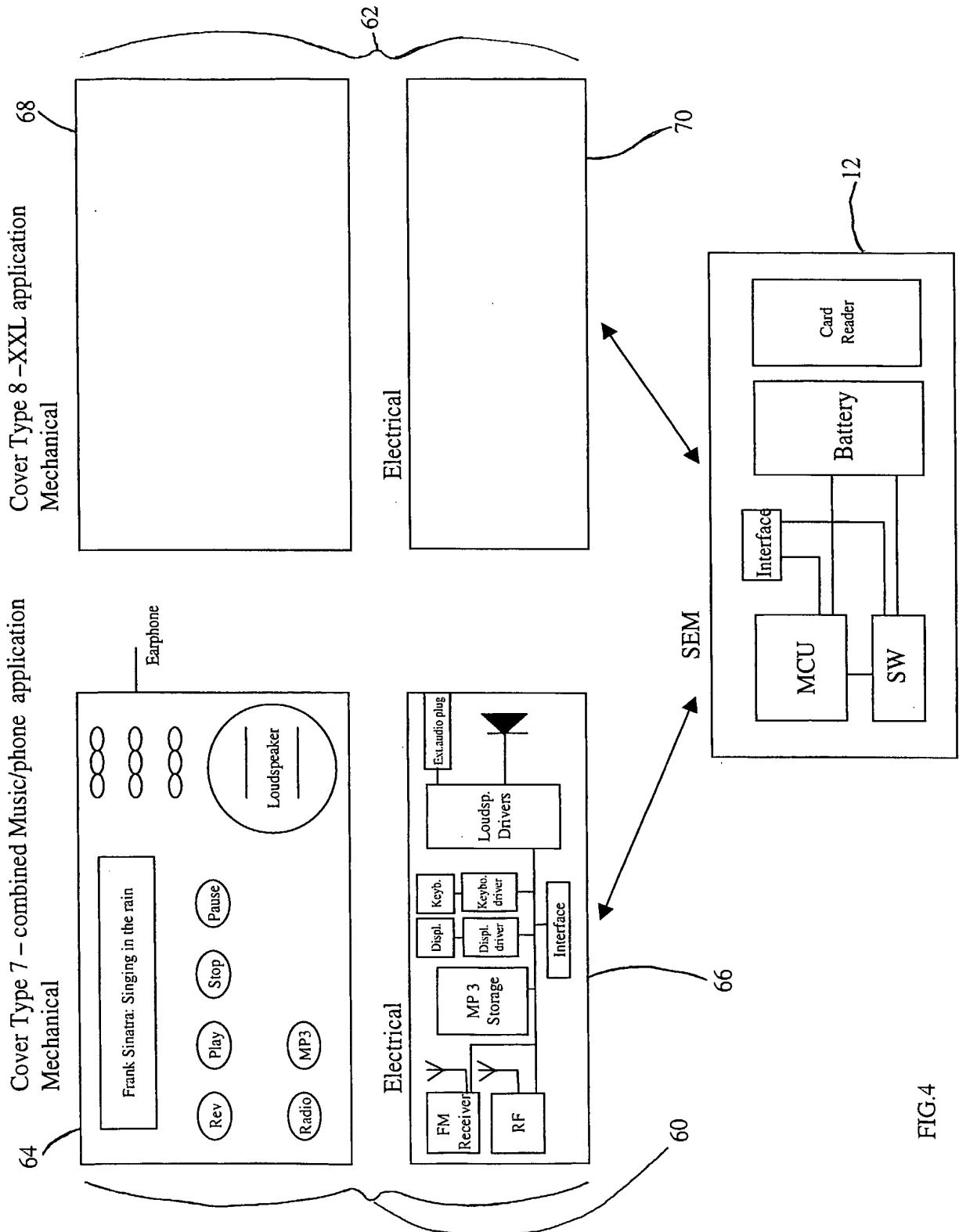


FIG.4

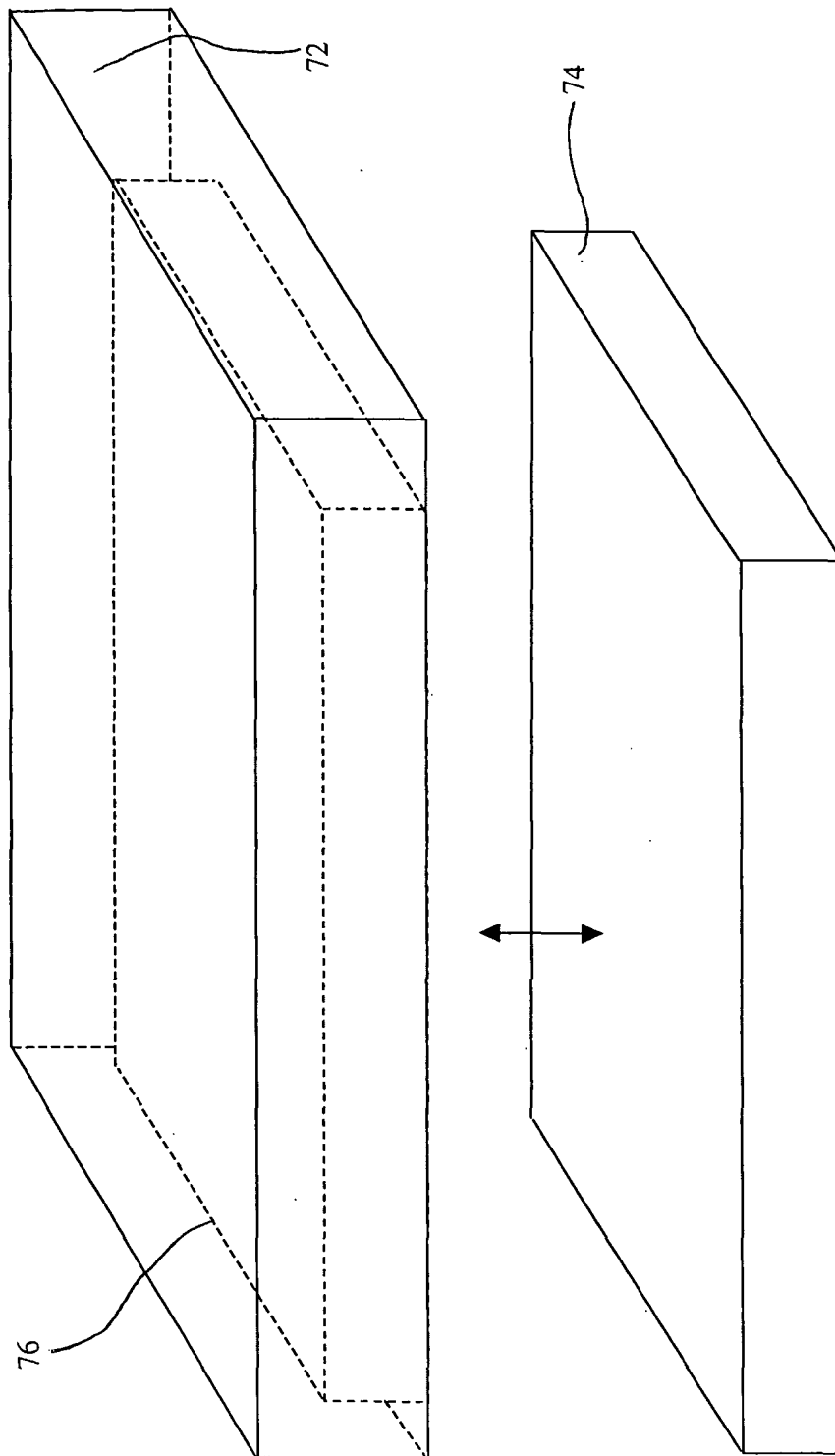


FIG.5

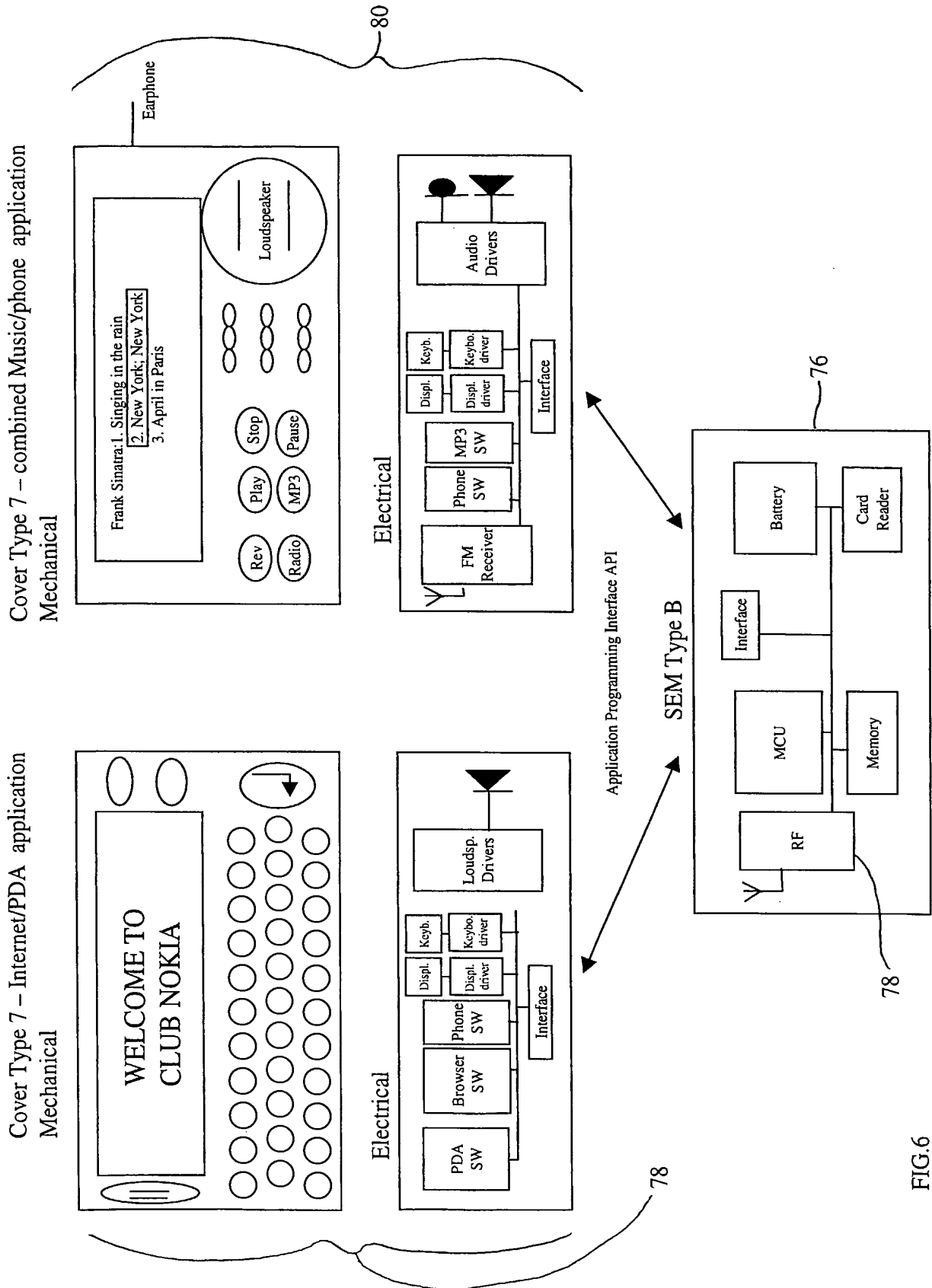


FIG.6

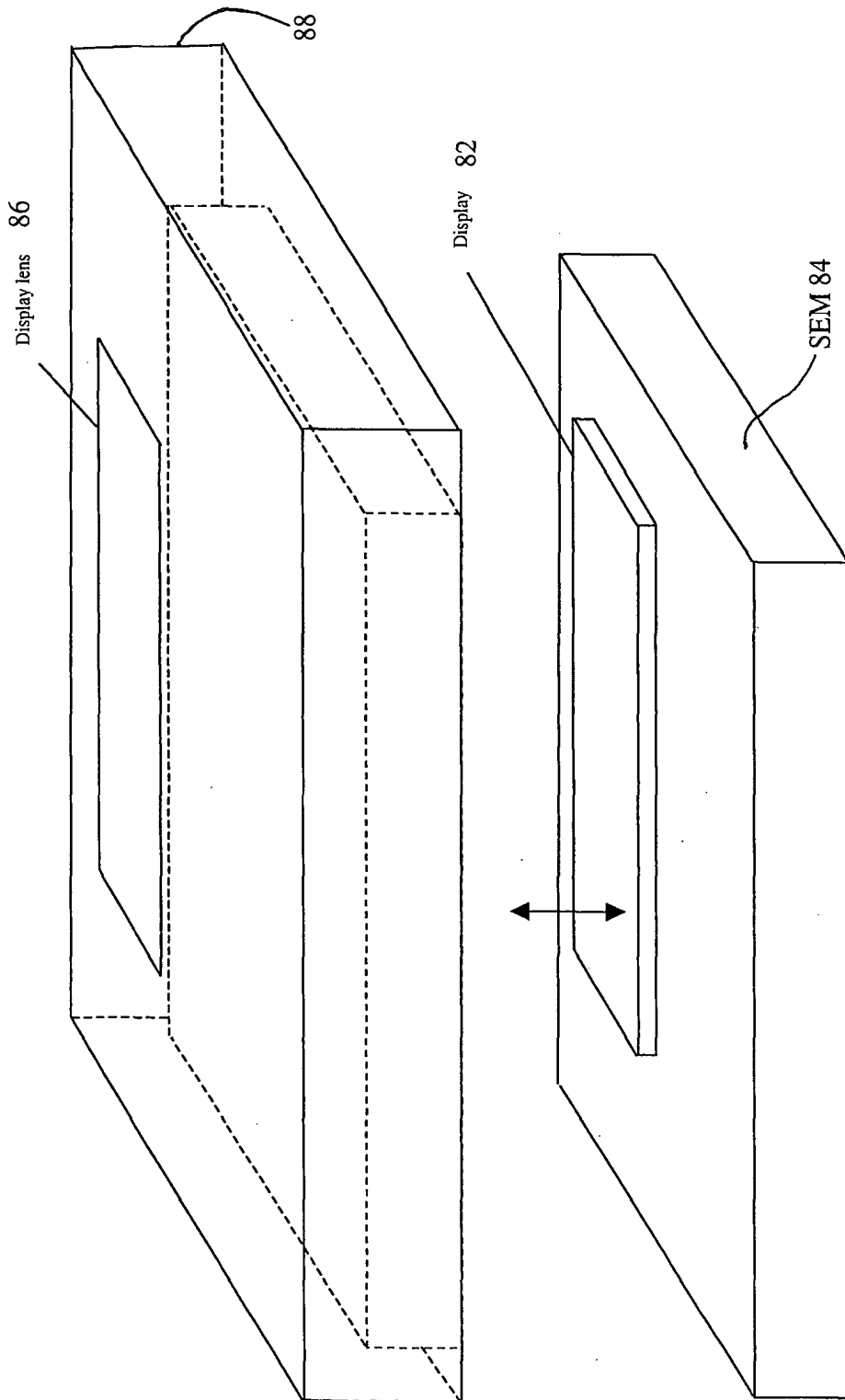


FIG.7

INTERNATIONAL SEARCH REPORT

International application No.
PCT/IB01/02809

A. CLASSIFICATION OF SUBJECT MATTER

IPC(7) :HO4B 1/38
US CL :455/90

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

U.S. : 455/90,575,558,556,550,66,74,558

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 6,118,986 A (HARRIS et al) 12 September 2000, col. 2, lines 50-58 and col. 8, lines 27-56.	1-3,5,8,9, 10,12,13
A		4,6,7,11
A	US 5,661,641 A (SHINDO) 26 August 1997, entire document.	1-13

Further documents are listed in the continuation of Box C. See patent family annex.

* Special categories of cited documents:	"I"	later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"A" document defining the general state of the art which is not considered to be of particular relevance	"X"	document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"E" earlier document published on or after the international filing date	"Y"	document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	"&"	document member of the same patent family
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"P" document published prior to the international filing date but later than the priority date claimed		

Date of the actual completion of the international search

01 DECEMBER 2002

Date of mailing of the international search report

19 DEC 2002

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INTERNATIONAL SEARCH REPORT

International application No.
PCT/IB01/02809

Box I Observations where certain claims were found unsearchable (Continuation of item 1 of first sheet)

This international report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

- 1. Claims Nos.: 15-16
because they relate to subject matter not required to be searched by this Authority, namely:

claims reference drawings

- 2. Claims Nos.:
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:

- 3. Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box II Observations where unity of invention is lacking (Continuation of item 2 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

- 1. As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.

- 2. As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.

- 3. As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:

- 4. No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

Remark on Protest The additional search fees were accompanied by the applicant's protest.
 No protest accompanied the payment of additional search fees.



(12) **EUROPÄISCHE PATENTANMELDUNG**

(43) Veröffentlichungstag: **02.01.2004 Patentblatt 2004/01** (51) Int Cl.7: **G06F 3/02, H04M 1/725**

(21) Anmeldenummer: **03010694.2**

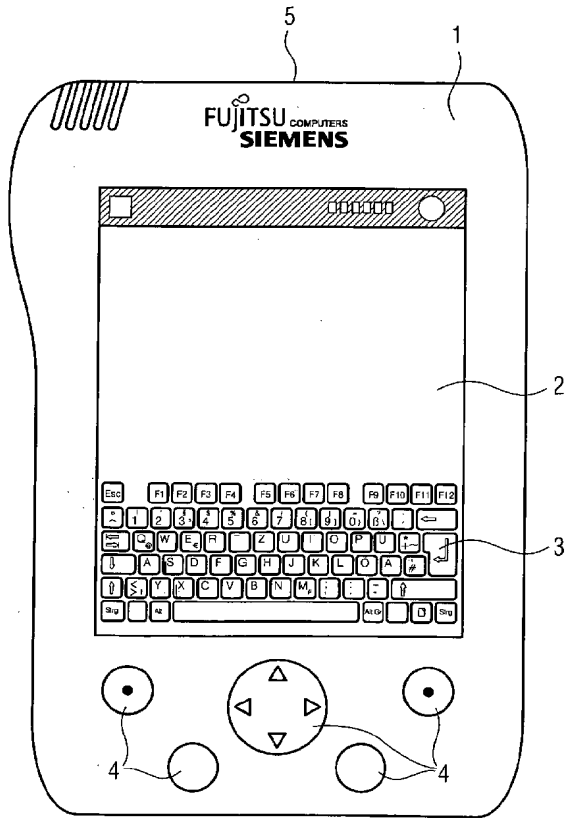
(22) Anmeldetag: **13.05.2003**

<p>(84) Benannte Vertragsstaaten: AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HU IE IT LI LU MC NL PT RO SE SI SK TR Benannte Erstreckungsstaaten: AL LT LV MK</p> <p>(30) Priorität: 28.06.2002 DE 10229068</p> <p>(71) Anmelder: Fujitsu Siemens Computers GmbH 81739 München (DE)</p>	<p>(72) Erfinder: • Gerstner, Robert 86163 Augsburg (DE) • Filimon, Diana 86368 Gersthofen (DE)</p> <p>(74) Vertreter: Epping Hermann & Fischer Ridlerstrasse 55 80339 München (DE)</p>
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(54) **Tragbares computerbasiertes Eingabegerät**

(57) Die Erfindung betrifft ein tragbares computerbasiertes Gerät, wobei tragbare computerbasierte Geräte wie z. B. PDA, Handy oder Notebook als Bedienelement für zweite computerbasierte Geräte einsetzbar

sind. Ein erfindungsgemäßes tragbares computerbasiertes Gerät ist in der Lage, Mouse- und Tastatureingaben für ein anderes Gerät zu emulieren und an das fernzusteuende zweite computerbasierte Gerät zu übermitteln.



EP 1 376 319 A1

Beschreibung

[0001] Die Erfindung betrifft ein tragbares computerbasiertes Gerät.

[0002] Tragbare computerbasierte Geräte wie PDAs (Personal Digital Assistant), Handys (Mobiltelefon) oder Notebooks (tragbarer Computer) erfreuen sich aufgrund ihrer kompakten Bauform immer größerer Beliebtheit. Zudem besitzen die Geräte Funk und IR-Schnittstellen die zur Übertragung von Daten geeignet sind. Diese Geräte befinden sich auch aufgrund ihrer ureigensten Aufgabe stets in Reichweite eines Anwenders.

[0003] Dennoch ist der Einsatzbereich dieser Geräte begrenzt. Dies steht im deutlichen Gegensatz zu dem oftmals sehr hohen Anschaffungspreis für diese Geräte. Es ist deshalb wünschenswert, die Einsatzmöglichkeiten solcher, hochpreisigen, tragbaren und computerbasierter, Geräte zu erweitern.

[0004] Es sind für tragbare computerbasierte Geräte wie zum Beispiel PDA's Anwendungen bekannt, die den ursprünglichen Einsatzzweck von PDA's dahingehend erweitern, daß diese Geräte als vielseitige Fernbedienungen für Geräte der Unterhaltungselektronik, wie TV-Geräte oder HiFi-Geräte einsetzbar sind. Anwendungen dieser Geräte als Bedienelemente, bzw. Eingabegeräte für computerbasierte Geräte sind nicht bekannt. Wesentliche Bedienelemente dieser zweiten computerbasierten Geräte sind z. B. Mouse und/oder Tastatur, womit die Anwendungen des Computers mit Daten gefüttert und bedient werden. Alternativ sind solche Eingabegeräte auch als drahtlose Geräte bekannt, die über eine Funk- oder Infrarotstrecke mit dem zweiten computerbasierten Gerät verbunden sind.

[0005] Es ist die Aufgabe der Erfindung, diese Situation zu verbessern.

[0006] Diese Aufgabe wird durch computerbasierte tragbare Geräte gemäß Patentanspruch 1 gelöst und in den untergeordneten Ansprüchen vorteilhaft weitergebildet.

[0007] Dabei werden tragbare computerbasierte Geräte wie z. B. PDA, Handy oder Notebook als Bedienelement für zweite computerbasierte Geräte einsetzbar. Ein erfindungsgemäßes tragbares computerbasiertes Gerät ist in der Lage, Mouse- und Tastatureingaben für ein anderes Gerät zu emulieren und an das fernsteuernde zweite computerbasierte Gerät zu übermitteln. Die Vorteile eines solchen tragbaren computerbasierten Gerätes lassen sich wie folgt zusammenfassen:

1. Durch Nutzung von Standardübertragungswegen ist eine Vielzahl von zweiten computerbasierten Geräten ansteuerbar.

2. Vorhandene-Hardware wie PDA, Handy oder Notebook stellen durch die zusätzlichen Funktionen eine Alternative zu den sonst üblichen, bzw. notwendigen Zusatzgeräten als Bedienelemente dar.

3. Gerätespezifische Eingabegeräte der zweiten computerbasierten Geräte sind ersetzbar.

4. Eine Vielzahl von drahtlosen Anbindungsmöglichkeiten auf das zu steuernde zweite computerbasierte Gerät, wie z. B. WLAN, IR, "Bluetooth" ist nutzbar.

5. Komplexe Bedienungsschritte wie z. B. Tastenkombinationen oder Tasteneingabefolgen können zusammengefasst werden und dann durch eine einfache Aktion wie zum Beispiel einem Tastendruck, oder ein Schriftkürzel, abgerufen und übermittelt werden.

[0008] Vorteilhafte Ausführungsformen des tragbaren computerbasierten Gerätes sind z. B. ein PDA, Handy oder Notebook mit Infrarotanbindung an ein zweites computerbasiertes Gerät. Mit diesem tragbaren computerbasierten Gerät eröffnen sich vielseitige Bedienungsmöglichkeiten für das zweite computerbasierte Gerät. So sind, über die am Display des PDAs angezeigte PopUp-Tastatur, Tastenkombination für die Emulation komplexer Befehlsketten erzeugbar. Desweiteren ist der Touchscreen des PDA als Touchpad für das zweite computerbasierte Gerät benutzbar. Ebenso sind, spezielle Mousebewegungen bzw. Mousepositionierungen per Software oder per Tastendruck durchführbar. Dazu gehören zum Beispiel die Positionierung der Mouse oder des Cursors in eine der Bildschirm oder Display-Ecken oder die Positionierung der Mouse oder des cursors in die Mitte des Bildschirms oder Displays, oder in die Mitte einer der Bildschirm oder Displayseiten. Desweiteren sind vielgenutzte Tastaturkommandos schnell erzeugbar.

[0009] Bei einer Erweiterung der Datenübertragung zwischen dem PDA, Handy oder Notebook auf einen bidirektionalen Datenverkehr, wobei Daten von dem fernsteuernden Gerät an das fernsteuernde Gerät zurücksendbar sind, ergeben sich weitere vielseitige Anwendungsvarianten, zum Beispiel: Information- oder Statusanzeigen des ferngesteuerten Gerätes auf dem tragbaren bzw. fernsteuernden Gerät.

[0010] Das erfindungsgemäße computerbasierte Gerät ist in der Lage, mit verschiedenen Funkprotokollen, wie zum Beispiel "Bluetooth" oder WLAN oder eine Funk-Draht-Kombination mit einem geeignetem Zusatzgerät mit USB, Kontakt zu dem zweiten fernsteuernden computerbasierten Gerät zu halten. Alternativ ist das tragbare computerbasierte Gerät auch über eine drahtgebundene Verbindungsstrecke, z. B. ein USB an das zweite computerbasierte Gerät anschließbar.

[0011] Es ist gemäß einer vorteilhaften Weiterbildung des computerbasierten Gerätes ein Notebook zur Fernsteuerung eines zweiten computerbasierten Gerätes einsetzbar. Damit sind Ferneingaben über die Notebook-Tastatur und Notebook-Mouse realisierbar.

[0012] Sehr vorteilhaft ist auch die Möglichkeit einer

erfindungsgemäßen Weiterbildung eines computerbasierten Gerätes wie beispielsweise eines Handys, wobei dies zur Emulation einer Mousefunktion gegenüber einer Menübedienung eines TV-Geräts heranziehbar ist.

[0013] Im folgenden ist die Erfindung unter der Bezugnahme auf ein Ausführungsbeispiel und eine Zeichnung erläutert. Die Figur zeigt einen erfindungsgemäßen PDA, stellvertretend für andere computerbasierte Geräte.

[0014] Der erfindungsgemäße PDA 1 weist eine Schnittstelle 5 auf. Diese Schnittstelle 5 ist alternativ als Funk- oder Infrarotschnittstelle ausgeführt, wobei im Falle einer Funkschnittstelle diese den Protokollen von zum Beispiel "Bluetooth" oder WLAN entspricht.

[0015] Desweiteren verfügt der PDA 1 über einen Touchscreen bzw. Touchpad 2, das vorzugsweise als Eingabeelement für Mousepositionierungen gegenüber dem zweiten computerbasierten Gerät dient.

[0016] Desweiteren weist der PDA 1 am unteren Ende 3 des Touchscreen eine Darstellung einer vollständigen Tastatur auf, wobei die Zeichen durch Berührung mit einem spitzen Gegenstand ausgewählt und selbstständig durch den PDA 1 an das zweite computerbasierte Gerät übergeben werden.

[0017] Desweiteren verfügt der PDA 1 über Mousepositionierungstasten 4, die eine schnelle Bewegung des Mousezeigers am ferngesteuerten zweiten computerbasierten Gerät in ganz vorbestimmte Positionen wie z. B. links oben, rechts unten, links unten, rechts unten oder Bildschirmmitte, oder wahlweise auch in andere vorbestimmte Positionen ermöglichen.

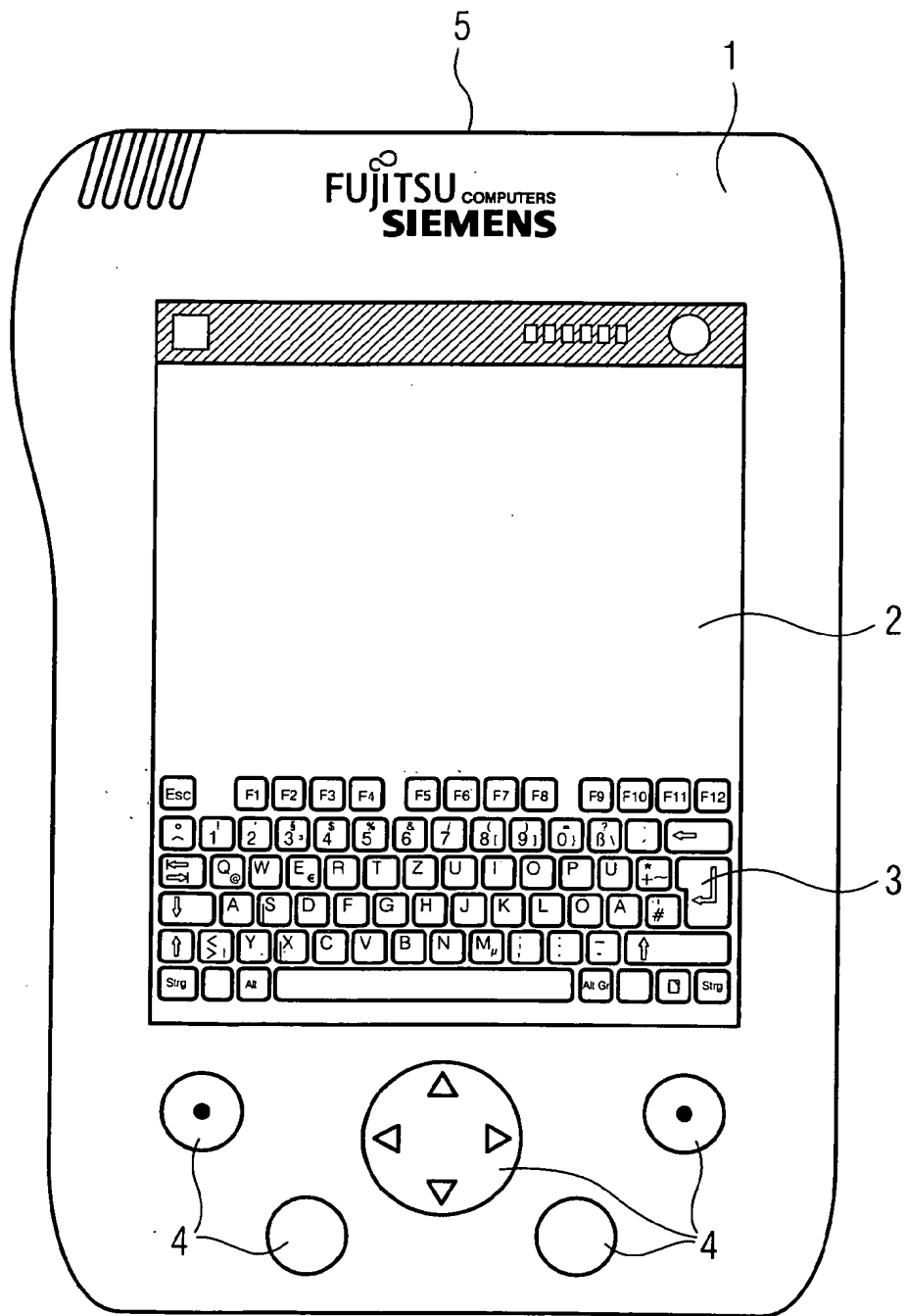
[0018] Zunächst ist vorstehend die Anwendung für computerbasierte Geräte wie zum Beispiel PDAs, Handys, oder Notebooks beschrieben, wobei diese ein zweites computerbasiertes Gerät wie PCs oder ähnliches bedienbar machen. Die Erfindung ist jedoch nicht allein an diese Ausführungsbeispiele gebunden. Vielmehr ist klar erkennbar, daß der Grundgedanke der Erfindung auf weitere Kombinationen computerbasierter Geräte anwendbar ist.

Patentansprüche

1. Tragbares computerbasiertes Gerät wie zum Beispiel PDA, Handy oder Notebook, als Bedienelement für ein zweites computerbasiertes Gerät, **dadurch gekennzeichnet, daß** das tragbare computerbasierte Gerät als Eingabegerät, wie zum Beispiel Maus oder/und Tastatur, gegenüber dem zweiten computerbasierten Gerät einsetzbar ist.
2. Tragbares computerbasiertes Gerät nach Patentanspruch 1, **dadurch gekennzeichnet, daß** zur Übertragung der Daten zwischen dem ersten

und dem zweiten computerbasierten Gerät eine Infrarotschnittstelle besteht.

3. Tragbares computerbasiertes Gerät nach Patentanspruch 1, **dadurch gekennzeichnet, daß** zur Übertragung der Daten zwischen den beiden computerbasierten Geräten eine Funkverbindung besteht.
4. Tragbares computerbasiertes Gerät nach Patentanspruch 3, **dadurch gekennzeichnet, daß** die Funkverbindung gemäß den Protokollen von "Bluetooth" oder WLAN oder GSM/GPRS durchgeführt wird.
5. Tragbares computerbasiertes Gerät nach Patentanspruch 1, **dadurch gekennzeichnet, daß** zur Übertragung der Daten zwischen den beiden computerbasierten Geräten eine Drahtverbindung besteht.
6. Tragbares computerbasiertes Gerät nach Patentanspruch 5, **dadurch gekennzeichnet, daß** die Drahtverbindung nach den Protokollen von seriellen Verbindungen, USB, Firewire oder LAN durchgeführt wird.
7. Tragbares computerbasiertes Gerät nach einem der vorhergehenden Patentansprüche, **dadurch gekennzeichnet, daß** ein Touchscreen des computerbasierten Gerätes als "Remote Touchpad" nutzbar ist.
8. Tragbares computerbasiertes Gerät nach einem der vorhergehenden Patentansprüche, **dadurch gekennzeichnet, daß** Bewegungen und/oder Positionierungen des Mousezeigers/Cursors auf dem zweiten computerbasierten Gerät durch vorbestimmte Tasten ausführbar sind.
9. Tragbares computerbasiertes Gerät nach einem der vorhergehenden Patentansprüche, **dadurch gekennzeichnet, daß** Tastatureingabefolgen des zweiten computerbasierten Gerätes durch vorbestimmte Tasten auf dem tragbarem Gerät ausführbar sind.
10. Tragbares computerbasiertes Gerät nach einem der vorhergehenden Patentansprüche, **dadurch gekennzeichnet, daß** die Datenübertragungswege zwischen dem computerbasierten Gerät und dem zweiten computerbasierten Gerät bidirektional sind.





Europäisches
Patentamt

EUROPÄISCHER RECHERCHENBERICHT

Nummer der Anmeldung
EP 03 01 0694

EINSCHLÄGIGE DOKUMENTE			
Kategorie	Kennzeichnung des Dokuments mit Angabe, soweit erforderlich, der maßgeblichen Teile	Betrifft Anspruch	KLASSIFIKATION DER ANMELDUNG (Int.Cl.7)
X	US 5 307 297 A (YAMANAKA YASUMASA ET AL) 26. April 1994 (1994-04-26) * Spalte 1, Zeile 10,11 * * Spalte 2, Zeile 5,6 * * Abbildung 1 *	1-10	G06F3/02 H04M1/725
X	US 2002/008693 A1 (GLADWIN S CHRISTOPHER ET AL) 24. Januar 2002 (2002-01-24) * Zusammenfassung * * Absatz [0008] * * Absatz [0026] * * Abbildung 1A *	1-10	
X	GB 2 303 945 A (GOODFELLOW JAMES) 5. März 1997 (1997-03-05) * Zusammenfassung * * Seite 3, Zeile 13 * * Abbildungen 1,6 *	1-10	
A	WO 02 09023 A (PSC SCANNING INC) 31. Januar 2002 (2002-01-31) * Seite 10, Zeile 6,35 *	3-6	RECHERCHIERTE SACHGEBIETE (Int.Cl.7) G06F H04M
Der vorliegende Recherchenbericht wurde für alle Patentansprüche erstellt			
Recherchenort	Abschlußdatum der Recherche	Prüfer	
MÜNCHEN	16. Juni 2003	Pohl, M	
KATEGORIE DER GENANNTEN DOKUMENTE		T : der Erfindung zugrunde liegende Theorien oder Grundsätze E : Älteres Patentdokument, das jedoch erst am oder nach dem Anmeldedatum veröffentlicht worden ist D : in der Anmeldung angeführtes Dokument L : aus anderen Gründen angeführtes Dokument & : Mitglied der gleichen Patentfamilie, übereinstimmendes Dokument	
X : von besonderer Bedeutung allein betrachtet Y : von besonderer Bedeutung in Verbindung mit einer anderen Veröffentlichung derselben Kategorie A : technologischer Hintergrund O : mündliche Offenbarung P : Zwischenliteratur			

EPO FORM 1503 03/02 (P4/C03)

**ANHANG ZUM EUROPÄISCHEN RECHERCHENBERICHT
 ÜBER DIE EUROPÄISCHE PATENTANMELDUNG NR.**

EP 03 01 0694

In diesem Anhang sind die Mitglieder der Patentfamilien der im obengenannten europäischen Recherchenbericht angeführten Patendokumente angegeben.

Die Angaben über die Familienmitglieder entsprechen dem Stand der Datei des Europäischen Patentamts am
 Diese Angaben dienen nur zur Unterrichtung und erfolgen ohne Gewähr.

16-06-2003

Im Recherchenbericht angeführtes Patendokument	Datum der Veröffentlichung	Mitglied(er) der Patentfamilie	Datum der Veröffentlichung
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US 2002008693 A1	24-01-2002	US 6292181 B1 US 6092117 A US 5974558 A US 5867106 A US 6209034 B1 US 6137473 A US 6262719 B1	18-09-2001 18-07-2000 26-10-1999 02-02-1999 27-03-2001 24-10-2000 17-07-2001
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EPC FORM P/0481

Für nähere Einzelheiten zu diesem Anhang : siehe Amtsblatt des Europäischen Patentamts, Nr.12/82

Electronic Patent Application Fee Transmittal

Application Number:	11249009			
Filing Date:	11-Oct-2005			
Title of Invention:	HUMAN INTERFACE INPUT ACCELERATION SYSTEM			
First Named Inventor/Applicant Name:	Elaine Chen			
Filer:	Hwa C. Lee/Julie Giordano			
Attorney Docket Number:	19146-005001			
Filed as Small Entity				
Utility Filing Fees				
Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Basic Filing:				
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Miscellaneous:				
Submission- Information Disclosure Stmt	1806	1	180	180
Total in USD (\$)				180

Electronic Acknowledgement Receipt

EFS ID:	2042660
Application Number:	11249009
International Application Number:	
Confirmation Number:	9446
Title of Invention:	HUMAN INTERFACE INPUT ACCELERATION SYSTEM
First Named Inventor/Applicant Name:	Elaine Chen
Customer Number:	20985
Filer:	Hwa C. Lee/Julie Giordano
Filer Authorized By:	Hwa C. Lee
Attorney Docket Number:	19146-005001
Receipt Date:	02-AUG-2007
Filing Date:	11-OCT-2005
Time Stamp:	17:39:56
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment was successfully received in RAM	\$ 180
RAM confirmation Number	2217
Deposit Account	061050

The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows:
Charge any Additional Fees required under 37 C.F.R. Section 1.16 and 1.17

File Listing:

Document Number	Document Description	File Name	File Size(Bytes) /Message Digest	Multi Part /.zip	Pages (if appl.)
1	Information Disclosure Statement (IDS) Filed	19146005001IDS.pdf	85051 a12348c9a968549c828af1cece143ab903da5c6a	no	2
Warnings:					
Information:					
This is not an USPTO supplied IDS fillable form					
2	NPL Documents	19146005001Ref1.pdf	615746 5f912eefabb3e81731d36ab06c2d61e9fc42db26	no	13
Warnings:					
Information:					
3	NPL Documents	19146005001Ref2.pdf	609672 99e92d8c094db58ee91d898aca1ed6a3c4c5fb02	no	14
Warnings:					
Information:					
4	NPL Documents	19146005001Ref3.pdf	2223857 a1a2e03dfa2e10d0d382119493de29d97714628a	no	62
Warnings:					
Information:					
5	NPL Documents	19146005001Ref4.pdf	1611913 ca439b0142cf371bbc8265e39cada99e46cf9af7	no	36
Warnings:					
Information:					
6	NPL Documents	19146005001Ref5.pdf	4985565 f75301d62f875f464da88d91950459cab44265ab	no	81
Warnings:					
Information:					
7	NPL Documents	19146005001Ref6.pdf	962376 317401febdc6b3c8031dc192db98d2e4fd0ff51a	no	26
Warnings:					
Information:					
8	NPL Documents	19146005001Ref7.pdf	281155 bb6b5ef38a0405b9aebc5407c9b90ccfe561621c	no	6
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Information:					

9	Fee Worksheet (PTO-06)	fee-info.pdf	8171	no	2
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Warnings:

Information:

Total Files Size (in bytes):	11383506
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New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

Substitute Form PTO-1449 (Modified) Information Disclosure Statement by Applicant (Use several sheets if necessary) (37 CFR §1.98(b))	U.S. Department of Commerce Patent and Trademark Office	Attorney's Docket No. 19146-005001	Application No. 11/249,009
	Applicant Beth Marcus, et al		
	Filing Date October 11, 2005		Group Art Unit 2629

U.S. Patent Documents							
Examiner Initial	Desig. ID	Document Number	Publication Date	Patentee	Class	Subclass	Filing Date If Appropriate
	AA	2003/0083114	May 1, 2003	Lavin et al.			
	AB						
	AC						
	AD						
	AE						
	AF						
	AG						
	AH						
	AI						
	AJ						
	AK						

Foreign Patent Documents or Published Foreign Patent Applications								
Examiner Initial	Desig. ID	Document Number	Publication Date	Country or Patent Office	Class	Subclass	Translation	
							Yes	No
	AL	EP1253547	Oct 30, 2002	EP				
	AM	WO03/007117	Jan 23, 2003	WIPO				
	AN	DE29823417	June 17, 1999	DE				X
	AO	EP1376319	Jan 2, 2004	EP			Abstract only	
	AP							

Other Documents (include Author, Title, Date, and Place of Publication)		
Examiner Initial	Desig. ID	Document
	AQ	"Developer's Guidelines Bluetooth™ HID remote control (K700, S700, V800 series)" Sony Ericsson, October, 2004
	AR	
	AS	
	AT	

Examiner Signature	Date Considered
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EXAMINER: Initials citation considered. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.



(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
30.10.2002 Bulletin 2002/44

(51) Int Cl.7: **G06K 11/18**

(21) Application number: **01125001.6**

(22) Date of filing: **19.10.2001**

(84) Designated Contracting States:
AT BE CH CY DE DK ES FI FR GB GR IE IT LI LU
MC NL PT SE TR
 Designated Extension States:
AL LT LV MK RO SI

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(30) Priority: **25.04.2001 US 843423**

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(54) **A wireless pen-type input device for computers**

(57) The invention is a modular pen-type speech input device for use with personal computers, palm top computers, personal digital assistants, wearable computers, desktop computers or other general purpose computers. The invention consists essentially of a pen shaped device with integral microphone, rechargeable power supply, wireless transmitter and a plurality of function modules. These modules can be selectively removed or added depending on the desired function set of the user.

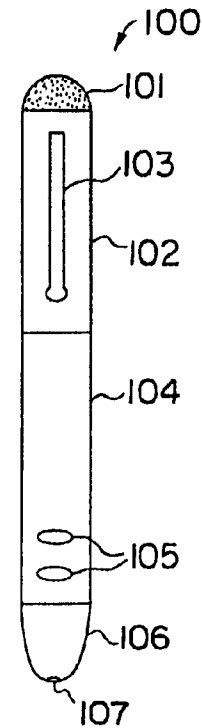


FIG. 1

Description

[0001] The present invention relates to a wireless pen-type input device for computers according to the features of claim 1.

[0002] This application is a continuation-in-part of co-pending U.S. patent application 09/461,870 filed on December 15, 1999 entitled "Mobile Computer with Audio Interrupt System" which is a continuation-in-part of U.S. patent application 09/160,849 filed on September 25, 1998 and also entitled "Mobile Computer with Audio Interrupt System" both of which are hereby incorporated by reference into the present disclosure.

[0003] The invention is essentially a pen-type input device for computers which allows user to input commands using both voice and manual controls integral to the pen device. Optionally, the pen device will serve as a writing instrument.

[0004] The current trend in the computer industry is to optimize the user's interface with the computer. Various ergonomic and efficient products have emerged to liberate users from the typical fixed, wired environment they have been accustomed to. Particular innovations have been made in the field of input devices. Wireless mice, headsets, keyboards, modems and pen tablets, etc. now allow users to input and interface with their PC in a un-tethered or quasi-tethered manner. This has made it possible for PC users to enjoy a more comfortable experience when using their PC's.

[0005] Traditionally, PC users have utilized the tethered computer mouse for activating commands and effecting nontextual input. Today various unwired mouse products are available which permit users to work partially or completely unwired from their computer. Typically, they utilize IR or RF communication if wireless, or use a wired pad which can be "written" on by a wireless pen or stylus. Human speech has also emerged as a popular and convenient method of activating PC's. Various software programs and operating systems are compatible with speech control. IBM Corporation manufactures and markets a commercial speech program under the name VIAVOICE, while L&H Corporation manufactures and markets a similar program under the name NATURALLY SPEAKING. These programs utilize a combination of microphone, sound card, software on the CPU to process verbal commands and even speech dictation (speech to text).

[0006] Diamond Multimedia Corporation manufactures and markets a pointing device called the Gyromouse. The Gyromouse is an egg-shaped pointing device which can work in a desktop or airborne mode. When on the desktop, the mouse moves via rotating ball located on the under side of the mouse, consistent with roller ball type desktop mice. However, the user may selectively switch the device into the air mode whereby an internal gyroscope detects changes in the mouse's position. These changes are converted to electrical signals and transmitted by an internal RF transmitter to a receiver

at the PC.

The mouse case itself also possesses left and right click mouse buttons so that it will operate in a manner familiar to the user. A shortcoming of the Gyromouse is that it is large and awkward to carry. It can not easily be carried in the pocket of a user or discretely attached to his clothing. Additionally, the device lacks any other utility than as a pointing device, except perhaps as a paper weight.

[0007] Wacom Corporation manufactures a wireless pen and mouse combination commercially labeled the Graphire wireless pen and mouse. This device consists of a pressure sensitive pad which sits on a desktop and is wired to a port on a PC. On the pad is a receptacle holding a pen input device and a mouse which sits on the pad. Either device can be used on the pad. The pen device is shaped like a pen but does not have a transmitter or power supply it merely activates pressure points on the pad to effect input. CIC manufactures a similar product known as the Handwriter Manta which is capable of reading handwriting "written" on the pad by the pen-type device. A shortcoming of this device is that the pen and mouse will only work with the special wired mouse pad.

[0008] U.S. patent 4,814,552 teaches an acoustic surface/tablet and handheld stylus for PC activation. The device consists of a tablet surface with several acoustic sensors. Under normal operation a user moves the stylus on the pad. The stylus itself transmits an IR signal and an ultrasound pulse. The sensors on the tablet are able to use triangulation to determine a location of the stylus. This information is then conveyed to the computer. This suffers from the fact that a special purpose tablet is required which adds another piece of bulky equipment to the desktop environment of the user.

[0009] U.S. patent 5,945,981 teaches a wireless pen-type computer input system. The pen device itself includes a LED, at least one switch, a rechargeable battery, and a control circuit. The system also uses a wired work surface or tablet with an optical receiver. The receiver detects the optical output of the LED and transmits this information as position to the PC. The pen device also incorporates a pressure sensitive tip for effecting different levels of saturation. However, this invention suffers from the same limitation as the above mentioned U.S. patent 4,814,552 in that it requires an additional piece of external hardware. Furthermore, the pen device can only be used when in contact with the tablet/sensor surface.

[0010] U.S. patent 5,894,119 teaches a pen device with a bar code scanner in the tip. The pen device has a connection port on the top of it for receiving a headphone jack. The device also possesses an integral power supply and RF transceiver. Users of the device can scan a bar code on CD label and a music sample of the contents of the CD are automatically transmitted wirelessly to the pen device and output over the headphones. This device does not serve as an activation device for PC's.

[0011] U.S. patent 5,671,158 discloses a wireless headset with a display and microphone. The headset communicates wirelessly with a nearby computer to affect control of the computer. Various information can be input and commands issued by the voice of the person wearing the headset. However, the device requires the user to wear a bulky headset and is directed to a different field of endeavor.

[0012] WIPO Documents WO 00101670 and WO 00073981, commonly assigned to Anoto Corporation of Sweden, disclose a character recognition system which is based on a pen-type input device and writing paper with a proprietary micro pattern inked into it. The pen-type device contains a Bluetooth transmitter, a micro-processor, memory, ink, and a camera. As the pen writes over the paper, the camera records the motion via the micro pattern on the paper. This information is then transmitted to any Bluetooth enabled device. This affords input of text and conversion of handwriting to text. However, the invention disclosed in these documents does not work when not utilized on the special writing paper. Additionally, the invention does not provide for speech based control of a Bluetooth enabled device. Furthermore, the inclusion of the camera next to the writing tip of the pen disturbs the symmetry of the pen, making it awkward to hold and write with.

[0013] The Bluetooth protocol has opened the door for the possibility of a wide variety of wireless devices. Bluetooth is a digital wireless protocol which enables computers, communication devices and other narrow to mid bandwidth devices to communicate without wires over short distances. Bluetooth modules capable of receiving signals from any Bluetooth enabled peripheral are now being built into OEM PC's such as those manufactured by Compaq Corporation of Houston, TX, USA. These modules are operable to communicate with a wide variety of Bluetooth enabled devices. Devices such as keyboards, mice, headsets, mobile phones, and even digital cameras will all become Bluetooth enabled devices.

[0014] Thus, there exists a need for a Bluetooth enabled input device which is devoid of the aforementioned shortcomings.

[0015] It is, therefore, an object of this invention to provide an activation device for personal computers which is devoid of the aforementioned limitations.

[0016] It is an additional object of this invention to provide a novel activation device for personal computers.

[0017] It is also an object of this invention to provide a wireless activation device for any Bluetooth enabled device.

[0018] It is another object of this invention to provide a wireless activation device for personal computers.

[0019] It is yet another object of this invention to provide a combination writing pen and activation device.

[0020] It is a further object of this invention to provide a wireless pen-based activation device which accepts voice commands.

[0021] It is still a further object of this invention to provide a wireless pen-based activation device which communicates to a computer using the Bluetooth protocol.

[0022] It is an additional object of this invention to provide a wireless pen-based activation device for a computer which can be used on any flat surface.

[0023] These and additional objects of the present invention are accomplished generally by a wireless pen-based activation device for computers.

[0024] In a preferred embodiment, the present invention is formed into the shape of a pen. At the writing end of the pen is the tip of an ink cartridge or other refillable or replaceable ink dispensing product. The tip of the pen fuselage contains a removable shroud that permits access to the ink so that it can be replaced when the supply of ink has been exhausted. The opposing end of the pen device contains a small microphone. There is a clip on the outside of the fuselage of the pen device so that the device may be easily clipped onto the shirt pocket of a user. Internal to the device is a rechargeable power supply, a control circuit, a Bluetooth transmitter, and a digital signal processor or like signal processing chip. In this preferred embodiment the pen-type input device will be used to assert control of a personal computer. However, other embodiments are contemplated wherein the device can be used to assert control of any electronic device utilizing a Bluetooth receiver. Such devices include appliances, video cameras, photographic cameras, etc. Preferably, at least one activation button will sit on the outside of the pen device so that a user may hold the pen in his hand and click to effect at least a left mouse click. Ideally, at least one additional button will exist allowing a right mouse click or programmable commands or command sequences.

[0025] Through use of the present invention, a user will be able to at least partially control a computer or operating system of a computer or software running on a computer through the use of speech, and/or speech combination with manual controls on the pen-type input device in a wireless manner. This can include functions such as powering the computer on and off, logging into the computer, opening and closing programs and navigating through programs.

[0026] A digital signal processor is a general purpose microprocessor which consumes very low power relative to traditional CPU's and whose architecture is optimized for performing mathematical calculations and filter-type algorithms. The disclosure of co-pending U.S. application 09/677,569, entitled, "Computer Motherboard Architecture with Integrated DSP," is hereby incorporated by reference. This will permit efficient processing of speech by the pen-type into commands so that only the commands will be transmitted to the computer, not requiring the computer to have voice recognition software. Alternatively, the pen will simply digitize and clean the signal and produce a digital signal representative of the spoken words to be transmitted to the computer where it will be interpreted by software and

the CPU.

[0027] In another embodiment, the present invention will replace the ink pen tip with a roller ball which is capable of capturing x-y coordinate data in a manner analogous to a desk top mouse. This will permit a user to roll the pen on any flat surface and affect mouse control without needing a special pressure or light sensitive mouse pad. This x-y coordinate information will be transmitted by the pen's transmitter to a receiving module on the computer which will move the cursor accordingly. Alternatively, this roller ball could be replaced with an eraser style mouse pointer such as is used on laptop devices.

[0028] In yet another embodiment, the present invention will have a laser pointing device in the tip portion of the device which upon activation will cause a stream of laser light to be emitted in direction defined by the axis of the pen device. Preferably, a pressure switch will reside on the tip portion consistent with laser pointing devices known in the art. The laser will be used identically to currently available laser devices such as to draw attention to certain elements when making a presentation, while the control buttons and/or the microphone can be used to drive the presentation.

[0029] The present invention will accommodate each embodiment by employing a core which consists of the fixed nonredundant components and a plurality of specific purpose modules, said modules including the writing pen module, the roller ball module, and the laser pointer module. These fixed components may include the internal electronics, command buffer memory, power supply, fuselage of the pen, microphone, DSP chip, Bluetooth transmitter, control chip and activation buttons.

[0030] In another related embodiment the upper portion of the pen will possess a small LED or like display screen to display to the user in graphical, textual, or icon based format the current active function set of the pen-type input device. Preferably, this screen will reside on a surface of the pen opposite to the pocket clip so as to protect the screen from damage or abrasion.

[0031] In another related embodiment, there is a programmable button on the pen-type input device which allows the user, with the assistance of a computer and software, to assign a specific command or sequence of commands to the button. Alternatively, voice commands received by the microphone can be customized using the same computer and software to affect a command or sequence of commands.

[0032] In another embodiment, a plurality of the pen-type input devices can be used simultaneously to effect a plurality of virtual desktops. For instance, in a collaborative group working environment, where a plurality of persons are present with one or more pen-type input devices of the present invention, a person can assert control of the presentation or their virtual version of the presentation by activating their input device.

They could then pull up the document which is relevant

to their particular question or input in the discussion. Control could then revert back to the group leader by activation of his pen-type input device.

[0033] Additional advantages and characteristics result from the following description of several embodiments of the invention in connection with the drawings. In the drawings are shown:

Fig. 1 illustrates a plan view of an embodiment of the present invention;

Fig. 2 illustrates a plan view of the lower portion of the pen embodiment of the present invention;

Fig. 3 illustrates a plan view of the lower portion of the roller ball embodiment of the present invention;

Fig. 4 illustrates an expanded plan view of the roller ball embodiment of the present invention;

Fig. 5 illustrates a plan view of the lower portion of the laser pointer embodiment of the present invention;

Fig. 6 illustrates a close up plan view of the top end of an embodiment of the device of the present invention;

Fig. 7 illustrates an exemplary circuit diagram of the internal electrical components of an embodiment of the present invention; and

Fig. 8 illustrates a plan view of an LED screen embodiment of the present invention.

[0034] Specific discussion of the present invention will now be made with respect to the drawing figures. Fig. 1 illustrates an exemplary embodiment of the present invention. It is essentially a pen-type input device for use with personal computers. By "pen shaped" or "pen-type" casing is meant throughout this disclosure and claims a shape similar to a conventional pen as shown in the drawings. For the purposes of this disclosure and claims, personal computers will be taken to include personal digital assistants, palm top computers, hand held computers, desktop computers, or any other general purpose computer. The device is comprised essentially of fixed and variable components. Fig. 1 illustrates a basic embodiment of the present invention, the pen-type input device 100. Components include a microphone 101, a combination antenna/pocket clip 103, and a two part fuselage comprising top portion 102 and bottom portion 104. Additionally, there is shroud 106 with opening 107 and one or more activation buttons 105. Preferably, the fuselage consisting of top portion 102, bottom portion 104, and shroud 106 are composed of a scratch and dent resistant material such as titanium, carbon

steel, or other hard metal and are finished to effect an aesthetic pleasing look, such that when in the pocket of a user it will appear to be a high quality pen such as those known in the art and manufactured by companies such as Waterman Corporation, Parker Corporation, and Mont Blanc Corporation to name a few. The one or more buttons 105 on the lower portion 104 are to affect mouse clicks in a manner analogous to a desktop mouse.

[0035] The microphone 101 in the upper portion 102 should ideally possess a dent resistant grille to protect the actual microphone from damage by contact.

[0036] Fig. 2 illustrates one specific embodiment of the present invention wherein the lower portion 104 is operable to accept a replaceable ink pen cartridge 108. In this manner, the pen-type input device 100 of the present invention can be utilized as an actual writing pen when not in use as a computer input device or in combination thereof. The shroud 106 will preferably be removable by twisting it on a pair of matching threads so that it may be removed and a replacement ink cartridge 108 can be inserted. When the ink cartridge is in the retracted position, it will not protrude beyond the surface of the shroud 106. However, through one of various well known activation means, including twisting the lower portion 104, twisting the shroud 106, clicking the clip 103, or another activation means, the ink cartridge 108 may be selectively engaged for use as a writing tool. The other components of the lower portion 104 including activation button or buttons 105 will be unaffected by the presence or absence of the ink cartridge 108.

[0037] Fig. 3 illustrates an alternative embodiment wherein the ink cartridge 108 of Fig. 2 is replaced by a roller ball 110. A different shroud 109 will attach to the lower portion 104 using either a friction-based attachment means, threaded attachment means, or combination thereof. Perpendicular roller will be housed within the shroud 109 to restrain the roller ball 110 and to provide X-Y coordinate information to the pen device. The activation or mouse buttons 105 will be unaffected by either the presence or absence of the roller ball 110 and shroud 109. Fig. 4 further refines this embodiment illustrating a colored or raised indicator 111 indicating to the user which direction in X-Y space is up. This will enable a user to effectively use the device as a mouse device knowing generally which direction will move the cursor upwards on the plane of the display screen of the computer device he is communicating with.

[0038] Fig. 5 illustrates yet an additional embodiment of the pen-type input device 100 of the present invention which includes a laser pointing device 112 in the lower portion 104 of the pen-type input device 100. The laser pointer component 112 will simply slide into lower portion and will remain secured by the shroud 114. Preferably, the shroud 114 will possess a button or sensor which when touched by the finger of a user will activate the laser device 112. This will cause a laser beam 113 to emanate from the pen-type input device 100 in a di-

rection parallel to the plane defined by the fuselage of the pen-type device 100. It may be desirable for the laser pointing device component to contain its own integral power supply. Alternatively, a single power supply may be utilized by all components of the pen-type input device 100.

[0039] Fig. 6 illustrates a close up of the microphone 101 which appears at the top of the upper portion 103 of the pen-type input device 100. The microphone may have an LED 115 in the center to indicate when the microphone is on and enabled. Turning the microphone on and off can be affected by a pressure switch located under the microphone, such that when pressure is applied to the wire cage covering the microphone it alternatively turns on and off. Optionally, the microphone could be activated by depressing one of the activation buttons 105 on the lower portion 104 of the pen-type input device.

[0040] Fig. 7 illustrates an overview of the basic internal electrical components of the pen-type input device. Essentially, there is a power bus created by a rechargeable power supply 116. The power supply 116 feeds power to all electrical components including the microphone, a CODEC chip 118 for analog to digital conversion of audio signals, a DSP chip 119, the activation buttons 120, the x-y position sensors 121 related to the roller ball 110, and the Bluetooth transmitter 124. While this application specifically discloses the Bluetooth protocol, one of ordinary skill in the art will understand and appreciate that any other efficient wireless protocol may be utilized without departing in spirit or scope from the present invention. Preferably, the power supply 116 will be a rechargeable lithium ion battery, however, one of ordinary skill in the art will understand and appreciate that the battery may be a NiCd, NMHd, Lithium Ion, fuel cell, or other type of currently available or future rechargeable power supply. Preferably, the activation buttons 120 and x-y position sensors and control chip will remain in the powered state so that they may utilized on demand. However, it may also be desirable to have a master control switch which can selectively disable all electrical components in the interest of saving power. When an activation button is depressed this information is sent to the control chip 123 which then hands it to the Bluetooth transmitter 124 to be transmitted to a complementary Bluetooth module 126 on a computer 125 which is not tethered to the pen-type input device 100. A similar process occurs when a roller ball 110 movement is detected whereby this coordinate information is passed on to the control chip 123 and then the Bluetooth transmitter 124 and then transmitted to the computer 125 to effect a cursor movement on the screen.

[0041] Fig. 8 illustrates an alternative embodiment of the pen-type input device 100 in which an LED screen 128 sits on the face of the upper portion 102 which may be positioned 180 degrees opposite to the pocket clip 103. The LED screen 128 may display function icons 129 which illuminate depending upon which attached

components are active. For purpose of example, icons 129 representing a microphone, mouse, ink, transmitter, and laser are shown. Also, it may be advantageous to include a battery icon 130 representative of the power supply or amount of remaining power supply. Alternatively, the icons may be replaced by text or other symbolic representations. Also shown is a master power switch 130 which selectively enables or disables all powered components of the pen-type input device 100.

[0042] When a user desires to use the device 100 in a voice command mode, he or she activates the microphone 117 through one of a plurality of means, and speaks his command such as "open mail". This audio command will be digitized by the CODEC 118 and passed to the DSP 119. The DSP can perform a variety of algorithms on the command to remove noise, match with stored commands or otherwise optimize. Then either a raw digital bit stream or a complete command are passed to the control chip and then the Bluetooth transmitter. When the command is reached at the computer 125, the command will be effected, opening the user's e-mail client, if that is the desired command. Using a combination of the pen-type input device and software running on the computer 125 various macro commands could be created to create a nearly infinite number of command sequences merely by uttering a single word. Alternatively, libraries will be available for the pen to work with specific applications such as the Microsoft Office Suite of applications or a specific web browser or operating system.

[0043] Referring again to Fig. 7, all commands derived from the pen, either voice or otherwise, are buffered and formatted by the control chip 123 and then passed to the Bluetooth transmitter 124 which is discretely housed within the upper portion 102 of the pen-type input device 100. This transmitter communicates with a Bluetooth module on a laptop, palmtop, desktop or other style computer. PCMCIA type Bluetooth modules are at present commercially available. Furthermore, computer manufacturers are now making Bluetooth modules integral to their computers so that a plurality of third party Bluetooth-type device can be utilized with their computer systems.

[0044] The preferred and optimally preferred embodiments of the present invention have been described herein to illustrate the underlying principles of the invention, but it is to be understood that numerous modifications, designs, and alterations may be made without departing from the spirit and scope of this invention.

List of Reference Signs

[0045]

100 input device
101 microphone
102 top portion
103 antenna/pocket clip

104 bottom portion
105 activation button
106 shroud
107 opening
5 108 ink cartridge
109 shroud
110 roller ball
111 indicator
112 laser pointing device
10 113 laser beam
114 shroud
115 LED
116 power supply
117 microphone
15 118 CODEC chip
119 DSP chip
120 activation buttons
121 position sensors
123 control chip
20 124 transmitter
125 computer
126 module
128 LED screen
129 function icons
25 130 battery icon / power switch

Claims

- 30 1. A wireless pen-type input device for computers, the device comprising:
- a pen shaped housing;
 - a microphone;
 - 35 an audio processing circuitry;
 - a power means;
 - means for attachment to a user;
 - a wireless transmitter;
 - 40 at least one removable function module.
2. A wireless pen-type input device according to claim 1, **characterized in that** said power means are formed as a power supply and/or a rechargeable power source, e. g. such as a battery.
- 45 3. A wireless pen-type input device according to claim 1 or 2, **characterized in that** said computer is a personal computer.
- 50 4. A wireless pen-type input device according to any one of the preceding claims, **characterized in that** said means for attachment to a user is formed as a pocket clip.
- 55 5. A wireless pen-type input device according to claim 4, **characterized in that** said pocket clip also functions as an antenna for said transmitter.

6. A wireless pen-type input device according to any one of the preceding claims, **characterized in that** said audio processing circuitry is formed as a speech processing circuitry.
7. A wireless pen-type input device according to any one of the preceding claims, **characterized in that** said wireless transmitter is housed within said housing and is operable to communicate with a wireless receiver attached or integral to a separate electronic device.
8. A wireless pen-type input device according to claim 7, **characterized in that** said separate electronic device is a separate computer device.
9. A wireless pen-type input device according to claim 7 or 8, **characterized in that** said wireless transmitter is a Bluetooth transmitter and said wireless receiver is a Bluetooth module.
10. A wireless pen-type input device according to any one of the preceding claims, **characterized in that** said function module is a module selected from the group consisting of an ink pen module, a lead pencil module, a laser pointer module, and a roller ball type mouse module.
11. A wireless pen-type input device according to any one of the preceding claims, **characterized in that** said audio processing circuitry includes an analog to digital converter.
12. A wireless pen-type input device according to any one of the preceding claims, **characterized in that** said audio processing circuitry further includes a digital signal processor.
13. A wireless pen-type input device according to any one of the preceding claims, **characterized in that** said audio processing circuitry includes a command buffer memory.
14. A wireless pen-type input device according to any one of the preceding claims, **characterized in that** said removable function module is a writing instrument module.
15. A wireless pen-type input device according to any one of the preceding claims, **characterized in that** said module is a roller ball type point device module.
16. A wireless pen-type input device according to any one of the preceding claims, **characterized in that** said module is a laser pointer module.
17. A wireless pen-type input device according to any one of the preceding claims, **characterized in that**
18. A wireless pen-type input device according to any one of the preceding claims, **characterized in that** said function module is a module selected from the group consisting of an ink pen module, a lead pencil module, a laser pointer module, and a roller ball type mouse module.
- said computer device is operable to receive input from a plurality of wireless pen-type input devices simultaneously.

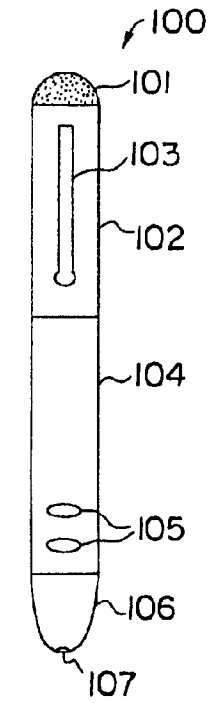


FIG. 1

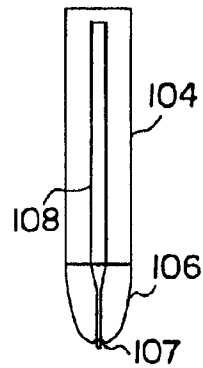


FIG. 2

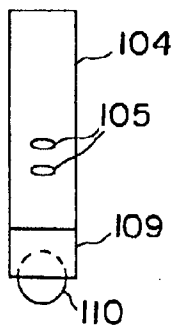


FIG. 3

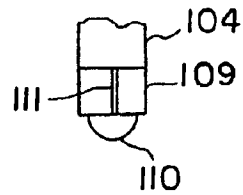


FIG. 4

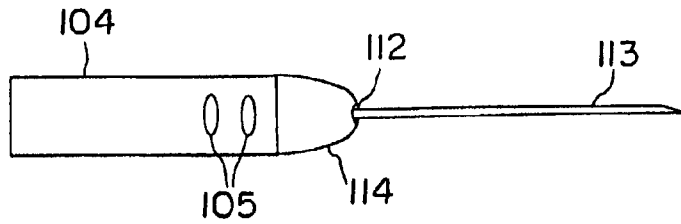


FIG. 5

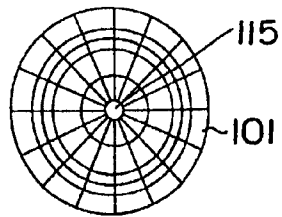


FIG. 6

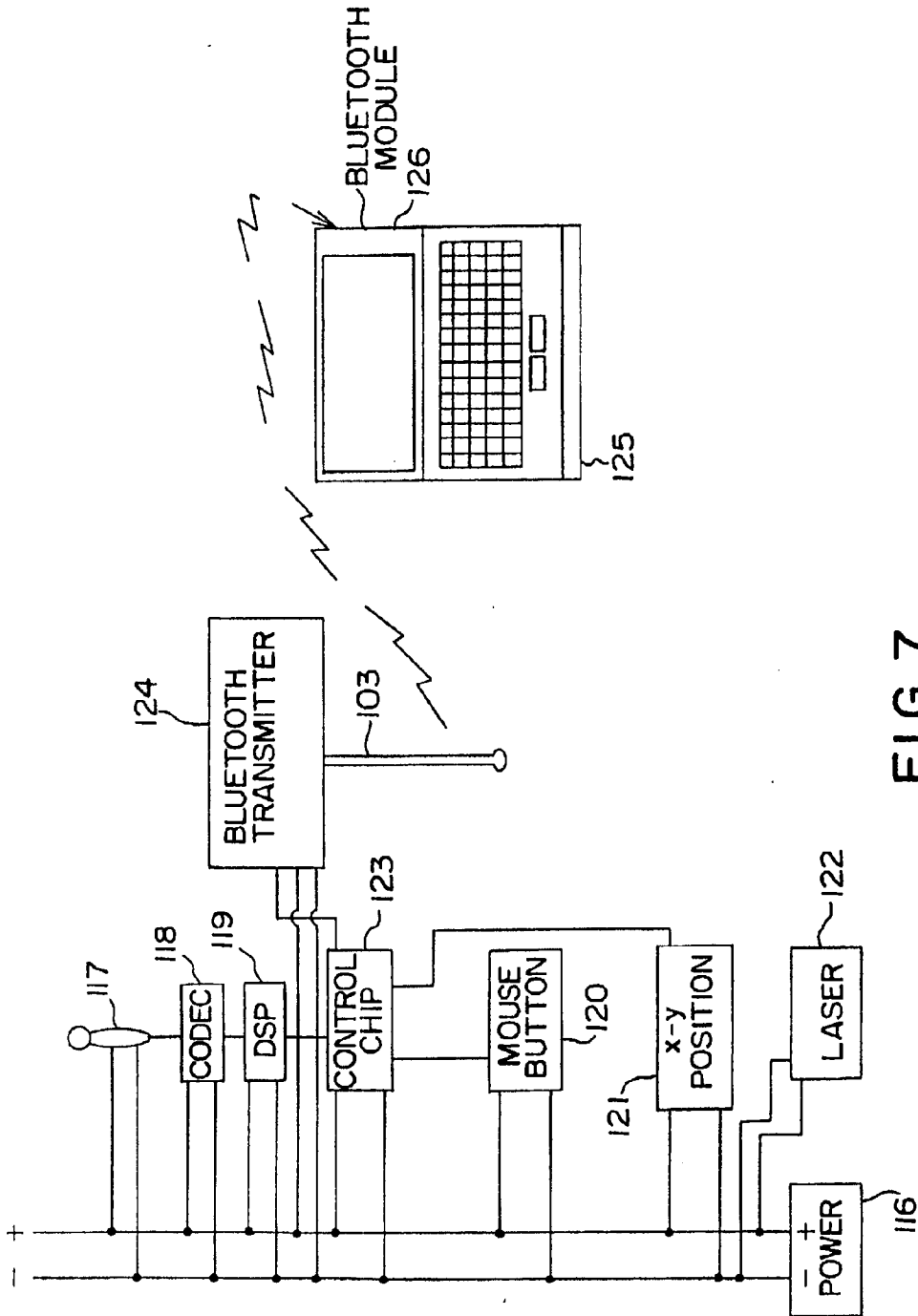


FIG. 7

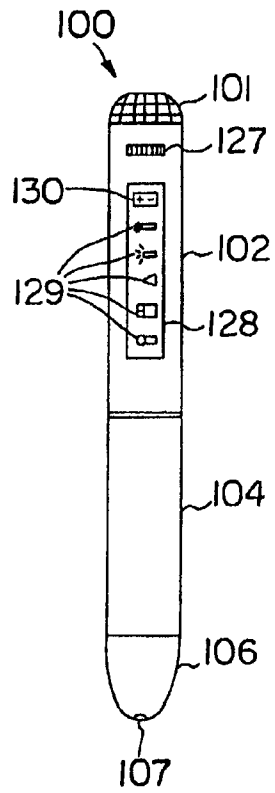


FIG. 8

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau



(43) International Publication Date
23 January 2003 (23.01.2003)

PCT

(10) International Publication Number
WO 03/007117 A2

- (51) International Patent Classification⁷: G06F GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, OM, PH, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZM, ZW.
- (21) International Application Number: PCT/US02/21956
- (22) International Filing Date: 11 July 2002 (11.07.2002)
- (25) Filing Language: English
- (26) Publication Language: English
- (30) Priority Data: 60/304,875 12 July 2001 (12.07.2001) US
- (71) Applicant and
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- (74) Agent: CONNORS, John, J.; Connors & Associates, Inc., 1600 Dove Street #220, Newport Beach, CA 92660 (US).
- (81) Designated States (national): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH,
- (84) Designated States (regional): ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, SK, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).
- Declaration under Rule 4.17:**
— of inventorship (Rule 4.17(iv)) for US only
- Published:**
— without international search report and to be republished upon receipt of that report
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WO 03/007117 A2

(54) Title: PORTABLE, HAND-HELD ELECTRONIC INPUT DEVICE AND COMBINATION WITH A PERSONAL DIGITAL DEVICE

(57) Abstract: A portable electronic data input device includes a housing sized to be held in the palm of one hand. One housing side has four individual dual-position control buttons arranged in a row and positioned to be actuated by an individual finger of a user grasping the input device in the palm of the hand. A multi-position control mechanism in an adjacent housing side comprises a plurality of individual switch contacts arranged in a predetermined pattern that enables a user, while holding the input device in the palm of one hand and the user's other fingers each touching an individual one of the dual-position control buttons, to reach with the thumb of the hand the multi-position control mechanism. Using only the thumb, the user activates any individual switch contact or activates two or more switch contacts simultaneously. The arrangement of the control buttons and multi-position control mechanism provides a chordic-keyboard capable of generating a variety of different electronic signals as determined by the user manipulating the dual-position control buttons, the multi-position control mechanism, or both simultaneously.

1 **PORTABLE, HAND-HELD ELECTRONIC INPUT DEVICE & COMBINATION WITH**
2 **A PERSONAL DIGITAL DEVICE**

3
4 RELATED PATENT APPLICATIONS & INCORPORATION BY REFERENCE

5
6 This application is a PCT application based on U. S. provisional patent application
7 Serial No. 60/304,875, entitled "Portable, Hand-Held Electronic Data Input Device &
8 Combination With Digital Assistant," filed July 12, 2001. This related application is
9 incorporated herein by reference and made a part of this application. Moreover, Applicant
10 incorporates herein by reference any and all U. S. patents, U. S. patent applications, and
11 other documents cited or referred to in this application or cited or referred to in the U. S.
12 patents and U. S. patent applications incorporated herein by reference.

13
14 BACKGROUND OF THE INVENTION

15
16 A personal digital device (PDD) is a very popular device that provides portability for
17 data normally stored in the memory of a computer and allows a user to input data into the
18 PDD and later download this data from the PDD. In many cases it also allows for the
19 transference of data or other digital artifacts (digital artifacts being considered special case of
20 data) via wired or wireless communication systems to other handheld units or data networks.
21 For example, a list of phone numbers may be stored in the memory of a PDD and new
22 numbers added to this memory. Periodically, the memory of the personal digital device is
23 connected to the computer's memory and the new data, such as, for example, new phone
24 numbers, is downloaded into the computer's memory. In other scenarios, data or other digital
25 artifacts (such as sound, images, or messages) captured with the PDD can be sent to other
26 units or networks via wired or wireless communication systems. A personal digital device
27 may be connected to the global computer network (e. g., the internet), it may be a component
28 of a mobile telephone, it may even be connected to a television broadcast or cable network.
29 All forms of communication systems are rapidly converging into a single portable, hand-held
30 unit.

31 There are several disadvantages using state-of-the-art PDDs. It is difficult to input
32 data conveniently. When hand writing on a writing pad, using a pen or stylus, as opposed to
33 using a keyboard, data entry is often inaccurate. Generally, the rate of data input is slow, for

1 example, typically data can only be inputted at a rate of less than 10 words per minute by
2 most users. And despite their portability, PDDs can only be used in a narrow variety of
3 circumstances; they cannot, for example, be used casually while operating a vehicle, walking,
4 or lying down.

6 SUMMARY OF THE INVENTION

7
8 This invention is an improvement in the device disclosed in U. S. Patent No.
9 5,432,510, and it is summarized in the CLAIMS that follow. After reading the following
10 section entitled "DETAILED DESCRIPTION," one will understand how the features of this
11 invention provide its benefits. The benefits of this invention include, but are not limited to:
12 convenience of use, both position and activity independence so it can be used in situations
13 where other data inputs devices cannot, rapid and accurate data input, and the capability to be
14 used with converging communication systems now evolving.

15 Some, but not all, of the features of this invention are:

16 The electronic data input device of this invention is portable. It includes a housing
17 sized to be held in the palm of one hand of a user. This housing has at least one pair of
18 adjacent sides. The housing holds a control circuit having an input and output, and typically
19 comprises a read only memory, a random access memory, and a central processing unit (CPU)
20 connected to the memories. One adjacent side has four individual dual-position control
21 buttons arranged in a row and positioned to be actuated by an individual finger of the hand of
22 a user grasping the input device in the palm of the hand. The housing preferably holds a
23 display that provides a visual readout corresponding to the unique symbol, command, or
24 results of a command (for example a map, graphical or character, different language, etc.) The
25 housing may also hold an audio generator that provides a sound corresponding to the unique
26 symbol, command, or results of a command.

27 In one embodiment, a multi-position control mechanism is employed. This multi-
28 position control mechanism preferably is seated in a depression in the other adjacent side of
29 the housing. The depression preferably is substantially hemispherical. As discussed
30 subsequently in greater detail, the depression is configured to seat therein the underside end
31 portion of a thumb of a user while he or she is grasping the input device in the palm of the
32 hand. The multi-position control mechanism comprises a plurality of individual switch
33 contacts. These switch contacts are arranged in a predetermined pattern that enables a user,

1 while holding the input device in the palm of one hand and his or her other fingers each
2 touching an individual one of the dual-position control buttons, to reach with the thumb of
3 the hand holding the input device the multi-position control mechanism and, using only the
4 thumb, activate any individual switch contact or activate two or more switch contacts
5 simultaneously.

6 The control buttons and multi-position control mechanism are connected via the input
7 to the control circuit. The arrangement provides a chordic-keyboard capable of generating a
8 variety of different electronic signals at the input to the control circuit as determined by the
9 user manipulating the dual-position control buttons, or the multi-position control mechanism,
10 or both simultaneously. The central processing unit (CPU) has a program that converts input
11 signals into signals at the output corresponding to a unique symbol or a unique command
12 depending upon which switch contact or combination of contacts is activated. Thus, in
13 response to activation of the dual-position control buttons, or the multi-position control
14 mechanism, or both simultaneously, the device generates at the output in accordance with the
15 program an electronic signal corresponding to a unique symbol or a unique command as
16 determined by the activation of the buttons or control mechanism.

17 The data input device may include an output connector adapted to connect the device
18 to a computing platform, a communication device or system, a computer network, a personal
19 digital device with or without a display, or with or without a keyboard. For example, the data
20 input device may be connected to a PDD or mobile communication device.

21 22 DESCRIPTION OF THE DRAWING

23
24 The preferred embodiments of this invention, illustrating all its features, will now be
25 discussed in detail. These embodiments depict the novel and non-obvious data input device
26 of this invention and the combination of data input device and PDD as shown in the
27 accompanying drawing, which is for illustrative purposes only. This drawing includes the
28 following figures (Figs.), with like numerals indicating like parts:

29
30 Fig. 1 is a perspective view of the first embodiment of data input device of this
31 invention having visual display screen straddled by a pair of unique multi-position (five
32 position) control mechanisms.

1 Fig. 1A is a perspective view of the data input device shown in Fig. 1 being used as a
2 user interface for a video game or other electronic device having dual input, enabling the user
3 to grasped the input device more conveniently and naturally.

4 Fig. 1B is a perspective view of an embodiment of the data input device of this
5 invention that does not have a visual display screen and is connected to a PDD.

6 Fig. 1C is a plan view of an embodiment of the data input device of this invention
7 connect via a 2-way infrared link to a mobile communications device, such as a cell phone
8 with text messaging capabilities.

9 Fig. 2 is a diagram illustrating the different switch contact positions of each individual
10 contact of the five position control mechanism depicted in each of the embodiments shown in
11 Figs. 1, 1A, 1B, 1C, and 3B.

12 Fig. 3A is a typical conventional switch used in calculator and laptop keyboards.

13 Fig. 3B is an exploded perspective view of the five-position control mechanism used
14 in this invention comprising five of the conventional switches shown in Fig. 3A arranged in
15 accordance with this invention.

16 Fig. 3C is a perspective view of the underside of the key top of the control mechanism
17 shown in Fig. 3B.

18 Fig. 3D is a side elevational view of the key top of the five-position control
19 mechanism shown in Fig. 3B.

20 Fig. 3E is a side elevational view of an embodiment of the data input device of this
21 invention using a one alternate embodiment of the five-position control mechanism.

22 Fig. 3F is a side elevational view of another alternate embodiment of the five-position
23 control mechanism used in this invention.

24 Fig. 4 is an illustration of various switch contact combinations for the five-position
25 control mechanism shown in Figs. 1, 1A, 1B, 1C, 2 and 3B.

26 Fig. 5 is a block diagram of the control circuit for the data input device discussed in the
27 *First Scenario*.

28 Fig. 6 is a block diagram of the control circuit for the data input device discussed in the
29 *Second Scenario*.

30 Fig. 7 is a conventional pager.

31 Fig. 8 is a block diagram of the control circuit for the data input device discussed in the
32 *Third Scenario*.

1 Fig. 9 is a perspective view depicting an embodiment the data input device of this
2 invention incorporated into a conventional, hand-held mobile phone.

3 Fig. 10 is a perspective view depicting an embodiment of the data input device of this
4 invention incorporated into a conventional, hand-held mobile phone, eliminating the
5 conventional alpha-numeric keyboard as shown in Fig. 9 and enlarging its visual display
6 screen.

7 Fig. 11 is a plan view of a conventional PDD adapted to be used with a mountable
8 version of the data input device of this invention shown in Fig. 12A.

9 Fig. 12A is a perspective view of an embodiment of data input device of this invention
10 showing the conventional PDD illustrated in Fig. 11 being mounted to this input device.

11 Figure 12B is a perspective view of an embodiment of this invention showing an
12 alternative mobile communication device, such as a mobile wireless phone with digital artifact
13 messaging capabilities, being mounted to this input device.

14 Fig. 13 is a block diagram of the control circuit for the data input device of used with
15 the embodiment shown in Fig. 12A.

16 Fig. 14 is a view of an astronaut using the data input device of this invention in outer
17 space, a zero gravity environment.

18 DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

19 First Embodiment

20
21
22
23 The input device 10 shown in Fig. 1 has a housing 11 with one side 11a having a pair
24 of five-position control mechanisms 12. Along a side 11b adjacent to side 11a is a row of dual
25 position finger control buttons 14a, 14b, 14c, and 14d. Between the two five-position control
26 mechanisms 12 is a visual display screen 13, for example, a liquid crystal display that
27 displays visual images generated by a control circuit contained within the housing depending
28 on which contact position of the five-position control mechanisms 12, or which dual position
29 control button, or combinations thereof, is actuated by the user. Preferably, the housing 11
30 has a pair of substantially hemispherical depressions 32a and 32b in the side 11a with a five-
31 position control mechanism 12 seated in each depression. This physical arrangement is
32 ergonomically advantageous.

1 The thumb-actuated five-position control mechanism 12 provides upward of 121
2 unique chord combinations. As schematically depicted in Fig. 2, the five-position control
3 mechanism 12 is a 4-way rocker switch (similar to cursor controls used in video game
4 controllers) having contacts a, b, c, and d and a center post e switch contact (marked with a
5 circle). A more detailed explanation of how the five-position control mechanism 12 works
6 appears in the diagram shown in Fig. 4. The large "plus" shape represents the control
7 mechanism 12 with switch contacts a, b, c, and d at the ends of the individual legs, and the
8 large oval o lying diagonally over it represents how a thumb is positioned over the control
9 mechanism in a "normal" position, with the first joint of the thumb resting on (but not
10 depressing) the center post e switch contact. The four arrows and center circle represent
11 pressure-sensitive areas, that when individually depressed close switch contacts. The thumb
12 can actuate each individual switch contact a, b, c, d and e or a combination of switch contacts.
13 This is achieved for example by pressing directly downward to actuate the center post e
14 switch contact or by lateral rotation, or physically repositioning the thumb slightly to actuate
15 switch contact a, b, c, or d. Although the five-position control mechanism 12 has 5
16 depressible switch contacts a, b, c, d, and e, there are 9 most practical combinations which are
17 depicted in the illustrations shown in Fig. 4. (Many other less practical combinations are
18 possible as well such as multiple arrow keys being depressed simultaneously. These
19 combinations may be used, for example, by 3rd party specialized application software.) With
20 the switch contact combinations depicted in Fig. 4, the data input device 10 is now capable of
21 approximately 144 single-chord combinations. All of the switch contact combinations, as
22 well as the 4 other dual position finger buttons 14a, 14b, 14c, and 14d used in the data input
23 device typing scheme, work silently but provide ample tactile feedback to the user.

24 The five-position control mechanism 12 includes a key top 30 (Fig. 3B) and a printed
25 circuit board 24 having five pairs of open electrical contacts 21 and 22 (only one pair shown
26 in Fig. 3A). The key top 30 overlies the circuit board 24 and is mounted to move into one of
27 the five different positions depicted in Fig. 4, depending on how a user manipulates the key
28 top 30, each different position closing one pair of open electrical contacts. The key top 30
29 may be in the form of a substantially cross 31 as depicted in Fig. 1, 1A, or 1B, including a
30 central element 31e with four legs 31a, 31b, 31c, and 31d extending outward from said a
31 central element. One pair of contacts is positioned beneath each of the legs 31a, 31b, 31c, and
32 31d and one pair of contacts 31e is positioned beneath the central element 31e. Alternately,
33 the key top 30 may be circular as shown in Fig. 3C, with a cross on its exterior surface 30a.

1 As depicted in Fig. 1A, the input device 10 provides two-handed user interface. Two
2 five-position control mechanisms 12 are used as an ideal and natural video game interface.
3 Using two hands instead of one, the users' two thumbs operate the pair of control
4 mechanisms 12 simultaneously like a video game controller.

5 6 **Five-Position Control Mechanism**

7
8 A conventional elastomeric switch 16 (those often used in calculator keypads and
9 laptop keyboards, for example) is illustrated in Fig. 3A. It includes a rubberized, hollow
10 dome 18, which contains a conductive polymer at its top 19. The dome 18 sits upon a
11 printed circuit board (PCB) 20 with two exposed (but not touching) electrical contacts 21 and
12 22 in the very center of the PCB. A key top 22 overlying the dome 18 is mounted to move
13 towards and away from the printed circuit board 20. When a force is applied by a user to the
14 key top 22, the switch 16 is closed. Specifically, the user's finger, exerting pressure on the
15 key top 22, depresses the key top. With the key top 22 pressing on the top 19 of the dome
16 18, the dome's shape collapses temporarily, allowing the conductive polymer of the top 19 to
17 bridge the two electrical contacts 21 and 22 on the printed circuit board 20, thereby closing
18 the circuit. When the finger pressure is released, the dome 18 springs back to its original
19 shape, breaking the circuit, and ready for the next actuation.

20 As depicted in Fig. 3B, the five-position control mechanism 12 includes five
21 rubberized domes 18a through 18e arranged on an internal, flat support surface 24a of the
22 printed circuit board 24 of the input device's housing 11 in a cross configuration: one central
23 dome 18e and domes 18a through 18d at each polar position. The center dome 18e, unlike the
24 others, has a small divot 26 at its top 19 that serves as a semispherical pivot point. There are
25 five contact pads 28a through 28e on the underside 30b of the key top 30 in registration with
26 the tops of the domes 18a through 18e. A central pad 28e rests on the central dome 18e and
27 the other pads 18a through 18d are positioned at polar points surrounding the pad 28e.
28 Preferably, the central dome 18e is designed to require a slightly greater actuation force than
29 the other domes 18a through 18d, since it must also act as part of the support structure for
30 key top 30. The key top 30 may have a circular configuration with a cross-shape design on
31 its exterior surface 30a, or it may simply be cross-shaped. In both cases, the key top 30 is
32 manually moveable into the contact positions depicted in Fig. 4 to depress individual domes
33 18a through 18e, or combinations of two or even more domes. In normal operation, the five-

1 position control mechanism 12, when not actuated, has the contact pads 28a through 28e of
2 the key top 30 just touching all 5 rubberized domes 18a through 18e. (The 5-position key
3 top 30 is held in place by the exterior surface of the case.) When a user's thumb presses
4 down on any one of the 5 positions (up, down, left, right, or center), the corresponding pads
5 28a through 28e of the key top 30 will exert a force downward on the rubberized dome below
6 it, thereby completing the circuit by closing the contacts beneath a dome as depicted in Fig.
7 3A. The dome's springing restoration force will also move the five-position key top 30 back
8 to its normal "home" position once the pressure is released.

9 One may wish to place the four outer rubberized domes 18a through 18d at a slight
10 angle as shown in Fig. 3F to better transfer the force of the thumb directly to the top of a
11 rubberized dome.

12

13 **An Alternative Five-Position Thumb Button**

14

15 Fig. 3E depicts another embodiment of the five-position control mechanism, namely
16 mechanism 34, using the same rubberized dome elastomeric switches 16 as described above in
17 Fig. 3A, but arranged differently than that depicted in Figs. 3B and 3F. Four of the five
18 switches 16 are arranged in a semicircle or arc, angled such that they match the natural angle of
19 the thumb as the thumb traverses four key tops 36a through 36d on the side 11a of the
20 housing 11. The second button from the left could be shaped slightly differently to allow the
21 user to identify it purely by feel (for example, a small bump or indentation on the top
22 surface), so a "home" position can quickly be identified blindly when in use. A fifth key top
23 36e, preferably a longer button along the row of key tops 36a through 36d, can be constructed
24 using two or more rubberized domes underneath, so pressing anywhere along the horizontal
25 bar will result in a proper closure of contacts.

26

27 **Implementation 1— As an auxiliary keyboard**

28

29 The following scenario benefits the owner of a PDD 42 (Fig. 1B) such as for example,
30 a Palm Pilot, or a Windows CE (now called "Pocket Windows") device, both of which fit into
31 the category of pen or keyboard based PDDs. Although users rely on them as a portable
32 device for the rapid retrieval of information, they are not often used for note taking due to
33 their inadequate writing pad 42a employing stylus, pen-, keypad-, or keyboard-based text

1 entry schemes. In this first usage scenario, a data input device 40 according to this invention,
2 which does not have a display 13, is used as an external, peripheral keyboard for users who
3 already use PDDs and is depicted in Fig 1B. The device 10 could also connect to a mobile
4 communications device D1, such as a cell phone with text messaging capabilities, via a
5 connection method native to the device, such as a 2-way infrared link, depicted in Fig. 1C.

7 *First Scenario*

8 *A busy executive uses his Palm Pilot extensively to keep his appointments,*
9 *and as his phone book, but one time while traveling he had a brainstorm of*
10 *ideas he wanted to write down while standing in a long line at the airport.*
11 *Not being able to take meaningful notes using the Palm Pilot's Graffiti*
12 *handwriting system (which might recognize 5 words per minute on a good*
13 *day, but this was not a good day since one had was holding a briefcase,*
14 *and two hands are required to use a Palm Pilot), he whips out his data*
15 *input device, using it as keyboard peripheral, he proceeds to capture his*
16 *ideas at 30 words per minute for the next half hour as the airport line*
17 *progresses. Taking his seat on board the airplane, the executive folds*
18 *down the tray table, takes out his Palm Pilot, and then transmits the ideas*
19 *captured earlier by the data input device into the Palm Pilot. A final idea*
20 *comes to him, and, while the two portable devices are communicating with*
21 *each other, he types the idea into the data input device which then acts as a*
22 *"real time" keyboard that transmits the information to the Palm Pilot in*
23 *typed form.*

24
25 Using today's technology, most of that executive's ideas would have been lost
26 because there was no way realistically to take notes on the conventional PDD. In this first
27 scenario matters were made worse because the executive had only one hand free, making the
28 conventional PDD use impossible. In this first scenario, the data input device 40 acts as a
29 supplement to the PDD already being used by the executive. Data can be transmitted to the
30 PDD via either a physical cable, infrared light, or a radio frequency link. The data input
31 device 40 in this scenario would have its own central processing unit and memory so as to
32 remember the notes for later transmission. This facilitates the take-notes-wherever-you-are
33 advantage of the data input device of this invention.

34 To build a device which fulfills this first scenario, a system similar to the block
35 diagram layout depicted in Fig. 5 would be required. Because the amount of processing
36 required of the hardware is minimal (Note the data input device chords via the 9-button
37 combinations, buffer it in local RAM, and send to the device via one of the I/O options
38 depicted in green boxes), almost any off-the-shelf components could be used to realize this
39 design. The CPU, for example, could be a "plain vanilla" Intel 8051 chip; the RAM (because

1 the buffering will only be holding a few characters at a time) could be a minimal amount
2 (perhaps a 4K memory chip). The green I/O boxes could either be part of the CPU (such as
3 the serial port, which is common today) or, as in the case of the Bluetooth RF protocol, a
4 dedicated chip set could be used¹.

5 6 **Second Embodiment**

7 8 **Implementation 2—As a fully-functional Personal Digital Device (PDD)**

9
10 Implementation 1 had the data input device 40 acting as a peripheral to an existing
11 PDD, necessitating the user to carry around two separate instruments in order to get
12 maximum benefit. There is no reason why the functionality of the hand-held date input
13 device of this invention cannot be encapsulated into a PDD, so that only one small device
14 need be carried without sacrifice of utility or performance.

15 A second scenario proposes just this. As shown in Fig. 6, a chordic data input device
16 44 having appropriate input control buttons/multi-position control mechanism, is combined
17 with PDD components within a single, unitary housing 11e. The PDD capability is
18 provided by employing adequate memory, CPU power, and software which performs
19 functions commonly found on PDDs. This second scenario has the on-the-go user utilizing
20 the data input device 44 for common PDD functions, except that these functions can be
21 accessed while driving, standing in line, lying down, or even running a marathon if the user so
22 chooses. Common PDD functions are:

- 23 • Complete appointment calendar, synchronizable with common contact management
24 software residing on a separate computing device.
- 25 • Complete phone book, including reverse-search phone book file, so you can cross-
26 reference who just paged you.
- 27 • Note pad desktop calendar applications such as Microsoft Outlook.
- 28 • Calculator (switchable between Scientific, Business, or Plain modes)
- 29 • Offline E-mail reader and writer
- 30 • Travel alarms w/ reminders. Interval alarms for exercising.

31

¹ In this paper, the term "Bluetooth" will be used in the broader term, meaning a generic 2-way close-proximity Radio Frequency (RF) protocol. IEEE Standard 802.11 is another example of an RF scheme that fits in this category.

1 Not-so-common functions that the data input device could perform are:

- 2 • Automatic Touch tone dialing - type in name, hold unit up to phone to dial out via
- 3 sound.
- 4 • Language translator
- 5 • Imaging Module (still, motion)
- 6 • Sound Recorder
- 7 • Foreign currency exchange calculator
- 8 • Games! Especially for the youth market.
- 9 • Handy thesaurus/spell checker program
- 10 • Grocery shopping mode- Capture things you need during the week as you think
- 11 of them; check off items, keep running cost total as you shop.
- 12 • Electronic score keeper for 2- and 3-person games, especially golf.

14 *Second Scenario*

15
16 *A restaurant critic had a difficult time being treated like just a "normal*
17 *customer" by the restaurants she reviewed; as her constant note taking*
18 *while sitting at the table would always tip off the local staff as to her*
19 *purpose there; blowing her cover and guaranteeing that her experience*
20 *there would be anything but typical. Fortunately, our reviewer started*
21 *learning to type on a data input device 44 the night before (it takes about an*
22 *hour to learn the basic alphabet), so she thought she'd try to take notes*
23 *with the a data input device instead. With her eyes on the menu and her*
24 *hand under the table, none of the staff ever suspected that she was actually*
25 *typing her thoughts with the hidden hand. With this new discreet note*
26 *taking tool, she ended up being treated like common folk, and therefore had*
27 *lots of dirt to report in her column, which subsequently increased her*
28 *reader following which led eventually to a raise. All because of the data*
29 *input device 44.*

30
31 *Suddenly her pager went off. She looked at the pager, but did not recognize*
32 *the telephone number at all, and so could not ascertain if it was an*
33 *important page or one she could blow off till after her meal. (Her cell*
34 *phone was no help; although it has a phone book inside, you can only look*
35 *up numbers by name; not the other way around. Here she had a number,*
36 *and needed to do a "reverse look-up" for the name.) Fortunately, since*
37 *her data input device 44 had all the functionality of a PDD, including the*
38 *ability to synch up with a phone book program on her desktop, she had her*
39 *entire contact list in the palm of her hand, and was able to do a reverse*
40 *lookup on the number. "Ohmigawd!", she said, in her best Valley Girl*
41 *voice, "That's the publisher of the magazine!! I'd better not keep him*
42 *waiting."*

43

1 Real Estate agents are another good market for this function, as they are constantly
2 driving around neighborhoods, showing properties, and taking notes from behind the wheel
3 (sometimes while the vehicle is moving!). Using a data input device in this scenario is
4 perfectly fitted to the needs of the traveling note taker.

5 The circuit illustrated in Fig. 6 provides the electronic components (hardware and
6 software) that are required to realize the *Second Scenario*. Because the data input device 44
7 depicted in Fig. 6 is being asked to do quite a bit more, the components required have to have
8 more "horsepower." The CPU, for example, not only has to manage all the data (upwards of
9 several megabytes worth of RAM, or as much as the technology of the day will allow), but it
10 also has to handle the bit-mapped display, and react quickly when data is typed and/or
11 manipulated on-screen. A CPU similar to the Motorola "Dragonball" 68000-based CPU
12 (which can have many of the required green-box peripherals on-chip) represents a good
13 combination of horsepower and low power consumption, and would be ideal for this
14 application. (The "Dragonball" is the same CPU used by the Palm Pilot.) Displays can be
15 large, flat, and bitmapped, similar to the type used in the Xircom REXX 6000 Micro PDD.

16 17 **Third Embodiment**

18 19 **Implementation 3 – As a fully-functional PDD with 2-way text paging**

20
21 As depicted in Fig. 8, the third embodiment of this invention, the data input device 48,
22 has a reasonably easy-to-use typing scheme and the functionality of a 2-way text pager (for
23 example, like that offered by the RIM 950 alphanumeric pager 44 which has a tiny yet
24 unusable keyboard 44a on its face as illustrated Fig. 7). With this kind of 2-way wireless e-
25 mail feature, the data input device 48 has these kinds of integrated functions for its user:

- 26
27 • Built-in alphanumeric pager (with automatic cross-referencing of names and numeric
28 pages). Users can download, respond to, and upload e-mail messages in the
29 background; answer messages while waiting in line, walking, driving, lying down, or at a
30 concert.
- 31
32 • A complete PDD as described above in connection with the data input device 44.

33

Third Scenario

1
2
3 *Miles Nader, renown for being a Master Negotiator, sat down at the*
4 *negotiating table representing his client. A top manager for Prisney*
5 *Company, Mr. E, has threatened to not renew the license to use Prisney*
6 *characters on some sweatshirts unless "better" terms are negotiated. The*
7 *conversation went something like this:*
8

9 *Mr. E: Well, I appreciate the amount of work you've done for us in the*
10 *past. Because of you we sold 100,000 of your sweatshirts last year, and we*
11 *both made a killing. But that was last year. As you know, your contract*
12 *ends tonight and I have already received better offers from two of your*
13 *competitors for the same rights that are expiring with you. As a*
14 *businessman, I'm obligated to go with the higher offer. It's nothing*
15 *personal.*
16

17 *Nader: If I can ask, who bid what?*
18

19 *Mr. E: Well, Sally's Sweats offered me \$50,000 for the rights; and Ben's*
20 *Britches offered an undisclosed yet higher amount but with slightly different*
21 *terms.*
22

23 *Nader stared at Mr. E and listened with intent, with one hand on top of the*
24 *table. Unbeknownst to Mr. E, he was also quietly typing an e-mail on his*
25 *data input device, which he had in his other hand, underneath the table.*
26 *The e-mail was short but sweet:*
27

28 *Better offers?*
29 *Sally's: \$50K*
30 *Ben's: > \$50K*
31 *Please advise.*
32

33 *And with that, he sent an e-mail off to Della Street, his research assistant.*
34 *Della made some quick phone calls to try to confirm these bids, while Miles*
35 *Nader went through the usual negotiation dance. Within 15 minutes, Miles*
36 *got a page, which he looked at briefly and then ignored as if it was another*
37 *client:*
38

39 *"Both gave Mr. E the bird."*
40

41 *With this discreet and time-sensitive intelligence, Miles had the upper hand*
42 *in the negotiations, was able to call Mr. E's bluff, and everyone lived*
43 *happily ever after.*
44

45 Needless to say, there is no way you can do this with any other instruments available today.

46 To make this ***Third Scenario*** a reality, new RF (Radio Frequency) modules need to be added

1 to the data input device hardware that will make it compatible with any one of the many
2 different text-based paging infrastructures worldwide.

3 As depicted in Fig. 8, the input device of the *Third Scenario* employs, for example,
4 text-paging infrastructures such as an RF Transmitter/Receiver that needs to be compatible
5 with (both in terms of frequency and in terms of protocol/packet construction) the
6 Motorola's Flex network (operating at either 400 or 900 MHz), and the RAM Mobile Data
7 packet-based infrastructure (operating at 800 MHz). This functionality can easily be
8 designed in using the RF manufacturer's pre-fabricated boards or chipsets. The same
9 Dragonball microprocessor discussed in Implementation 2 above can be used here as well.

10

11 **Fourth Embodiment**

12

13 **Implementation 4—As a fully-functional PDD with web browsing capabilities**

14

15 The idea of 2-way e-mail is being extended. There is a new generation of handheld
16 devices that are always connected to the global computer network (The Internet) via radio,
17 and have in them web browsers that are capable of displaying pictures, playing sound files,
18 etc. The current offerings in this category are pretty useless, mostly because nobody has
19 figured out how to address the conflicting requirements of portability and data entry. There's
20 no reason why one cannot simply apply the data input device's typing scheme to a
21 manufacturer's pre-existing platform to create a superior and usable unit. To a casual
22 observer, this implementation might appear to be exactly the same as Implementation 3: a
23 data input device 48 (Fig. 8) with a wireless connection to the Internet. However, from a
24 technical point of view, the two are vastly different. A text-based pager transfers only ASCII
25 (text) data and can do so at relatively slow speeds in the background while it's worn on the
26 user's belt. A wireless web based unit must be able to transfer larger amounts of information
27 (graphics, audio, video, in addition to Unicode) nearly "on demand" as the user surfs the web.
28 The infrastructures, frequencies, protocols, and chipsets that would be used in
29 implementation are completely different and therefore warrant its own section for discussion.

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A short list of emerging frequencies and protocols that would support such an internet
appliance are listed below. (This is not an exhaustive list; it is here for illustrative purposes
only). Because this is a transitional technology and the markets are just now emerging, most
of these protocols are based and/or grafted onto cell phone standards:

1

Basic digital Cell Phone frequencies – 900 MHz, 1800 MHz (PCS)
Cellular Digital Packet Data (CDPD) – data channel used with today’s digital cell phones. (I.e., Omnisky)
Short Message System (SMS) Protocol – Protocol used to send brief text-based messages from one cell phone to another.
Wireless Application Protocol (WAP) – lightweight protocol used for the “microbrowsers” employed in some of today’s today’s cell phones. Often layered on top of the SMS protocol.
Handiphone – A Japanese standard for up to 56K in wireless Internet Access Speeds (scheduled to arrive in the U.S. shortly)
WCDPD, CDPD 2000 – Wider bandwidth standard of the Cellular Digital Packet Data standard.

2

3

4

Fourth Scenario

5

Tommy the tourist is lost in a foreign country, looking for the closest Hilton hotel. If he were by his desktop computer at work, Tommy would simply go to a web search engine and look up all the information he needs, and then print it out for the road. But because he has his data input device-based Internet Appliance with him, he can quickly do the same thing regardless of where he is.

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Tommy whips the data input device from his belt and, using the device’s chording method of typing, types in the URL for the search engine. Because the handheld unit has a large, color touch-sensitive screen, Tommy can then use the index finger of his free hand to point to hyperlinks and surf the web from that point. Because the unit is “always on” via the built-in packet radio interface, Tommy does not have to wait for the unit to connect to the Internet in order to use it.

*Tommy can also check his web-based hotmail account using the web browser, and respond to any and all messages throughout the day as he takes periodic rests. But because the web is multi-media (rather than text only), Tommy can also send multimedia e-post cards via the unit’s built-in camera and audio recorder (see *Second Scenario*). For example, when sending e-mail, Tommy can point the unit’s built-in camera toward the monument he just found, record a 10-second audible caption, and send both of these artifacts as attachments to an e-mail and off it goes.*

Tommy puts the device back in its holster and thinks of what to do next. Meanwhile, the data input device is transmitting the message to the Internet via radio in the background while Tommy is free to concentrate on other things.

1
2 **Fifth Embodiment**

3
4 **Implementation 5 – Incorporation into a cell phone**

5
6 In implementation 5 a data input device is combined with a cell phone including all the
7 conventional components that go into making a cell phone function. Imagine the poor cell
8 phone user who is also driving his car and needs to take his eyes off the road in order to take
9 notes or even just to dial the next number. The cell phone user who actually tries to make
10 use of his phone's 2-way e-mail feature by trying to type a message onto the tiny keypad on
11 the cell phone is most likely driving negligently. Incorporating the data input device's typing
12 scheme into an existing mobile cell phone as the embodiment 50 of this invention illustrates in
13 Fig. 9 alleviates this problem, plus solves some others.

14
15 ***Fifth Scenario***

16 *John was just released from the hospital, having spent 3 weeks recovering*
17 *from an automobile crash. John was a Field Sales Rep, and made most of*
18 *his business phone calls from the road. Although he used a headset while*
19 *he drove, the headset did not eliminate the need to take his eyes off the road*
20 *while he initiated and ended phone calls. The day of the accident was*
21 *particularly bad; as John was hastily trying to write down a quick phone*
22 *number during a call. That's when a car cut in front of him and, because*
23 *John's eyes were off the road for the wrong few seconds, he was not able to*
24 *react in time.*

25
26 *John learns from his mistakes. He immediately went out and purchased a*
27 *cell phone which had the data input device typing scheme built-in. Using*
28 *the typing scheme, John can now dial numbers, type in a person's name*
29 *and have the phone dial that person's number, and he can also take notes*
30 *during a phone call, all without having to take his eyes off the road.*

31
32 *John's 20-year-old son, Darrin, didn't like talking much on the phone; he*
33 *grew up on the Internet and therefore can only communicate with people if*
34 *they're in a chat room. Although Darrin owned a cell phone, he would*
35 *never be seen talking on one; he and his friends just send e-mail messages*
36 *to each other over their cell phones. (Because he didn't know any better, it*
37 *hadn't even occurred to him that typing a message using the letters on the*
38 *telephone keypad was not only hideously slow, but it might also possibly be*
39 *a really stupid way to type.) When Darrin saw his father's new phone with*
40 *the built-in Data input device scheme, he immediately grabbed his*
41 *skateboard and went out to buy one of his own. Now, whenever Darrin*
42 *sends a phone-based e-mail message to his friends, he can type his*

1 *message about ten times faster, and he can do it during class, too, where*
2 *the teacher sees only that Darrin is looking straight ahead and appears to*
3 *be alert.*

4
5 Another great market for a data input device with communication capabilities would be
6 Highway Patrol Officers who must routinely “run” license plates through the central computer,
7 sometimes before the motorist is pulled over. Current police cars use laptops mounted over
8 the transmission hump, where the officer is expected to take his eyes off the road, hunt-and-
9 peck with one hand, and then read the results on the screen, all while keeping an eye on traffic.
10 A data input device with a Speech Synthesizer and 2-way communication would be a superior
11 solution; license plates could be typed in while the officer keeps his eyes on the road, and the
12 results could be “spoken” back to the officer using the unit’s built-in speech synthesizer. In
13 this case, the eyes never leave the road.

14 A slightly different, perhaps more visionary cell phone embodiment 52 of this
15 invention appears in Fig. 10, where the keypad is done away with completely, leaving room
16 for a larger and far more useful visual display 54 (especially when it comes to those cell
17 phones that can browse the web – all existing web-enabled cell phones have displays that are
18 far too small to be useful.)

19 20 **Sixth Embodiment**

21 22 **Implementation 6 – As an Exoskeleton for an existing product**

23 As a quick way to “jump to market”, this embodiment 56 of this invention (Fig. 12A)
24 would bypass a lot of the development and R&D required to build a fully-functional,
25 integrated product from scratch. There are several existing PDD and portable communication
26 products on the market for which one can manufacture an external peripheral (an exoskeleton)
27 comprising a jacket 58 to which the conventional PDD 60 (Fig. 11) or other communication
28 device, such as a message-capable mobile phone, is mounted. The jacket 58 has the required
29 control buttons 14a through 14d and a multi-position control mechanism 12 on the exterior of
30 the jacket and includes a program that allows the PDD 60 or other device to recognize the
31 chording as inputs from the actuated buttons/multi-position control mechanism on the jacket
32 58 .

33 As an example, Fig. 11 shows the commercially available “Micro PDD”. It is the size
34 of a PC or credit card and can slip very easily into a laptop computer’s PCMCIA slot. It has

1 its own CPU, display, batteries, display 60a, and memory. Its display 60a or screen is
2 touch-sensitive so one can point to and touch an icon 60b and then navigate within that
3 subscreen. The only thing it is missing is a good way to enter information. That's where
4 implementation 6 comes in.

5 As shown in Fig. 12A, the jacket 58 has a slot 58a designed specifically to
6 accommodate the Micro PDD 60. When the PDD 60 is inserted into the open end 58b of the
7 slot 58a, it couples electronically to the control buttons and multi-position mechanism.
8 Consequently, the embodiment 56 acts as a keyboard to the PDDs own CPU and display
9 60a.

10 Another example is shown in Fig. 12B, where the exoskeleton accommodates a mobile
11 communications device D2 (such as a cell phone with text messaging capabilities). Using a
12 coupling similar to that described for Fig. 12A, having a user press combinations of buttons
13 will end up "typing" a message which can then be sent via the communications device.

14 Advantages to marketing a product like this are numerous:

- 15 1) Easy manufacture – all the intelligence and development work already reside in the
16 PDD or mobile communications device.
- 17 2) Low cost – same reason as in implementation 1.
- 18 3) Right Demographic – "early adopters" who buy this instead of a Palm Pilot for the
19 portability and convenience will be drawn to the low-cost data input device keyboard
20 adapter for the same reasons.
- 21 4) Low risk for investors – relatively little R&D required.

22
23 The requirements for this sixth embodiment depend on which the PDD or mobile
24 communications device is being interfaced. Fig. 13 shows what is required to make one
25 version of this sixth embodiment when being interfaced to the Xircom Rex Micro PDD 60
26 shown in Fig. 12A. Like Implementation 1, this implementation 6 is a relatively lightweight
27 application, and the CPU can be a lightweight performer. One possibility might be an all-in-
28 one integrated or hybrid package, such as the "Basic Stamp" from PIC Corp. The PCMCIA
29 (Now often called "PC CARD") Chipset is another off-the-shelf solution that would interface
30 with this particular organizer. Other organizer products might require another interface
31 method, such as a dedicated serial interface or 2-way infrared communications scheme.

32

Miscellaneous

If the data input device were to be manufactured with special markets and uses in mind, the following kinds of very unique features could be included:

- Bar code reader (great for Federal Express workers)
- Text-to-Speech synthesizer for those with speech problems. (You should see the bulky units available on the market!)
- Text-to-Speech foreign language converter – type in the phrase in the language you know, have the speech synthesizer say it in the language you don't.
- Digital audio recorder: have it record sound for musicians who might forget that great musical phrase they just thought of.
- Built-in digital camera. (Combined with the above feature, the invention becomes an ideal companion for field journalists.)
- Camera time exposure control port - program the invention to take "timed exposure" pictures using various over- and under-exposures. Makes for beautiful nighttime shots without the guesswork.
- Include an Infrared transmitter and receiver; turn the Data input device into a learning TV/VCR/Cable remote control. (Can replace bolted down remote controls in hotel rooms.)

Most, if not all of these are features, are not present in any conventional hand-held unit available at the time of this writing.

Sixth Scenario

Jane was traveling in Nepal as a tourist, but like most Americans, hadn't bothered to learn the language before embarking. Instead, she had her Data input device always at her side – it was the ideal companion for the traveler. She had the foresight to have added the Nepal Travel software module to the unit before she left.

When Jane was at a store and wanted to know how much something would cost in US Dollars, she would discreetly take out her data input device, type in the price of the object in Rupees, and press the "convert" chord command to get the price. If there was no price tag, Jane would hold the object in one hand, and with the other hand type in the sentence "How much does this cost?", press the "Translate" chord, and the onboard speech synthesizer would verbally ask the question in perfect Hindi. (The shopkeeper would then write down an answer using numbers, a response she could understand.)

The remarkable thing about the *Sixth Scenario* is that at no time did Jane have to put down her purse, packages, or object and scurry toward a counter or tabletop surface in order to realize the usefulness of the data input device. It is handy and usable in real-life situations,

1 while standing, holding packages, articles of clothing, etc. No other hand-held device on the
2 planet can be used with such transparency.

3 The Nepal software module also has in it a complete travel guide, which is all
4 searchable via keywords, and easily readable via the unit's large display, which can display
5 several lines of text and graphics at once. Jane saved considerable space in her backpack by
6 leaving the travel books home and used the data input device to quickly look up information
7 she needed. Future incarnations of the device might do away with a travel module altogether,
8 instead accessing the internet wirelessly in real time from wherever she was.

9
10 Implementation 7- In space

11
12 As illustrated in Fig. 14, when floating in space an astronaut 100 can manipulate the
13 data input device 10 of this invention with one hand and avoid strapping him or herself to a
14 stationary object in the spacecraft when taking notes or otherwise gathering data (or outside
15 the spacecraft where it's not possible to place a conventional computer or keyboard).

16
17 SCOPE OF THE INVENTION

18
19 The above presents a description of the best mode contemplated of carrying out the
20 present invention, and of the manner and process of making and using it, in such full, clear,
21 concise, and exact terms as to enable any person skilled in the art to which it pertains to make
22 and use this invention. This invention is, however, susceptible to modifications and alternate
23 constructions from that discussed above which are fully equivalent. Consequently, it is not
24 the intention to limit this invention to the particular embodiments disclosed. On the contrary,
25 the intention is to cover all modifications and alternate constructions coming within the spirit
26 and scope of the invention as generally expressed by the following claims, which particularly
27 point out and distinctly claim the subject matter of the invention:

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THE CLAIMS

- 1
2
- 3 1. A portable, electronic data input device, including
4 a housing sized to be held in the palm of one hand of a user and having at least one
5 pair of adjacent sides,
6 said housing holding a control circuit having an input and output, and
7 one adjacent side having four individual dual-position control buttons arranged in a
8 row and positioned to be actuated by an individual finger of the hand of a user grasping the
9 input device in the palm of the hand, and
10 the other adjacent side having a depression configured to seat therein the underside end
11 portion of a thumb of a user while he or she is grasping the input device in the palm of the
12 hand,
13 a multi-position control mechanism in said depression, said multi-position control
14 mechanism comprising a plurality of individual switch contacts arranged in a predetermined
15 pattern that enables a user, while holding the input device in the palm of one hand and his or
16 her other fingers each touching an individual one of the dual-position control buttons, to reach
17 with the thumb of the hand holding the input device said multi-position control mechanism
18 and, using only the thumb, activate any individual switch contact or activate two switch
19 contacts simultaneously,
20 said control buttons and multi-position control mechanism being connected via the
21 input to the control circuit and providing a chordic-keyboard capable of generating a variety
22 of different electronic signals at the input to the control circuit as determined by the user
23 manipulating the dual-position control buttons, the multi-position control mechanism, or both
24 simultaneously,
25 said control circuit in response to activation of said buttons, multi-position control
26 mechanism, or both simultaneously, generating at the output an electronic signal
27 corresponding to a unique symbol or a unique command in accordance with said activation.
28
- 29 2. The input device according to Claim 1 where the control circuit comprises a read only
30 memory, a random access memory, and a central processing unit connected to said memories.
31
- 32 3. The input device according to Claim 1 including an output connector adapted to
33 connect the input device to one or more of the following: a computing platform, a

1 communication device, a computer network, a personal digital device with or without a
2 display, or with or without a keyboard.

3
4 4. The input device according to Claim 1 where the housing holds a display that provides
5 a visual read-out corresponding to the unique symbol, command, or results of a command.

6
7 5. The input device according to Claim 4 where the results of a command include a map,
8 a graphical or character, or different language.

9
10 6. The input device according to Claim 1 where the housing holds an audio generator that
11 provides a sound corresponding to the unique symbol, command, or results of a command.

12
13 7. The input device according to Claim 1 where the housing has on an exterior surface of
14 said other adjacent side a display that provides a visual read-out corresponding to the unique
15 symbol, command, or results of a command, and there is a pair of said multi-position control
16 mechanisms on said other adjacent side, said display being disposed between individual ones
17 of the pair of multi-position control mechanisms.

18
19 8. The input device according to Claim 1 connected to a personal digital device.

20
21 9. In combination,

22 a portable hand-held input device and a personal digital device including a data storage
23 device and a data entry mechanism connected to the data storage device, said data entry
24 mechanism activated by a user to input data to the data storage device,

25 said hand-held input device and personal digital device each including couplers that
26 enable them to be manually connected and disconnected under the control of a user, upon
27 connection said hand-held input device being directly linked to the data storage device or a
28 communication system, so that, when the hand-held input device is activated by a user, data
29 is transmitted from the hand-held input device to the data storage device or the
30 communication system, bypassing the data entry mechanism,

31 said hand-held input device including

32 a housing sized to be held in one hand of a user and having a plurality of control
33 buttons that provide a chordic-keyboard capable of generating a variety of different electronic

1 data signals as determined by which single button or combination of buttons are activated,
2 each single button or combination of buttons corresponding to a unique symbol or a unique
3 command,

4 said button or combination of buttons being activated by a user manually manipulating
5 his or her digits while the housing is being grasped by a hand of the user from which the digits
6 extend.

7
8 10. The combination according to Claim 9 where the data entry mechanism is a writing
9 pad.

10
11 11. The combination according to Claim 10 where the writing pad responds to a stylus
12 manipulated by user to touch, or otherwise to stimulate, the writing pad.

13
14 12. The combination according to Claim 9 where the data entry mechanism is a keyboard.

15
16 13. The combination according to Claim 9 where the personal digital device has a
17 connector enabling the personal digital device to be linked to a communication system.

18
19 14. The combination according to Claim 9 where the data storage device includes a
20 program that provides phone numbers.

21
22 15. The combination according to Claim 9 where the personal digital device has a
23 connector device enabling the personal digital device to be linked to a global computer
24 network.

25
26 16. The combination according to Claim 9 where the personal digital device has a
27 connector device enabling the personal digital device to be linked to a high-bandwidth
28 communication system.

29
30 17. The combination according to Claim 16 where the high-bandwidth communication
31 system is television.

32
33

- 1 18. The combination according to Claim 9 where the personal digital device includes a
2 visual display for displaying visual data.
3
- 4 19. The combination according to Claim 18 where visual display and writing pad share a
5 common screen.
6
- 7 20. A jacket serving as an external peripheral for a communication device, said jacket
8 comprising
9 a compartment adapted to hold the communication device,
10 a plurality of control buttons on an exterior surface of the jacket, and
11 a program that allows the communication device to recognize as input data signals the
12 manual actuation by a user of a button, or combination of the buttons.
13
- 14 21. The jacket according to Claim 20 where the communication device is personal digital
15 device for collecting data.
16
- 17 22. The jacket according to Claim 20 where the communication device is a mobile
18 telephone.
19
- 20 23. A electronic data input device, including
21 a housing sized to be held in the palm of one hand of a user,
22 said housing including a control circuit having an input and output,
23 four individual dual-position control buttons arranged in a row along a first side of the
24 housing, each of said dual-position control button positioned to be actuated by an individual
25 finger of the hand of a user grasping said input device in the palm of the hand, and
26 at least one five-position control mechanism on a second side of the housing that is
27 adjacent to said first side, said five-position control mechanism positioned to be within reach
28 of the thumb of a user while holding the input device in the palm of one hand with the other
29 fingers of said one hand each positioned next to an individual dual-position control button,
30 so that, using only the thumb and with each of said other fingers so positioned next to
31 an individual dual-position control button, the user can actuate one position of the five-
32 position control mechanism, or, can activate simultaneously at least two positions of the five-
33 position control mechanism,

1 said control buttons and five-position control mechanism being connected via the
2 input to the control circuit and providing a chordic-keyboard capable of generating a variety
3 of different electronic signals at the input to the control circuit as determined by the user
4 manipulating the dual-position control buttons and five-position control mechanism,

5 said control circuit providing individual data signals corresponding to a unique symbol
6 or a unique command depending on which individual dual position control button, or which
7 position of the five-position control mechanism, or combination thereof, is actuated.

8
9 24. The electronic data input device according to Claim 23 where the five-position control
10 mechanism includes a key top member and a circuit board having five pairs of open electrical
11 contacts, said key top member overlying the circuit board and mounted to move into five
12 different positions depending on how a user manipulates the key top member, each different
13 position closing one pair of open electrical contacts.

14
15 25. The electronic data input device according to Claim 24 where the key top member has
16 a substantially cross-shape configuration, including a central element with four legs extending
17 outward from said a central element.

18
19 26. The electronic data input device according to Claim 25 where one pair of contacts is
20 positioned beneath each of said legs and one pair of contacts is positioned beneath the central
21 element.

22
23 27. A electronic data input device, including
24 a housing sized to be held in the palm of one hand of a user,
25 said housing holding a control circuit having an input and output, and
26 having four individual dual-position control buttons arranged in a row along a first side
27 of the housing, each of said dual-position control buttons positioned to be actuated by an
28 individual finger of the hand of a user grasping said input device in the palm of the hand, and
29 at least one multi-position control mechanism on a second side of the housing that is
30 adjacent to said first side, said multi-position control mechanism comprising a plurality of
31 buttons arranged in an arc and at least one button next to the arc of buttons, said buttons of
32 the multi-position control mechanism being positioned to be within reach of the thumb of a

1 user while holding the input device in the palm of one hand with the other fingers of the this
2 one hand each positioned next to an individual dual-position control button,

3 so that, using only the thumb and with each of said other fingers so positioned next to
4 an individual dual-position control button, the user can actuate one position of the multi-
5 position control mechanism, or, can activate simultaneously at least two positions of the
6 multi-position control mechanism,

7 said control buttons and multi-position control mechanism being connected via the
8 input to the control circuit and providing a chordic-keyboard capable of generating a variety
9 of different electronic signals at the input to the control circuit as determined by the user
10 manipulating the dual-position control buttons and five-position control mechanism,

11 said control circuit providing individual data signals corresponding to a unique symbol
12 or a unique command depending on which individual dual position control button, or which
13 position of the multi-position control mechanism, or combination thereof, is actuated.

14
15 28. A portable, electronic data input device, including

16 a housing sized to be held in the palm of one hand of a user,

17 said housing including

18 one side having four individual dual-position control buttons arranged in a row
19 and positioned to be actuated by an individual finger of the hand of a user grasping the
20 input device in the palm of the hand, and

21 another side having a multi-position control mechanism positioned to be
22 actuated by a thumb of a user while he or she is grasping the input device in the palm
23 of the hand,

24 said multi-position control mechanism comprising a plurality of individual
25 switch contacts arranged in a predetermined pattern that enables a user, while holding
26 the input device in the palm of one hand and his or her other fingers each touching an
27 individual one of the dual-position control buttons, to reach with the thumb of the
28 hand holding the input device said multi-position control mechanism and, using only
29 the thumb, activate any individual switch contact or activate two switch contacts
30 simultaneously,

31 said control buttons and multi-position control mechanism being connected to a
32 control circuit to provide a chordic-keyboard capable of generating a variety of different

1 electronic signals at an input as determined by the user manipulating the dual-position control
2 buttons, the multi-position control mechanism, or both simultaneously,

3 said control circuit in response to activation of said buttons, multi-position control
4 mechanism, or both simultaneously, generating at the output an electronic signal
5 corresponding to a unique symbol or a unique command in accordance with said activation.

6

7 29. The electronic data input device according to Claim 28 where the multi-position
8 control mechanism is seated in a substantially hemispherical depression.

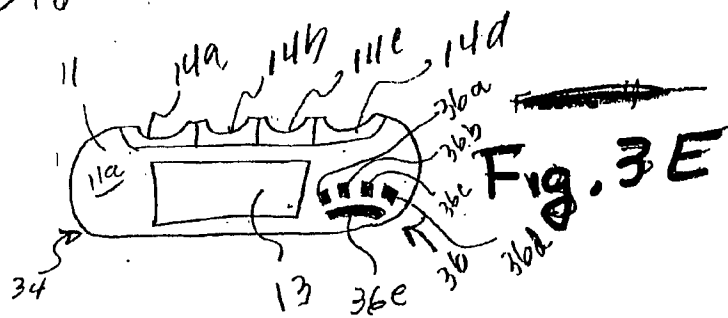
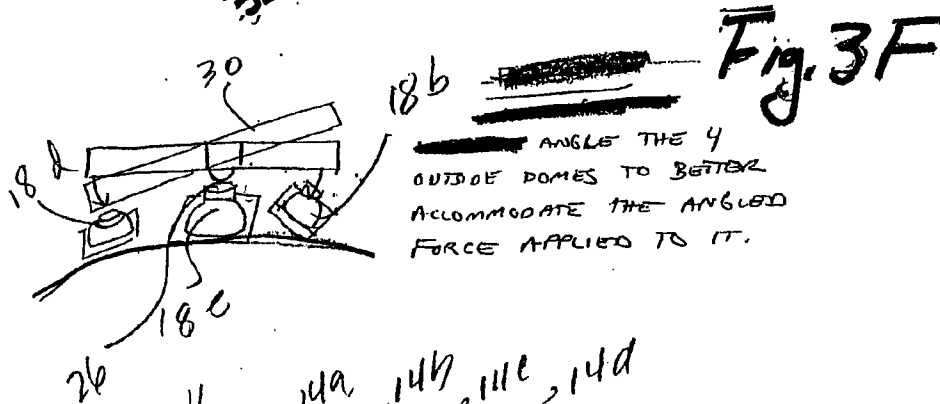
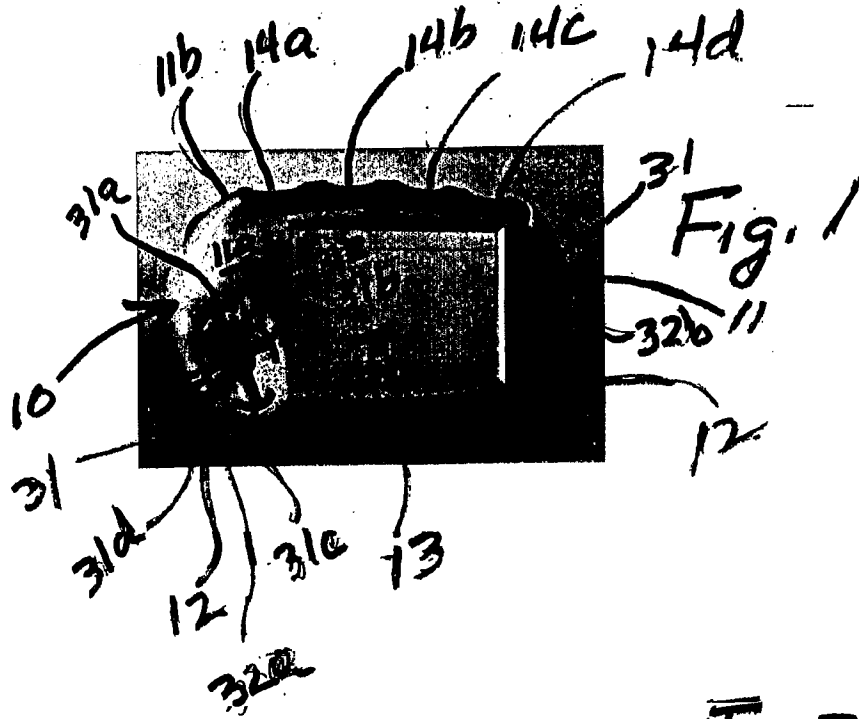
9

10 30. The electronic data input device according to Claim 28 where at least some of the
11 switch contacts of multi-position control mechanism are arranged in an arcuate pattern.

12

13

14



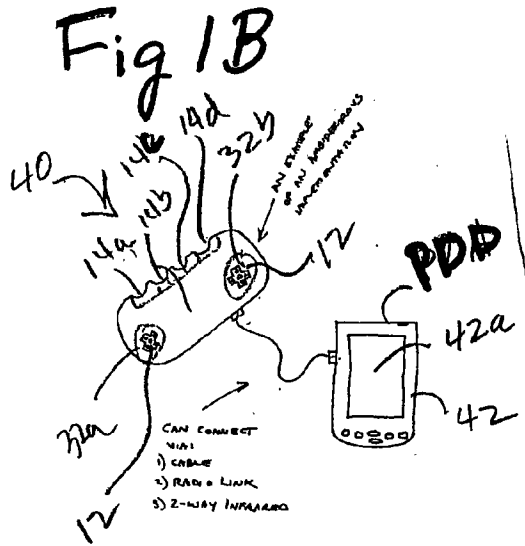
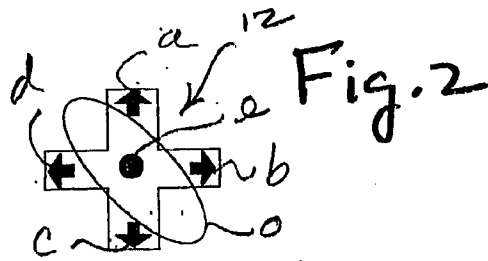
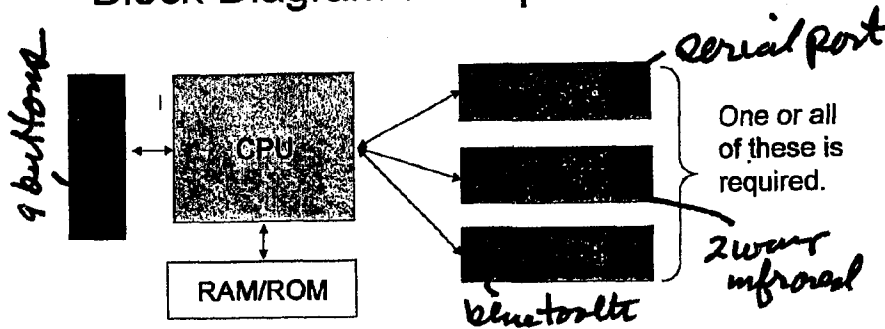
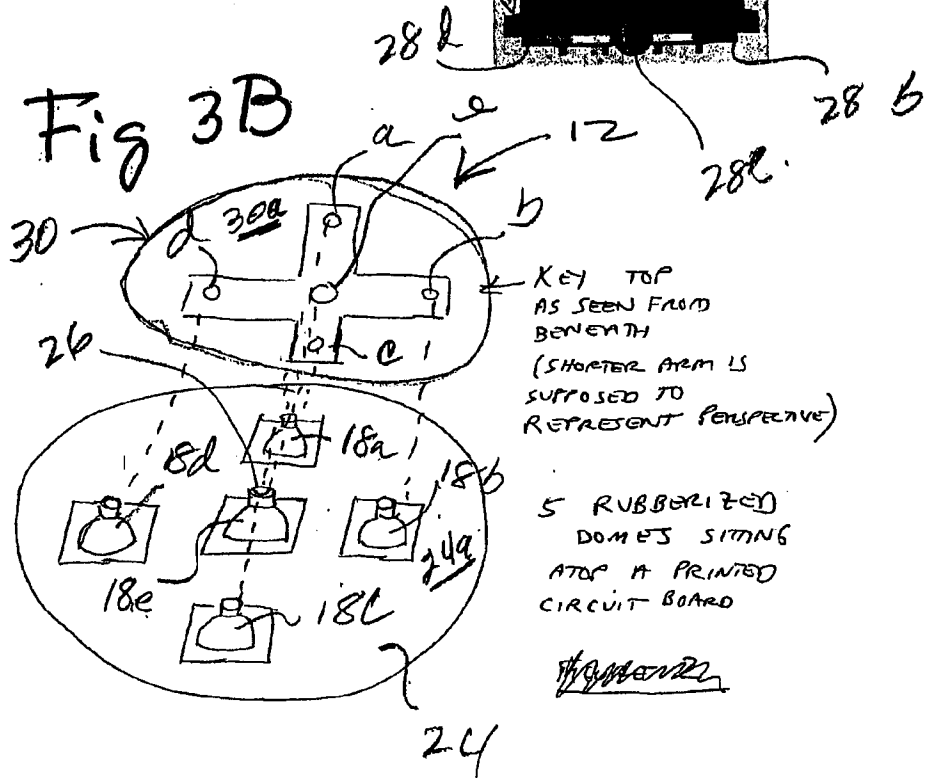
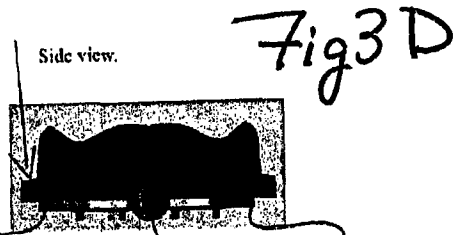
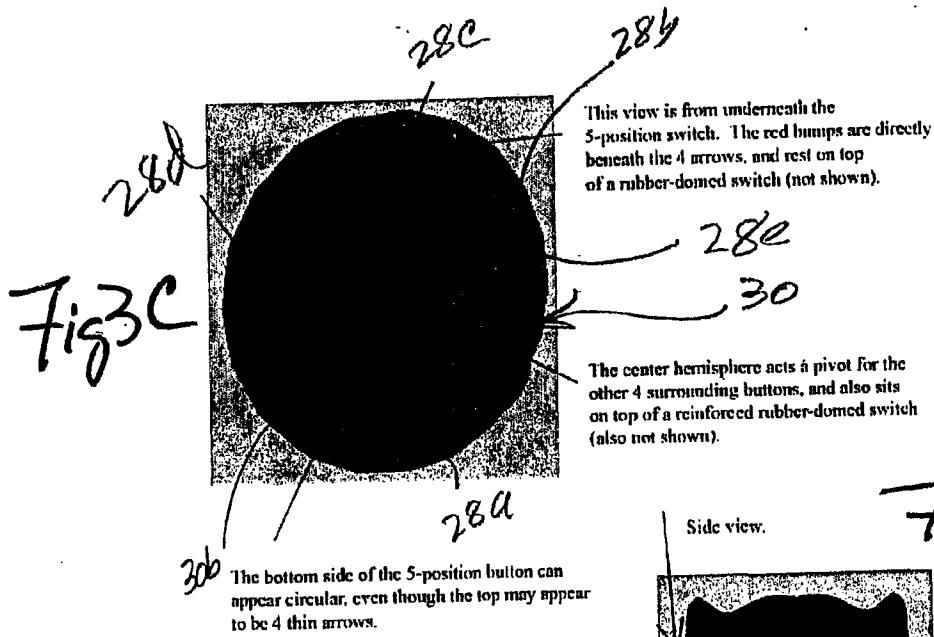


Fig. 5

Block Diagram for Implementation 1



* Bluetooth is an industry brand name referring to a 2-way close-range radio frequency link designed for close-range peripherals to communicate and share information.



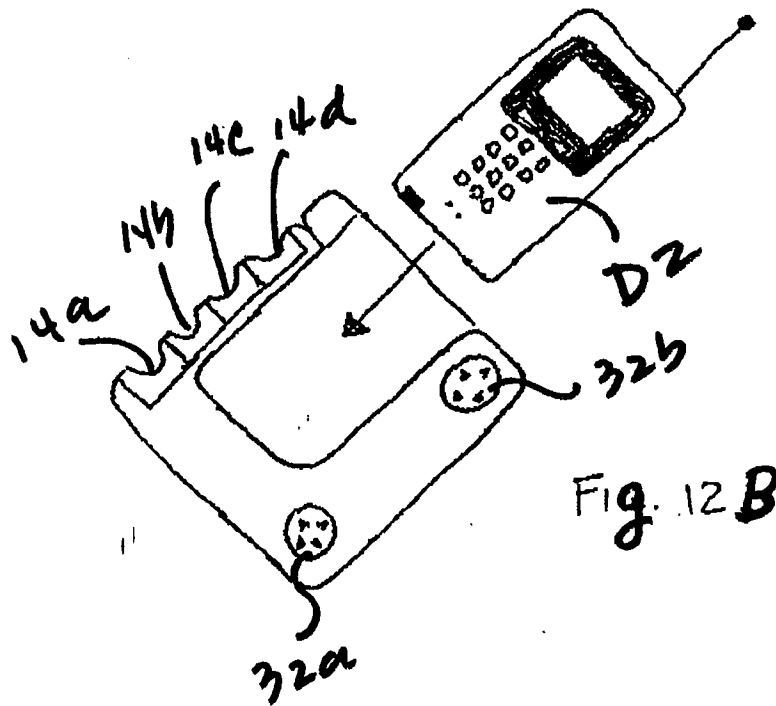
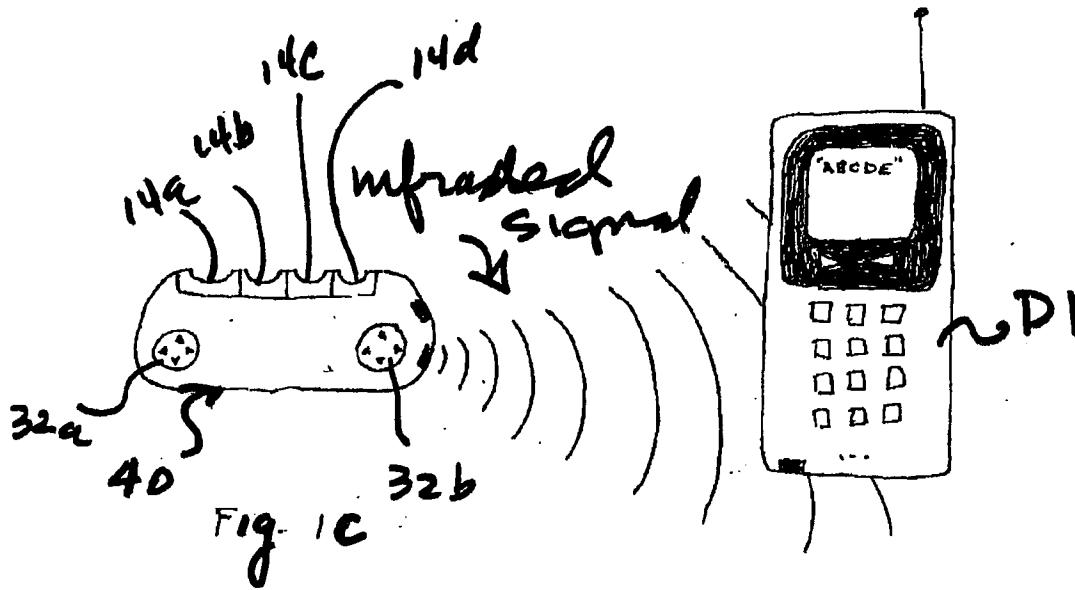


Fig 4

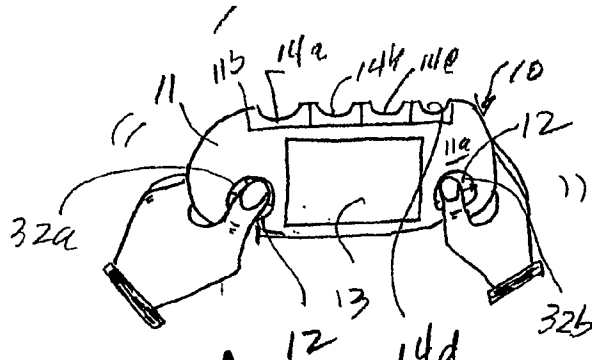
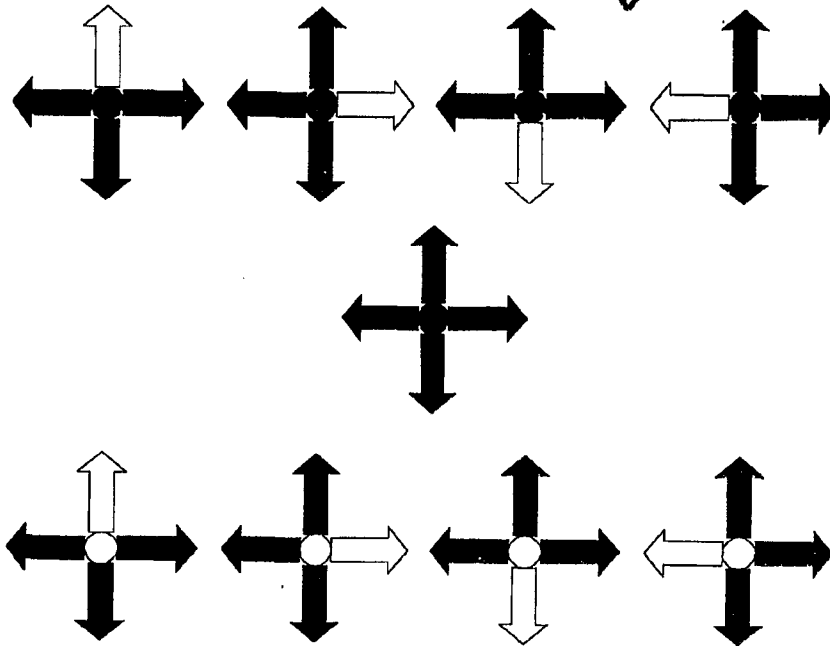


Fig. 1A

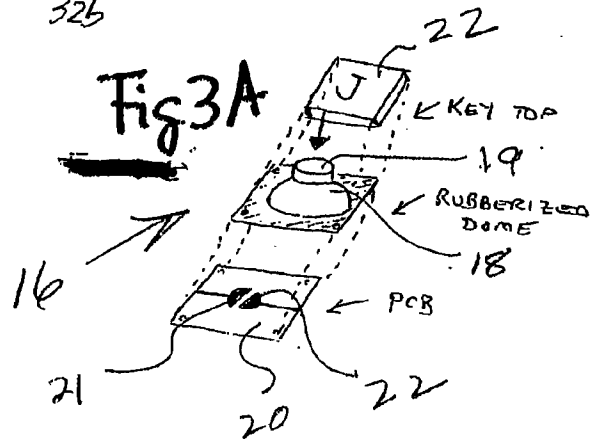
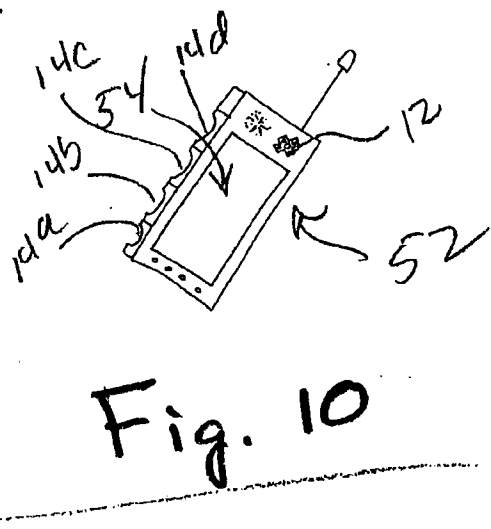
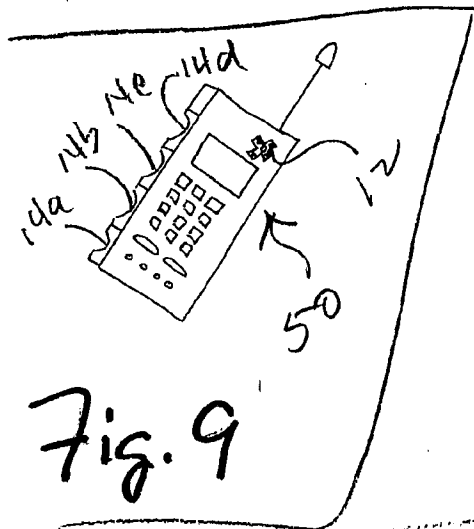
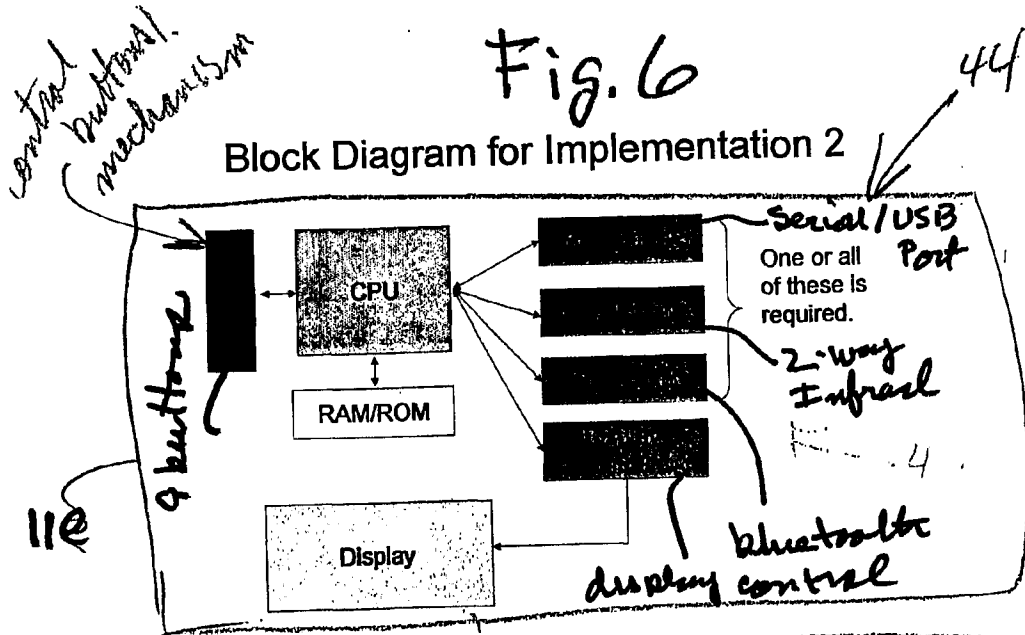


Fig 3A



Block Diagram for Implementation 3

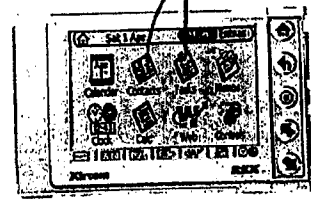
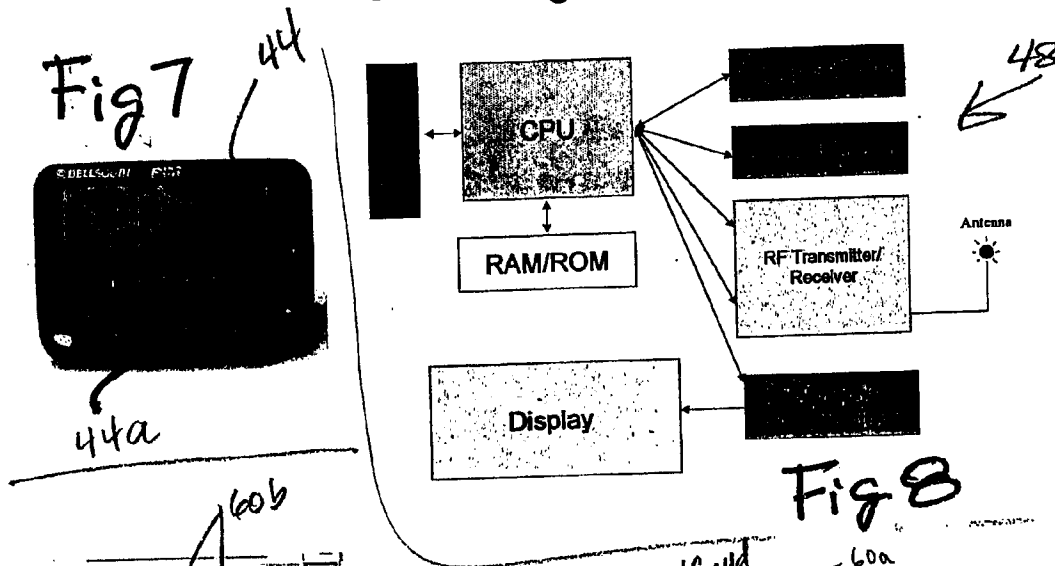


Fig. 7

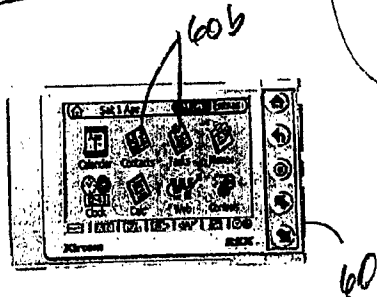


Fig. 11

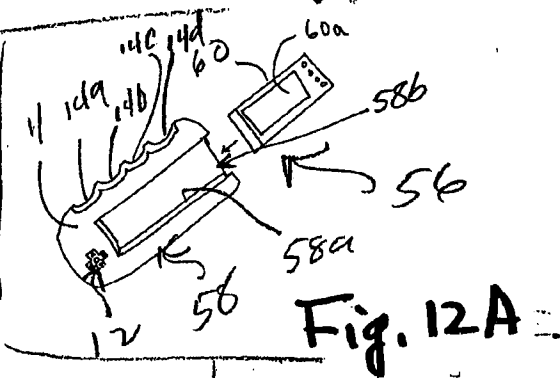


Fig. 12A

Block Diagram for Implementation 4

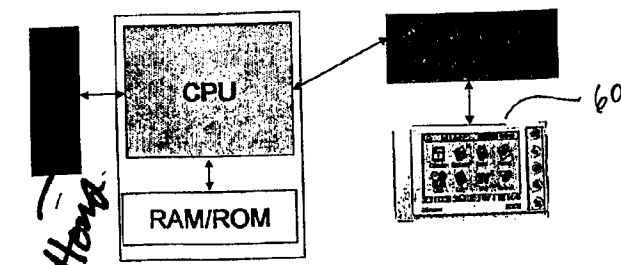
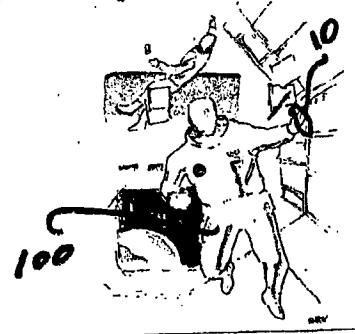


Fig. 13

Fig. 14



(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau



(43) International Publication Date
23 January 2003 (23.01.2003)

PCT

(10) International Publication Number
WO 03/007117 A3

(51) International Patent Classification⁷: G09G 5/00, 5/08

(21) International Application Number: PC1/US02/21956

(22) International Filing Date: 11 July 2002 (11.07.2002)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
60/304,875 12 July 2001 (12.07.2001) US

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non Street, Fountain Valley, CA 92708 (US).

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(81) Designated States (national): AE, AG, AL, AM, AT, AU,
AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU,

CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH,
GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC,
LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW,
MX, MZ, NO, NZ, OM, PH, PL, PT, RO, RU, SD, SE, SG,
SI, SK, SL, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ,
VN, YU, ZA, ZM, ZW.

(84) Designated States (regional): ARIPO patent (GH, GM,
KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW),
Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM),
European patent (AT, BE, BG, CH, CY, CZ, DE, DK, EE,
ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, SK,
TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ,
GW, ML, MR, NE, SN, TD, TG).

Declaration under Rule 4.17:
— of inventorship (Rule 4.17(iv)) for US only

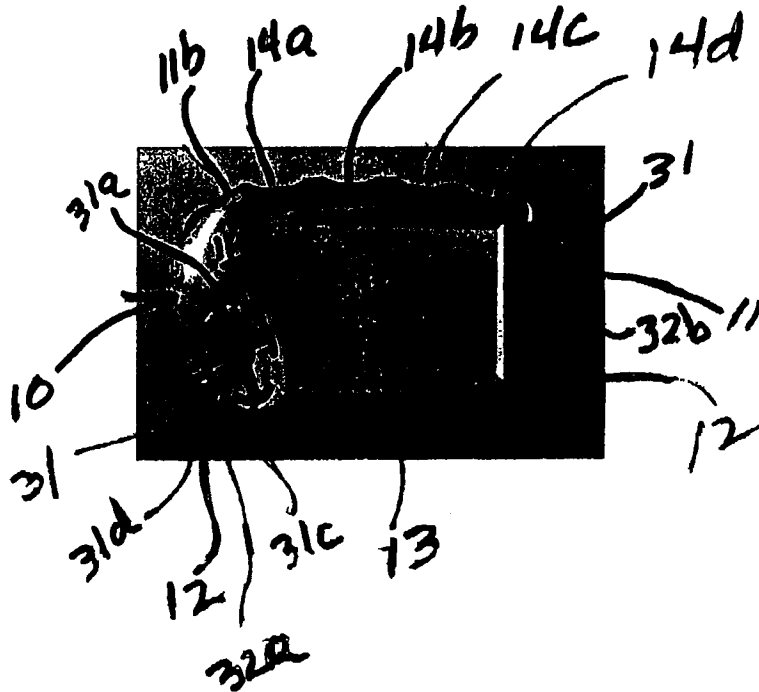
Published:
— with international search report

[Continued on next page]

(54) Title: PORTABLE, HAND-HELD ELECTRONIC INPUT DEVICE AND COMBINATION WITH A PERSONAL DIGITAL
DEVICE



WO 03/007117 A3



(57) Abstract: A portable electronic data input device (10) includes a housing (11) sized to be held in the palm of one hand. One housing side has four individual dual-position control buttons (12) arranged in a row and positioned to be actuated by an individual finger of a user grasping the input device (10) in the palm of the hand. A multi-position control mechanism (12) in an adjacent housing side comprises a plurality of individual switch contacts (a, b, c, d, e) arranged in a predetermined pattern that enables a user, while holding the input device (10) in the palm of one hand and the user's other fingers each touching an individual one of the dual-position control buttons, to reach with the thumb of the hand the multi-position control mechanism (12). Using only the thumb, the user activates any individual switch contact (a, b, c, d, e) or activates two or more switch contacts simultaneously. The arrangement of the control buttons and multi-position control mechanism (12) provides

a chordic-keyboard capable of generating a variety of different electronic signals as determined by the user manipulating the dual-position control buttons, the multi-position control mechanism (12), or both simultaneously.



(88) **Date of publication of the international search report:** 3 July 2003 *For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.*

INTERNATIONAL SEARCH REPORT

International application No.

PCT/US02/21956

A. CLASSIFICATION OF SUBJECT MATTER		
IPC(7) : G09G 5/00, 5/08		
US CL : 345/156, 157, 160, 161, 169, 864		
According to International Patent Classification (IPC) or to both national classification and IPC		
B. FIELDS SEARCHED		
Minimum documentation searched (classification system followed by classification symbols) U.S. : 345/156, 157, 160, 161, 169, 864		
Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched		
Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)		
C. DOCUMENTS CONSIDERED TO BE RELEVANT		
Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 4,791,408 A (HEUSINKVELD) 13 December 1988, column 4 line 61 to column 5 line 24.	1-30
A	US 4,998,457 A (SUZUKI et al) 12 March 1991, see columns 3-4.	1-30
<input type="checkbox"/> Further documents are listed in the continuation of Box C. <input type="checkbox"/> See patent family annex.		
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Date of the actual completion of the international search		Date of mailing of the international search report
30 September 2002 (30.09.2002)		04 FEB 2003
Name and mailing address of the ISA/US Commissioner of Patents and Trademarks Box PCT Washington, D.C. 20231		Authorized officer <i>Kent Chang</i> Kent Chang
Facsimile No. (703)305-3230		Telephone No. 703-305-9700



19 BUNDESREPUBLIK
DEUTSCHLAND



DEUTSCHES
PATENT- UND
MARKENAMT

12 **Gebrauchsmuster**
10 **DE 298 23 417 U 1**

51 Int. Cl. 6:
G 06 F 3/00

21	Aktenzeichen:	298 23 417.3
22	Anmeldetag:	24. 11. 98
47	Eintragungstag:	6. 5. 99
43	Bekanntmachung im Patentblatt:	17. 6. 99

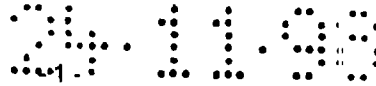
DE 298 23 417 U 1

66 Innere Priorität:
197 57 933. 7 27. 12. 97

73 Inhaber:
Sun, Lei, 95445 Bayreuth, DE; Sun, Maotang, Dr.,
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DE

34 Ergonomische, drahtlose, multifunktionale und kompakte Eingabe- und Anzeigevorrichtung

DE 298 23 417 U 1



Ergonomische, drahtlose, multifunktionale und kompakte Eingabe- und Anzeigevorrichtung

Zusammenfassung

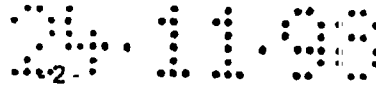
Die vorliegende Erfindung bezieht sich auf eine ergonomische, drahtlose, multifunktionale und kompakte Eingabe- und Anzeigevorrichtung, die aus verschiedenen Bausteinen besteht, die Licht-, Funk- oder Tonsignale senden („Multisender“) bzw. empfangen („Multiempfänger“) können, mit Steuerkugel („Trackball“) für einen stationären Computer sowie einen tragbaren Computer wie einen Notebook, Laptop, usw., mit versetzten Steuertasten und Steuerkugel, sowie Laserpointer und Mikrofon.

Beschreibung

Die vorliegende Erfindung bezieht sich auf eine ergonomische, drahtlose, multifunktionale und kompakte Eingabe- und Anzeigevorrichtung mit Steuerkugel („Trackball“) für einen Computer sowie einen tragbaren Computer wie einen Notebook, Laptop, usw. mit Einrichtungen für den drahtlosen Gebrauch z. B. besonders für Präsentationen und Vorführungen.

Aus dem Stand der Technik sind Eingabevorrichtungen mit Steuerkugel und andere Eingabevorrichtungen bekannt. Außerdem sind auch Laserstifte und Mikrofone bekannt. Aber alle Geräte sind getrennt und nicht ergonomisch und müssen separat benutzt werden. Aber häufig sind gerade deren Gebrauch eng miteinander verbunden. Daß Steuersignale und Datensignale auf einem gemeinsamen Kanal versendet werden können, ergibt sich zwar aus dem Stand der Technik. Aber in dem von uns angesprochenen Umfang, ergonomische, drahtlose, multifunktionale und kompakte Eingabe- und Anzeigevorrichtung, ist es jedoch unbekannt.

Der Erfindung liegt die Aufgabe zugrunde, eine ergonomische, multifunktionale und kompakte Eingabe- und Anzeigevorrichtung anzugeben, die außerdem drahtlos und in einer Hand zu führen ist. Diese hat den Vorteil, daß alle benötigten Eingabe- und Anzeigevorrichtung kompakt und ergonomisch in einer Hand vorhanden ist. Durch die drahtlose Übertragung der Signale durch die Luft, beispielsweise durch Licht



oder Funk, ist der Anwender auch uneingeschränkt in seiner Bewegungsfreiheit. Das eingebaute Mikrofon kann sowohl zur Tonbearbeitung, als auch zur Befehlsübertragung an den Computer und auch zur Aufnahme dienen.

Die erfindungsgemäße Vorrichtung zeichnet sich zum einen dadurch aus, daß sie hauptsächlich aus einer multifunktionalen Eingabe- und Anzeigevorrichtung mit Multisender 20 in Fig. 1, Fig. 4 und Fig. 7 und einem Multiempfänger besteht, der entweder integriert 15 in Fig. 10 und Fig. 11 im Computer oder als Steckkarte 17 in Fig. 10 und Fig. 11 möglich ist. Multisender 20 in Fig. 1, Fig. 4 und Fig. 7 sowie Multiempfänger sind mit einem Frequenzwahlwähler versehen, um eine optimale Übertragung und störungsfreien Betrieb zu gewährleisten.

Die multifunktionale Eingabe- und Anzeigevorrichtung zeichnet sich dadurch aus, daß zum einen die Klicktasten und der Schalter für den Mikrofon sowie die Taste für den Laserpointer mit der Steuerkugel nicht auf einer Ebene liegen. Vorzugsweise gibt es zwei verschiedene Varianten, die in den Figuren 1 - 3 und den Figuren 4 - 8 gezeigt werden.

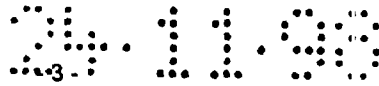
Bei der ersten Variante (Figuren 1 - 3) sitzt die Steuerkugel auf dem unteren Teil der Vorrichtung 11 in Fig. 2 und Fig. 3, so daß sie vorzugsweise mit dem Zeigefinger bewegt wird.

Die Klicktasten 2, 3 und 4 in Fig. 1 und der Mikrofonschalter 5 und die Taste für den Laserpointer 6 in Fig. 1 sind dann auf der oberen Seite angebracht (Fig. 1). Diese werden vorzugsweise durch den Daumen genutzt.

Bei der zweiten Variante (Figuren 4 - 8) ist nun die Steuerkugel 11 in Fig. 4 auf der oberen Seite der Vorrichtung angebracht und wird vorzugsweise mit dem Daumen gesteuert.

Die Klicktasten 2, 3, 4 in Fig. 7 und der Mikrofonschalter 5 und die Taste für den Laserpointer 6 in Fig. 7 sind auf der unteren Seite angebracht, so daß diese nun vorzugsweise mit dem Zeigefinger benutzt werden.

Auf der rechten Seite der Vorrichtung (Fig. 4) ist in dieser Variante eine weitere Klicktaste 12 in Fig. 4 angebracht, die gleiche Funktionen wie die Klicktaste 2 in Fig. 7 aufweist. Diese wird auch vorzugsweise mit dem Zeigefinger betätigt und ist z. B. besonders hilfreich beim „Ziehen“ auf dem Bildschirm. Für Linkshänder sollte es eine entsprechende Möglichkeit auf der linken Seite geben. Desweiteren zeichnet



sich die Vorrichtung dadurch aus, daß auf der oberen Seite ein eingebautes Mikrofon 7 in Fig. 1, Fig. 4 und Fig. 9 beinhaltet.

Außerdem zeichnet sich die Vorrichtung durch einen Schalter 10 in Fig. 3 und Fig. 6 aus, durch die die Vorrichtung ein- und ausgeschaltet werden kann.

Auch zeichnet sich die Vorrichtung durch einen Anschluß 9 in Fig. 1, Fig. 4, Fig. 7 und Fig. 9 aus, durch die die Vorrichtung mit Strom durch ein Ladegerät 13 in Fig. 9 geladen werden kann.

Desweiteren zeichnet sich die Vorrichtung dadurch aus, daß sie einen Multisender 20 in Fig. 1, Fig. 4 und Fig. 7 mit sich führt, das die Übertragung von Steuersignalen der Klicktasten und die Tonsignale senden kann (z. B. durch Licht oder Funk).

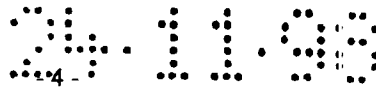
Die Vorrichtung zeichnet sich auch dadurch aus, daß sie auf der unteren Seite des Gehäuses Einkerbungen für die Finger, die die Eingabe- und Anzeigevorrichtung umschließen (Mittelfinger, Ringfinger und kleiner Finger) 19 in Fig. 3 und Fig. 6 besitzt, um ein ergonomisches Handhabe zu gewährleisten.

Die Vorrichtung zeichnet sich auch dadurch aus, daß sie auf der Frontseite eine Öffnung für den Laserpointer 8 in Fig. 2, Fig. 5 und Fig. 8 mit oder ohne Schärfereinstellvorrichtung besitzt, um die Anzeigefunktion der Vorrichtung zu gewährleisten.

Die Vorrichtung zeichnet sich auch dadurch aus, daß sie an ein Ladegerät 13 in Fig. 9 angeschlossen werden kann, um so das eingebaute Akku 21 in Fig. 1, Fig. 4 und Fig. 7 aufzuladen. Auch ist ein Betrieb mit herkömmlichen Batterien 21 in Fig. 1, Fig. 4 und Fig. 7 möglich.

Der Multiempfänger zeichnet sich zum einen dadurch aus, daß die Empfänger für Tonsignale und Steuersignale getrennt oder zusammen in einer Einheit verschmolzen sind.

Desweiteren zeichnet sich dieser aus, daß er entweder im Computer eingebaut 15 in Fig. 10 und Fig. 11 oder als Computerzubehör 17 in Fig. 10 und Fig. 11 nach Bedarf vom Computerhersteller erhältlich ist, um so das Angebot attraktiver und effektiver gestalten zu können.

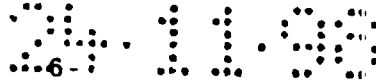


Die Erfindung wird im folgenden anhand einer vorteilhaften Ausführungsform unter Bezugnahme auf die beigefügten Zeichnungen beschrieben. Es zeigen:

- Fig. 1 in Draufsicht die erste Variante der Vorrichtung mit dem Griffgehäuse 1, den Klicktasten 2, 3, 4, dem Schalter für das Mikrofon 5, die Taste für den Laser 6, das eingebaute Mikrofon 7, den Multisender 20, den Akku oder Batteriefach 21 und den Ladegerätanschluß 9.
- Fig. 2 in Frontsicht die Klicktasten 2, 3, 4, die Öffnung für den Laserpointer 8 und die untere Steuerkugel 11.
- Fig. 3 in Seitenansicht von der linken Seite die Klicktaste 2, den Schalter für das Mikrofon 5, die Steuerkugel 11, den Schalter für das Ein- und Ausschalten der Vorrichtung 10 und die Einkerbungen 19.
- Fig. 4 in Draufsicht die zweite Variante der Vorrichtung mit der Steuerkugel 11, dem eingebauten Mikrofon 7, der Klicktaste auf der rechten Seite 12, dem Multisender 20, und dem Akku oder Batteriefach 21 und dem Ladegerätanschluß 9.
- Fig. 5 in Frontsicht die Klicktasten 2, 3, 4, die Klicktaste auf der rechten Seite 12, die Öffnung für den Laserpointer 8, und die Steuerkugel 11.
- Fig. 6 in Seitenansicht von der linken Seite die obere Steuerkugel 11, die Klicktaste 2, den Schalter für das Mikrofon 5, den Schalter für das Ein- und Ausschalten der Vorrichtung 10 und die Einkerbungen 19.
- Fig. 7 in der Ansicht von unten die Klicktasten 2, 3, 4, die Klicktaste auf der rechten Seite 12, den Schalter 5 für das Mikrofon, die Taste 6 für den Laserpointer, den Multisender 20, den Akku oder Batteriefach 21 und den Ladegerätanschluß 9.
- Fig. 8 in Frontsicht die Klicktasten 2, 3, 4, die Klicktaste auf der rechten Seite 12, die Öffnung für den Laserpointer 8, und die Steuerkugel 11.
- Fig. 9 in Standsicht die Eingabe- und Anzeigevorrichtung mit eingebautem Mikrofon 7, der Klicktaste auf der rechten Seite 12, der Steuerkugel 11, dem Anschluß 9 für das Ladegerät 13.
- Fig. 10 in perspektivischer Sicht einen tragbaren Computer 14 mit dem eingebauten Multiempfänger 15 oder dem Slot 16 für den ein- und ausbaubaren Multiempfänger 17.

25.1.98

Fig. 11 in perspektivischer Sicht einen stationären Computer 18 mit dem eingebauten Multiempfänger 15 oder dem Slot 16 für den ein- und ausbaubaren Multiempfänger 17.



Schutzansprüche

1. Vorrichtung zur Eingabe von Signalen in ein Datenverarbeitungsgerät und Anzeige von Lichtsignalen für Computer und Präsentationen, umfassend eine Eingabe- und Anzeigevorrichtung (1) mit einem Multisender (20) und einen Multiempfänger (15 bzw. 17) mittels welchen Steuer-, Funk- und Lichtsignale gesendet und von dem Multiempfänger (15 bzw. 17) empfangen werden können, dadurch gekennzeichnet, daß sich auf dem Griffgehäuse die Steuerkugel (11) und die Klicktasten (2, 3, 4, 6, 12) und der Schalter (5) nicht auf einer Ebene befinden, daß die Vorrichtung verschiedene Signale (Licht-, Funk- und Tonsignale) zwecks Steuerung, Anzeige und Tonbearbeitung in einer Einheit verwendet und daß die Anzeige- und Eingabevorrichtung gekennzeichnet ist durch die Integration von Mikrofon und Laserpointer in einem Eingabegerät.
2. Vorrichtung nach Anspruch 1, gekennzeichnet durch das mit versetzten Klicktasten (2, 3, 4, 6, 12), Schalter (5) und Steuerkugel (11) versehene Griffgehäuse (1), wobei sich die Klicktasten (2, 3, 4, 6, 12) auf der oberen Seite und die Steuerkugel (11) auf der unteren Seite des Griffgehäuses befinden.
3. Vorrichtung nach Anspruch 1, gekennzeichnet durch das mit versetzten Klicktasten (2, 3, 4, 6, 12), Schalter (5) und Steuerkugel (11) versehene Griffgehäuse (1), wobei sich die Klicktasten (2, 3, 4, 6, 12) auf der unteren Seite und die Steuerkugel (11) auf der oberen Seite des Griffgehäuses befinden, wobei noch eine zusätzliche Klicktaste (12), die mit der Klicktaste (2) die gleiche Funktion hat, auf der rechten Seite des Griffgehäuses, bei Linkshändern auch auf der rechten Seite, angebracht ist.
4. Vorrichtung nach Anspruch 1, gekennzeichnet durch die Möglichkeit, Steuersignale der Steuerkugel (11) und Signale der Klicktasten (2, 4, 6, 12) dem Computer durch die Luft zu senden.
5. Vorrichtung nach Anspruch 1, gekennzeichnet durch ein integriertes Mikrofon (7), das sowohl zur Tonbearbeitung, als auch zur



- Befehlsübertragung und zur Aufnahme dienen kann, der durch den Schalter (5) ein- und ausgeschaltet werden kann.
6. Vorrichtung nach Anspruch 1, gekennzeichnet durch einen integrierten Laserpointer (8), dessen Schärfe entweder einstellbar oder fest ist.
 7. Vorrichtung nach Anspruch 1, gekennzeichnet durch einen Multisender (20), der sowohl die Steuersignale der Steuerkugel (11) und der Klicktasten (2, 3, 4, 6, 12) als auch die Signale des integrierten Mikrofons senden kann, wobei das Gerät entweder getrennt oder zusammen auf einer Platine im Griffgehäuse angebracht ist.
 8. Vorrichtung nach Anspruch 1, gekennzeichnet durch einen Multiempfänger (15 bzw. 17), der sowohl die Steuersignale der Steuerkugel (11) und der Klicktasten (2, 3, 4, 6, 12) als auch die Signale des integrierten Mikrofons empfangen kann, wobei das Gerät entweder getrennt oder zusammen auf einer Platine im Computergehäuse (15) oder als ein Zubehör (17), wie z. B. eine Steckkarte, angebracht ist.
 9. Vorrichtung nach Anspruch 1, gekennzeichnet durch Funkübertragung mit einer oder mehreren Frequenzen des Multisenders und des Multiempfängers.
 10. Vorrichtung nach Anspruch 1, gekennzeichnet durch die Einkerbungen (19) auf der unteren Seite des Griffgehäuses.
 11. Vorrichtung nach Anspruch 1, gekennzeichnet durch einen Anschluß (9), der an das Ladegerät (13) angeschlossen werden kann, so daß die Vorrichtung nicht nur mit Batterie (21), sondern auch mit dem Akku (21), betrieben werden kann.

Fig. 1

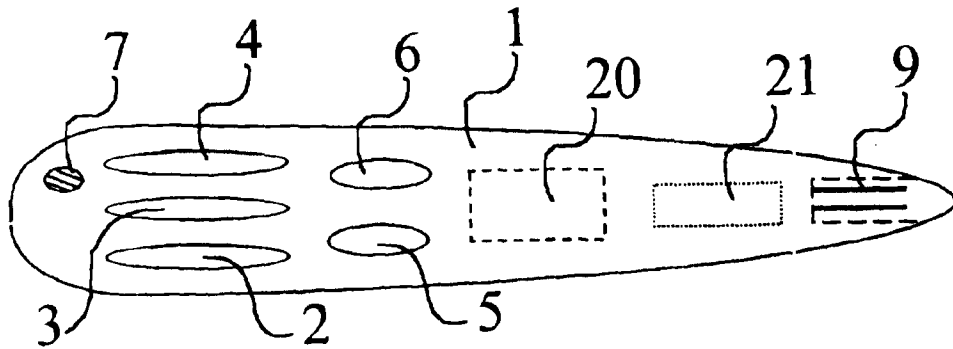


Fig. 2

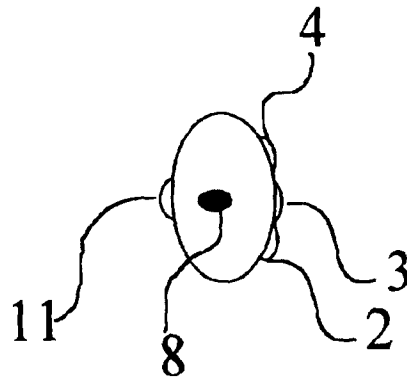


Fig. 3

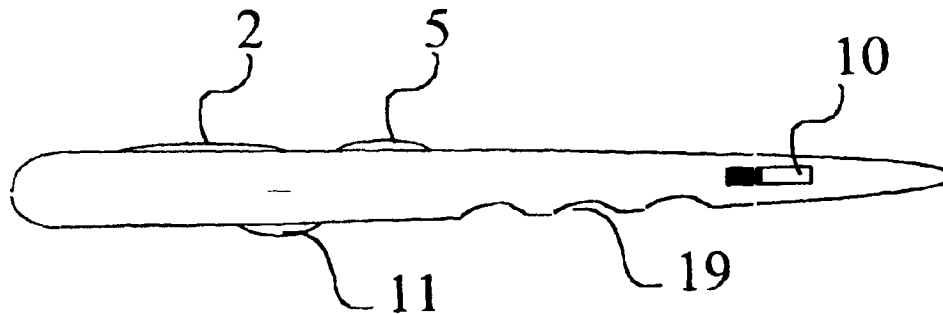


Fig. 4

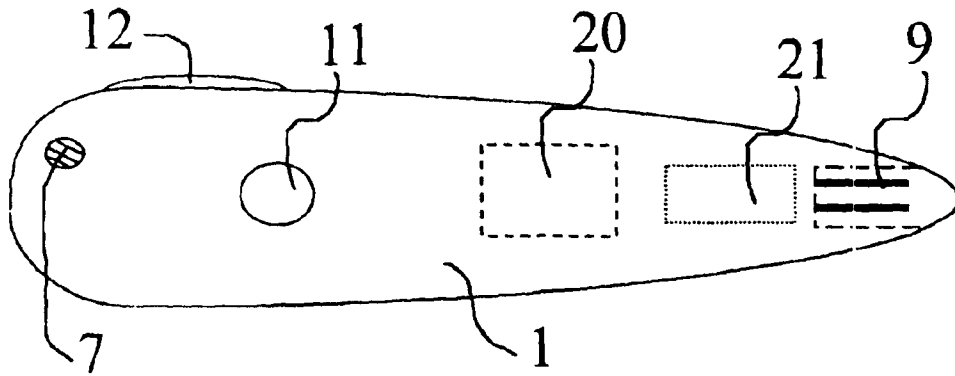


Fig. 5

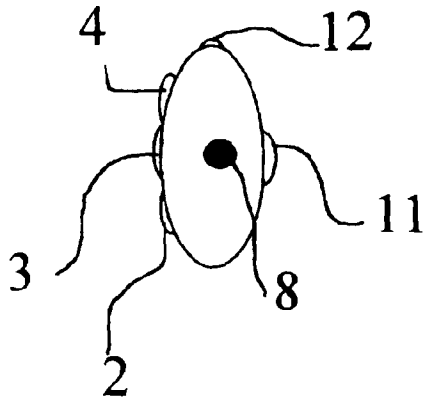


Fig. 6

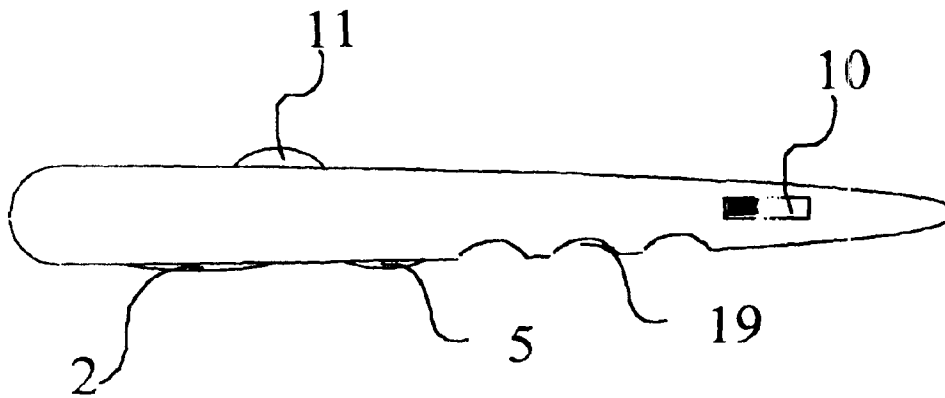


Fig. 7

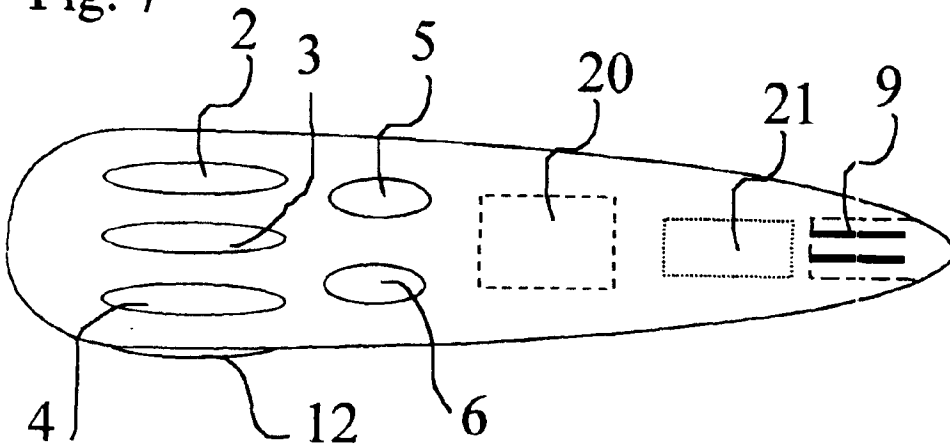


Fig. 9

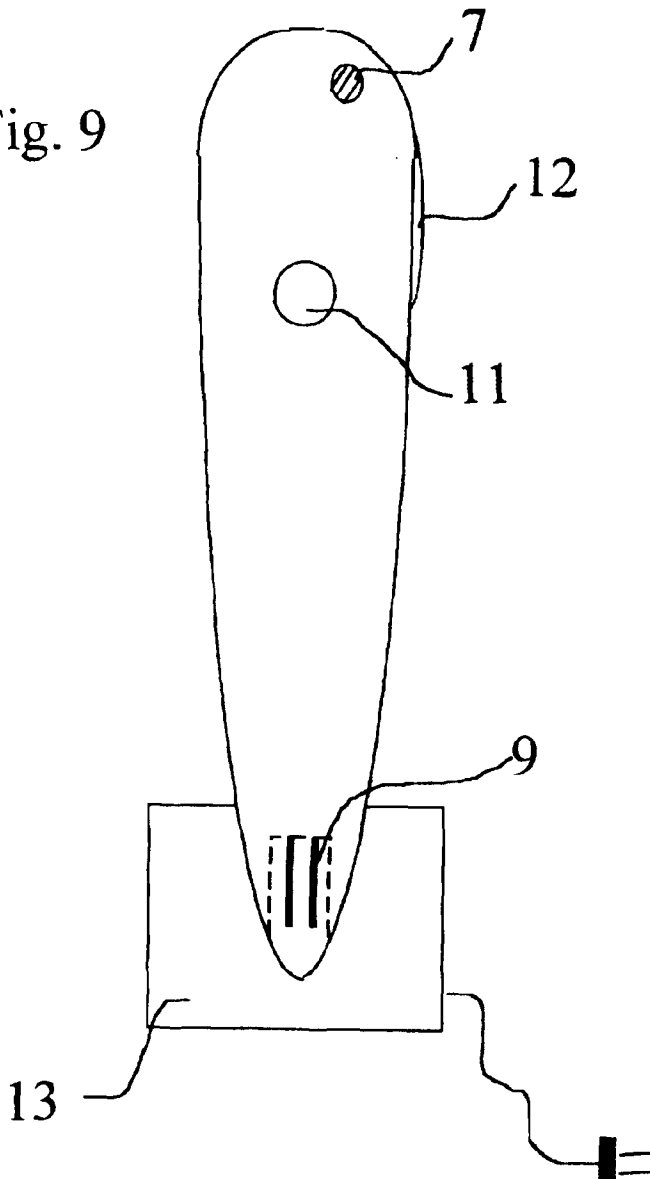


Fig. 8

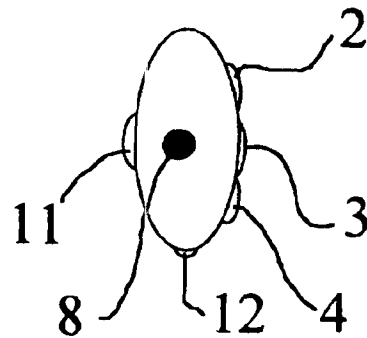


Fig. 10

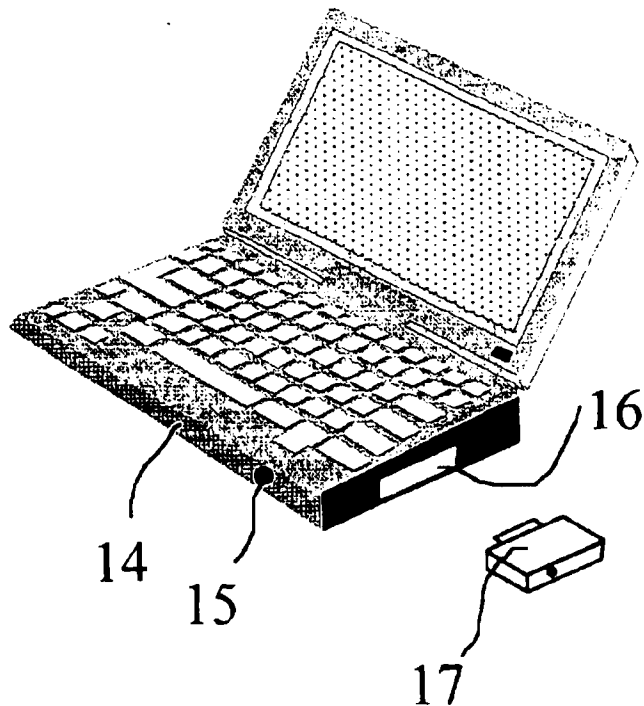
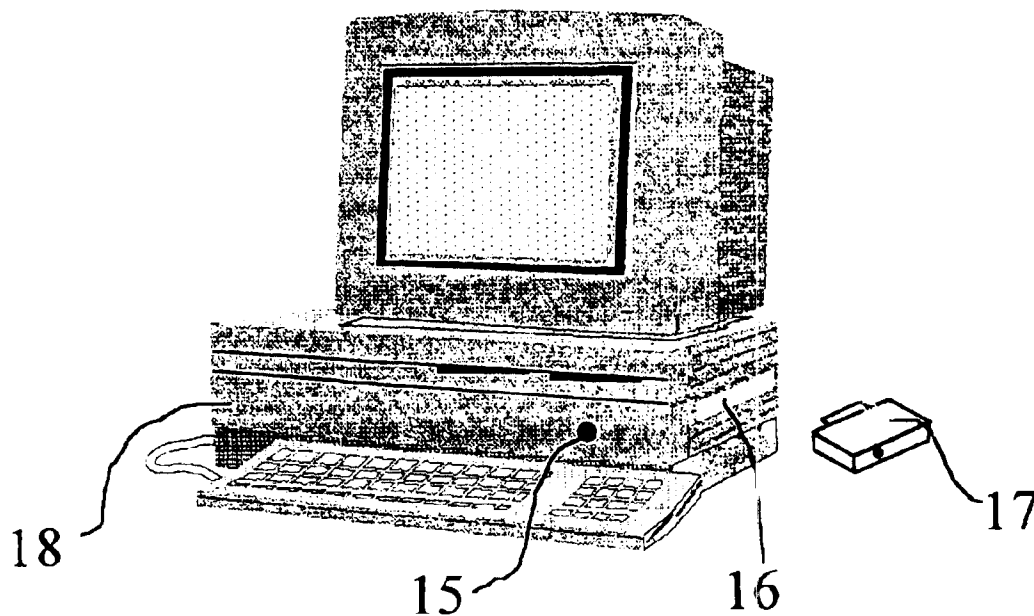


Fig. 11



Portable computerbased input device

Publication number: EP1376319

Publication date: 2004-01-02

Inventor: GERSTNER ROBERT (DE); FILIMON DIANA (DE)

Applicant: FUJITSU SIEMENS COMPUTERS GMBH (DE)

Classification:






- international: *G06F3/02; G06F1/16; G06F3/033; H04M1/725;*
G06F3/02; G06F1/16; G06F3/033; H04M1/72; (IPC1-7):
G06F3/02; H04M1/725

- European: G06F3/048A3T; G06F1/16P3; G06F3/048A3;
H04M1/725F1B1; H04M1/725F1B2




Application number: EP20030010694 20030513

Priority number(s): DE20021029068 20020628

Also published as:

 US6954355 (B2)
 US2004004603 (A1)
 JP2004038975 (A)
 CN1469265 (A)
 DE10229068 (B3)

Cited documents:

 US5307297
 US2002008693
 GB2303945
 WO0209023

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Abstract of EP1376319

Portable computer-based device such as a PDA, mobile phone or laptop for use as a control device for a second computer-based device is configured so that it can be used as an input device for the second computer-based device, e.g. as a mouse or keyboard.

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Electronic Acknowledgement Receipt

EFS ID:	1787093
Application Number:	11249009
International Application Number:	
Confirmation Number:	9446
Title of Invention:	HUMAN INTERFACE INPUT ACCELERATION SYSTEM
First Named Inventor/Applicant Name:	Elaine Chen
Customer Number:	20985
Filer:	Hwa C. Lee/Susan Sesnovich
Filer Authorized By:	Hwa C. Lee
Attorney Docket Number:	19146-005001
Receipt Date:	17-MAY-2007
Filing Date:	11-OCT-2005
Time Stamp:	17:52:06
Application Type:	Utility

Payment information:

Submitted with Payment	no
------------------------	----

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)	Multi Part /.zip	Pages (if appl.)
1	Information Disclosure Statement (IDS) Filed	19146005001IDS.pdf	615131	no	16

Warnings:

Information:					
This is not an USPTO supplied IDS fillable form					
2	Foreign Reference	EP1253547.pdf	516171	no	11
Warnings:					
Information:					
3	Foreign Reference	WO03007117.pdf	1791239	no	38
Warnings:					
Information:					
4	Foreign Reference	DE29823417.pdf	379727	no	12
Warnings:					
Information:					
5	Foreign Reference	EP1376319.pdf	28354	no	1
Warnings:					
Information:					
6	NPL Documents	Sonyericssonbluetooth.pdf	589805	no	22
Warnings:					
Information:					
Total Files Size (in bytes):			3920427		
<p>This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.</p> <p><u>New Applications Under 35 U.S.C. 111</u> If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.</p> <p><u>National Stage of an International Application under 35 U.S.C. 371</u> If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.</p> <p><u>New International Application Filed with the USPTO as a Receiving Office</u> If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.</p>					



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NOTICE OF ALLOWANCE AND FEE(S) DUE

20985 7590 05/17/2007

FISH & RICHARDSON, PC
P.O. BOX 1022
MINNEAPOLIS, MN 55440-1022

EXAMINER: OSORIO, RICARDO
ART UNIT: 2629
PAPER NUMBER:
DATE MAILED: 05/17/2007

Table with 5 columns: APPLICATION NO., FILING DATE, FIRST NAMED INVENTOR, ATTORNEY DOCKET NO., CONFIRMATION NO.
Row 1: 11/249,009, 10/11/2005, Elaine Chen, 19146-005001, 9446
TITLE OF INVENTION: HUMAN INTERFACE INPUT ACCELERATION SYSTEM

Table with 7 columns: APPLN. TYPE, SMALL ENTITY, ISSUE FEE DUE, PUBLICATION FEE DUE, PREV. PAID ISSUE FEE, TOTAL FEE(S) DUE, DATE DUE
Row 1: nonprovisional, YES, \$700, \$0, \$700, \$700, 08/17/2007

THE APPLICATION IDENTIFIED ABOVE HAS BEEN EXAMINED AND IS ALLOWED FOR ISSUANCE AS A PATENT. PROSECUTION ON THE MERITS IS CLOSED. THIS NOTICE OF ALLOWANCE IS NOT A GRANT OF PATENT RIGHTS. THIS APPLICATION IS SUBJECT TO WITHDRAWAL FROM ISSUE AT THE INITIATIVE OF THE OFFICE OR UPON PETITION BY THE APPLICANT. SEE 37 CFR 1.313 AND MPEP 1308.

THE ISSUE FEE AND PUBLICATION FEE (IF REQUIRED) MUST BE PAID WITHIN THREE MONTHS FROM THE MAILING DATE OF THIS NOTICE OR THIS APPLICATION SHALL BE REGARDED AS ABANDONED. THIS STATUTORY PERIOD CANNOT BE EXTENDED. SEE 35 U.S.C. 151. THE ISSUE FEE DUE INDICATED ABOVE DOES NOT REFLECT A CREDIT FOR ANY PREVIOUSLY PAID ISSUE FEE IN THIS APPLICATION. IF AN ISSUE FEE HAS PREVIOUSLY BEEN PAID IN THIS APPLICATION (AS SHOWN ABOVE), THE RETURN OF PART B OF THIS FORM WILL BE CONSIDERED A REQUEST TO REAPPLY THE PREVIOUSLY PAID ISSUE FEE TOWARD THE ISSUE FEE NOW DUE.

HOW TO REPLY TO THIS NOTICE:

I. Review the SMALL ENTITY status shown above.

If the SMALL ENTITY is shown as YES, verify your current SMALL ENTITY status:

- A. If the status is the same, pay the TOTAL FEE(S) DUE shown above.
B. If the status above is to be removed, check box 5b on Part B - Fee(s) Transmittal and pay the PUBLICATION FEE (if required) and twice the amount of the ISSUE FEE shown above, or

If the SMALL ENTITY is shown as NO:

- A. Pay TOTAL FEE(S) DUE shown above, or
B. If applicant claimed SMALL ENTITY status before, or is now claiming SMALL ENTITY status, check box 5a on Part B - Fee(s) Transmittal and pay the PUBLICATION FEE (if required) and 1/2 the ISSUE FEE shown above.

II. PART B - FEE(S) TRANSMITTAL, or its equivalent, must be completed and returned to the United States Patent and Trademark Office (USPTO) with your ISSUE FEE and PUBLICATION FEE (if required). If you are charging the fee(s) to your deposit account, section "4b" of Part B - Fee(s) Transmittal should be completed and an extra copy of the form should be submitted. If an equivalent of Part B is filed, a request to reapply a previously paid issue fee must be clearly made, and delays in processing may occur due to the difficulty in recognizing the paper as an equivalent of Part B.

III. All communications regarding this application must give the application number. Please direct all communications prior to issuance to Mail Stop ISSUE FEE unless advised to the contrary.

IMPORTANT REMINDER: Utility patents issuing on applications filed on or after Dec. 12, 1980 may require payment of maintenance fees. It is patentee's responsibility to ensure timely payment of maintenance fees when due.

PART B - FEE(S) TRANSMITTAL

Complete and send this form, together with applicable fee(s), to: **Mail** Mail Stop ISSUE FEE
Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450
 or **Fax** (571)-273-2885

INSTRUCTIONS: This form should be used for transmitting the ISSUE FEE and PUBLICATION FEE (if required). Blocks 1 through 5 should be completed where appropriate. All further correspondence including the Patent, advance orders and notification of maintenance fees will be mailed to the current correspondence address as indicated unless corrected below or directed otherwise in Block 1, by (a) specifying a new correspondence address; and/or (b) indicating a separate "FEE ADDRESS" for maintenance fee notifications.

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20985 7590 05/17/2007

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MINNEAPOLIS, MN 55440-1022

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I hereby certify that this Fee(s) Transmittal is being deposited with the United States Postal Service with sufficient postage for first class mail in an envelope addressed to the Mail Stop ISSUE FEE address above, or being facsimile transmitted to the USPTO (571) 273-2885, on the date indicated below.

(Depositor's name)
(Signature)
(Date)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
11/249,009	10/11/2005	Elaine Chen	19146-005001	9446

TITLE OF INVENTION: HUMAN INTERFACE INPUT ACCELERATION SYSTEM

APPLN. TYPE	SMALL ENTITY	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	YES	\$700	\$0	\$700	\$700	08/17/2007

EXAMINER	ART UNIT	CLASS-SUBCLASS
OSORIO, RICARDO	2629	345-156000

<p>1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363).</p> <p><input type="checkbox"/> Change of correspondence address (or Change of Correspondence Address form PTO/SB/122) attached.</p> <p><input type="checkbox"/> "Fee Address" indication (or "Fee Address" Indication form PTO/SB/47; Rev 03-02 or more recent) attached. Use of a Customer Number is required.</p>	<p>2. For printing on the patent front page, list</p> <p>(1) the names of up to 3 registered patent attorneys or agents OR, alternatively, _____ 1</p> <p>(2) the name of a single firm (having as a member a registered attorney or agent) and the names of up to 2 registered patent attorneys or agents. If no name is listed, no name will be printed. _____ 2</p> <p>_____ 3</p>
--	---

3. ASSIGNEE NAME AND RESIDENCE DATA TO BE PRINTED ON THE PATENT (print or type)

PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. If an assignee is identified below, the document has been filed for recordation as set forth in 37 CFR 3.11. Completion of this form is NOT a substitute for filing an assignment.

(A) NAME OF ASSIGNEE _____ (B) RESIDENCE: (CITY and STATE OR COUNTRY) _____

Please check the appropriate assignee category or categories (will not be printed on the patent) : Individual Corporation or other private group entity Government

<p>4a. The following fee(s) are submitted:</p> <p><input type="checkbox"/> Issue Fee</p> <p><input type="checkbox"/> Publication Fee (No small entity discount permitted)</p> <p><input type="checkbox"/> Advance Order - # of Copies _____</p>	<p>4b. Payment of Fee(s): (Please first reapply any previously paid issue fee shown above)</p> <p><input type="checkbox"/> A check is enclosed.</p> <p><input type="checkbox"/> Payment by credit card. Form PTO-2038 is attached.</p> <p><input type="checkbox"/> The Director is hereby authorized to charge the required fee(s), any deficiency, or credit any overpayment, to Deposit Account Number _____ (enclose an extra copy of this form).</p>
---	--

5. Change in Entity Status (from status indicated above)

a. Applicant claims SMALL ENTITY status. See 37 CFR 1.27. b. Applicant is no longer claiming SMALL ENTITY status. See 37 CFR 1.27(g)(2).

NOTE: The Issue Fee and Publication Fee (if required) will not be accepted from anyone other than the applicant; a registered attorney or agent; or the assignee or other party in interest as shown by the records of the United States Patent and Trademark Office.

Authorized Signature _____ Date _____

Typed or printed name _____ Registration No. _____

This collection of information is required by 37 CFR 1.311. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, Virginia 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, Virginia 22313-1450.

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11/249,009 10/11/2005 Elaine Chen 19146-005001 9446

20985 7590 05/17/2007
FISH & RICHARDSON, PC
P.O. BOX 1022
MINNEAPOLIS, MN 55440-1022

EXAMINER

OSORIO, RICARDO

ART UNIT PAPER NUMBER

2629

DATE MAILED: 05/17/2007

Determination of Patent Term Adjustment under 35 U.S.C. 154 (b)
(application filed on or after May 29, 2000)

The Patent Term Adjustment to date is 0 day(s). If the issue fee is paid on the date that is three months after the mailing date of this notice and the patent issues on the Tuesday before the date that is 28 weeks (six and a half months) after the mailing date of this notice, the Patent Term Adjustment will be 0 day(s).

If a Continued Prosecution Application (CPA) was filed in the above-identified application, the filing date that determines Patent Term Adjustment is the filing date of the most recent CPA.

Applicant will be able to obtain more detailed information by accessing the Patent Application Information Retrieval (PAIR) WEB site (http://pair.uspto.gov).

Any questions regarding the Patent Term Extension or Adjustment determination should be directed to the Office of Patent Legal Administration at (571)-272-7702. Questions relating to issue and publication fee payments should be directed to the Customer Service Center of the Office of Patent Publication at 1-(888)-786-0101 or (571)-272-4200.

Notice of Allowability

Application No. 11/249,009	Applicant(s) CHEN ET AL.	
Examiner RICARDO L. OSORIO	Art Unit 2629	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

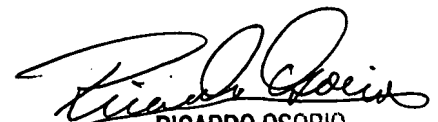
- 1. This communication is responsive to 5/3/2007.
 - 2. The allowed claim(s) is/are 1-38.
 - 3. Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 - a) All b) Some* c) None of the:
 - 1. Certified copies of the priority documents have been received.
 - 2. Certified copies of the priority documents have been received in Application No. _____.
 - 3. Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).
- * Certified copies not received: _____.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.
THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

- 4. A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.
 - 5. CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
 - (a) including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
 - 1) hereto or 2) to Paper No./Mail Date _____.
 - (b) including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.
- Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).
- 6. DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

- 1. Notice of References Cited (PTO-892)
- 2. Notice of Draftperson's Patent Drawing Review (PTO-948)
- 3. Information Disclosure Statements (PTO/SB/08),
Paper No./Mail Date 5/3/2007
- 4. Examiner's Comment Regarding Requirement for Deposit of Biological Material
- 5. Notice of Informal Patent Application
- 6. Interview Summary (PTO-413),
Paper No./Mail Date _____.
- 7. Examiner's Amendment/Comment
- 8. Examiner's Statement of Reasons for Allowance
- 9. Other _____.


RICARDO OSORIO
PRIMARY EXAMINER

5/3/2007

Sheet 1 of 2

Substitute Form PTO-1449 (Modified) Information Disclosure Statement by Applicant (Use several sheets if necessary) (37 CFR §1.98(b))	U.S. Department of Commerce Patent and Trademark Office	Attorney's Docket No. 19146-005001	Application No. 11/249,009
	Applicant Beth Marcus, et al		
	Filing Date October 11, 2005		Group Art Unit 2629

U.S. Patent Documents							
Examiner Initial	Desig. ID	Document Number	Publication Date	Patentee	Class	Subclass	Filing Date If Appropriate
/RO/	AA	2005/093846	05/05/2005	Marcus et al.			
/RO/	AB	6,615,299	09/02/2003	Chu et al.			
	AC						
	AD						
	AE						
	AF						
	AG						
	AH						
	AI						
	AJ						
	AK						

Foreign Patent Documents or Published Foreign Patent Applications								
Examiner Initial	Desig. ID	Document Number	Publication Date	Country or Patent Office	Class	Subclass	Translation	
							Yes	No
/RO/	AL	EP 0 251 477 A2	01/07/1988	EP				
	AM							
	AN							
	AO							
	AP							

Other Documents (include Author, Title, Date, and Place of Publication)		
Examiner Initial	Desig. ID	Document
/RO/	AQ	ZAWINSKI, J., "XKeyCaps"[Online], 12 December 1999, XP002421133, Retrieved from the Internet: URL: http://www.jwz.org/xkeycaps/ , pp. 1-3.
/RO/	AR	ZAWINSKI, J., "XKeyCaps Manual"[Online], 12 December 1999, XP002421293, Retrieved from the Internet: URL: http://www.jwz.org/xkeycaps/man.html , pp. 1-14.
/RO/	AS	OPEN SOURCE TECHNOLOGY GROUP: "Project Details for XKeyCaps"[Online], 1 January 2006, XP002421134, Retrieved from the Internet: URL: http://freshmeat.net/projects/xkeycaps , pp. 1-2.


Examiner Signature /Ricardo Osorio/	Date Considered 05/12/2007
EXAMINER: Initials citation considered. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.	

Substitute Disclosure Form (PTO-1449)

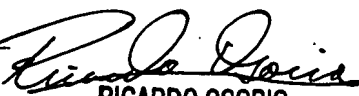
Substitute Form PTO-1449 (Modified) Information Disclosure Statement by Applicant (Use several sheets if necessary) (37 CFR §1.98(b))	U.S. Department of Commerce Patent and Trademark Office	Attorney's Docket No. 19146-005001	Application No. 11/249,009
	Applicant Beth Marcus, et al		Filing Date October 11, 2005
			Group Art Unit 2629

Other Documents (include Author, Title, Date, and Place of Publication)		
Examiner Initial	Desig. ID	Document
/RO/	AT	THE XFREE86 PROJECT, INC: "XMODMAP(1) manual page"[Online], 18 January 2002, XP002421135, Retrieved from the Internet: URL: http://www.xfree86.org/4.2.0/xmodmap.1.html >, pp. 1-5.
	AU	THE XFREE86 PROJECT, INC: "XFree86 Release 4.2.1"[Online], 8 May 2006, XP002421136, Retrieved from the Internet: URL: http://www.xfree86.org/releases/rel420.html >, pp. 1-2.
	AV	TOMAN, K. and; PASCAL, I. U., "How to Further Enhance XKB Configuration"[Online], 25 November 2002, XP002421137, Retrieved from the Internet: URL: http://www.xfree86.org/4.5.0/XKB-Enhancing.pdf >, pp. 1-9.
	AW	Ranta, et al., "Human Interface Device (HID) Profile, Version 1.0 Adopted", <u>Bluetooth HID Profile, Version 1.0, May 22, 2003</u>
	AX	"Welcome to iGo!, Stowaway Travel Mouse", http://www.thinkoutside.com/btmouse_product.html , retrieved from the internet May 2, 2007
	AY	"Broadcom Targets Wireless Keyboard, Mouse with First Bluetooth SoC", Broadcom Press Release, June 10, 2003
	AZ	"Gameboard EGB-10 – Overview – Sony Ericsson", http://www.sonyericsson.com/spg.jsp?cc=my&lc=en&ver=4000&template=pio1&pid=1011 , retrieved from the internet May 2, 2007
↓	AAA	"Sprint PCS Accessories: Accessory Listing for Samsung A600", http://www.sprintpcsaccessories.com/direct/sp/accessory.jsp?prod=1595 , May 2, 2007
	ABB	

Examiner Signature /Ricardo Osorio/	Date Considered 05/12/2007
EXAMINER: Initials citation considered. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.	

Issue Classification 	Application/Control No. 11/249,009	Applicant(s)/Patent under Reexamination CHEN ET AL.
	Examiner RICARDO L. OSORIO	Art Unit 2629

ISSUE CLASSIFICATION									
ORIGINAL					INTERNATIONAL CLASSIFICATION				
CLASS		SUBCLASS			CLAIMED			NON-CLAIMED	
345		156			6 09 G			5 1 0 0	
CROSS REFERENCES									
CLASS	SUBCLASS (ONE SUBCLASS PER BLOCK)								
345	169						/		/
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(Assistant Examiner) (Date)	 RICARDO OSORIO PRIMARY EXAMINER (Date) 5/14/07	Total Claims Allowed: 38	
(Legal Instruments Examiner) (Date)		O.G. Print Claim(s) 1	O.G. Print Fig. 4

<input type="checkbox"/> Claims renumbered in the same order as presented by applicant		<input type="checkbox"/> CPA		<input type="checkbox"/> T.D.		<input type="checkbox"/> R.1.47		
Final	Original	Final	Original	Final	Original	Final	Original	
1	1	36	31	61	91	121	151	181
2	2	37	32	62	92	122	152	182
9	3	38	33	63	93	123	153	183
10	4	31	34	64	94	124	154	184
11	5	32	35	65	95	125	155	185
12	6	34	36	66	96	126	156	186
3	7	35	37	67	97	127	157	187
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13	9		39	69	99	129	159	189
14	10		40	70	100	130	160	190
15	11		41	71	101	131	161	191
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6	13		43	73	103	133	163	193
7	14		44	74	104	134	164	194
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23	25		55	85	115	145	175	205
24	26		56	86	116	146	176	206
27	27		57	87	117	147	177	207
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29	29		59	89	119	149	179	209
30	30		60	90	120	150	180	210



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Bib Data Sheet

CONFIRMATION NO. 9446

SERIAL NUMBER 11/249,009	FILING OR 371(c) DATE 10/11/2005 RULE	CLASS 345	GROUP ART UNIT 2629	ATTORNEY DOCKET NO. 19146-005001
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APPLICANTS
 Elaine Chen, Arlington, MA;
 Rob Podoloff, Framingham, MA;
 Lorraine Wheeler, Billerica, MA;
 Beth Marcus, Bedford, MA;

**** CONTINUING DATA ******* *NO RLO*

**** FOREIGN APPLICATIONS ******* *NO RLO*

IF REQUIRED, FOREIGN FILING LICENSE GRANTED SMALL ENTITY****
**** 11/02/2005**

Foreign Priority claimed <input type="checkbox"/> yes <input checked="" type="checkbox"/> no	STATE OR COUNTRY MA	SHEETS DRAWING 13	TOTAL CLAIMS 38	INDEPENDENT CLAIMS 3
35 USC 119 (a-d) conditions <input type="checkbox"/> yes <input checked="" type="checkbox"/> no <input type="checkbox"/> Met after met				
Verified and Acknowledged <i>Richard D. Brown</i> Examiner's Signature <i>RLO</i> Initials				

ADDRESS
20985

TITLE
HUMAN INTERFACE INPUT ACCELERATION SYSTEM

FILING FEE RECEIVED 1315	FEES: Authority has been given in Paper No. _____ to charge/credit DEPOSIT ACCOUNT No. _____ for following:	<input type="checkbox"/> All Fees
		<input type="checkbox"/> 1.16 Fees (Filing)
		<input type="checkbox"/> 1.17 Fees (Processing Ext. of time)
		<input type="checkbox"/> 1.18 Fees (Issue)
		<input type="checkbox"/> Other _____
		<input type="checkbox"/> Credit



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MINNEAPOLIS, MN 55440-1022

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MAY 07 2007

In re Application of :
Elaine Chen et al :
Application No. 11/249,009 :
Filed: October 11, 2005 :
Attorney Docket No. 19146-005001 :

**OFFICE OF PETITIONS
ON PETITION**

This is a decision on the petition, filed May 3, 2007 under 37 CFR 1.313(c)(2) to withdraw the above-identified application from issue after payment of the issue fee.

The petition is **GRANTED**.

The above-identified application is withdrawn from issue for consideration of a submission under 37 CFR 1.114 (request for continued examination). See 37 CFR 1.313(c)(2).

Petitioner is advised that the issue fee paid on April 25, 2007 in the above-identified application cannot be refunded. If, however, the above-identified application is again allowed, petitioner may request that it be applied towards the issue fee required by the new Notice of Allowance.¹

The file does not indicate a change of address has been submitted, although the address given on the petition differs from the address of record. If appropriate, a change of address should be filed in accordance with MPEP 601.03. A courtesy copy of this decision is being mailed to the address given on the petition; however, the Office will mail all future correspondence solely to the address of record.

Telephone inquiries should be directed to Irvin Dingle at (571) 272-3210.

This matter is being referred to Technology Center AU 2629 for processing of the request for continued examination under 37 CFR 1.114 and for consideration of the concurrently filed Information Disclosure Statement.

Irvin Dingle
Irvin Dingle
Petitions Examiner
Office of Petitions

cc: Fish & Richardson P.C.
12390 El Camino Real
San Diego, CA 92130

¹ The request to apply the issue fee to the new Notice may be satisfied by completing and returning the new Issue Fee Transmittal Form PTOL-85(b), which includes the following language thereon: 'Commissioner for Patents is requested to apply the Issue Fee and Publication Fee (if any) or re-apply any previously paid issue fee to the application identified above. Petitioner is advised that, whether a fee is indicated as being due or not, the Issue Fee Transmittal Form **must** be completed and timely submitted to avoid abandonment. Note the language in bold text on the first page of the Notice of Allowance and Fee(s) Due (PTOL-85).'

<p style="text-align: center;">Request For Continued Examination (RCE) Transmittal</p> <p>Address to: Mail Stop RCE Commissioner for Patents P.O. Box 1450 Alexandria, VA 22313-1450</p>	<i>Application Number</i>	11/249,009
	<i>Filing Date</i>	October 11, 2005
	<i>First Named Inventor</i>	Beth Marcus, et al
	<i>Group Art Unit</i>	2629
	<i>Conf No.</i>	9446
	<i>Examiner Name</i>	Ricardo Osorio
	<i>Attorney Docket Number</i>	19146-005001

This is a Request for Continued Examination (RCE) under 37 C.F.R. §1.114 of the above-identified application.
 Request for Continued Examination (RCE) practice under 37 CFR 1.114 does not apply to any utility or plant application filed prior to June 8, 1995, or to any design application. See Instruction Sheet for RCEs (not to be submitted to the USPTO) on page 2.

1. **Submission required under 37 C.F.R. §1.114** Note: If the RCE is proper, any previously filed unentered amendments and amendments enclosed with the RCE will be entered in the order in which they were filed unless applicant instructs otherwise. If applicant does not wish to have any previously filed unentered amendment(s) entered, applicant must request non-entry of such amendment(s)

a. Previously submitted. If a final Office action is outstanding, any amendment filed after the final Office action may be considered as a submission even if this box is not checked.

i. Consider the arguments in the Appeal Brief or Reply Brief previously filed on _____

ii. Other _____

b. Enclosed

i. Amendment/Reply

ii. Affidavit(s)/Declaration(s)

iii. Information Disclosure Statement (IDS)

iv. Other Petition to Withdraw from Issue

2. **Miscellaneous**

a. Suspension of action on the above-identified application is requested under 37 C.F.R. §1.103(c) for a period of _____ months. (Period of suspension shall not exceed 3 months; Fee under 37 C.F.R. §1.17(i) required)

b. Other _____

3. **Fee** The RCE fee under 37 C.F.R. §1.17(e) is required by 37 C.F.R. §1.114 when the RCE is filed.

a. The Director is hereby authorized to charge the following fees, or credit any overpayments, to Deposit Account No. 06-1050

i. RCE fee required under 37 CFR 1.17(e)

ii. Extension of time fee (37 CFR 1.136 and 1.17)

iii. Other Any deficiencies

b. Check in the amount of \$_____ enclosed

c. Payment by credit card (Form PTO-2038 enclosed)

SIGNATURE OF APPLICANT, ATTORNEY OR AGENT REQUIRED			
<i>Name (Print/Type)</i>	Hwa C. Lee	<i>Registration No. (Attorney/Agent)</i>	59,747
<i>Signature</i>	/Hwa C. Lee/	<i>Date</i>	May 3, 2007

Substitute Form PTO-1449 (Modified) Information Disclosure Statement by Applicant (Use several sheets if necessary) (37 CFR §1.98(b))	U.S. Department of Commerce Patent and Trademark Office	Attorney's Docket No. 19146-005001	Application No. 11/249,009
	Applicant Beth Marcus, et al		
	Filing Date October 11, 2005		Group Art Unit 2629

U.S. Patent Documents							
Examiner Initial	Desig. ID	Document Number	Publication Date	Patentee	Class	Subclass	Filing Date If Appropriate
	AA	2005/093846	05/05/2005	Marcus et al.			
	AB	6,615,299	09/02/2003	Chu et al.			
	AC						
	AD						
	AE						
	AF						
	AG						
	AH						
	AI						
	AJ						
	AK						

Foreign Patent Documents or Published Foreign Patent Applications								
Examiner Initial	Desig. ID	Document Number	Publication Date	Country or Patent Office	Class	Subclass	Translation	
							Yes	No
	AL	EP 0 251 477 A2	01/07/1988	EP				
	AM							
	AN							
	AO							
	AP							

Other Documents (include Author, Title, Date, and Place of Publication)		
Examiner Initial	Desig. ID	Document
	AQ	ZAWINSKI, J., "XKeyCaps"[O nline], 12 December 1999, XP002421133, Retrieved from the Internet: URL: http://www.jwz.org/xkeycaps/ >, pp. 1-3.
	AR	ZAWINSKI, J., "XKeyCaps Manual"[Online], 12 December 1999, XP002421293, Retrieved from the Internet: URL: http://www.jwz.org/xkeycaps/man.html >, pp. 1-14.
	AS	OPEN SOURCE TECHNOLOGY GROUP: "Project Details for XKeyCaps"[Online], 1 January 2006, XP002421134, Retrieved from the Internet: URL: http://freshmeat.net/projects/xkeycaps , pp. 1-2.

Examiner Signature	Date Considered
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EXAMINER: Initials citation considered. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

Substitute Form PTO-1449 (Modified)	U.S. Department of Commerce Patent and Trademark Office	Attorney's Docket No. 19146-005001	Application No. 11/249,009
Information Disclosure Statement by Applicant (Use several sheets if necessary) (37 CFR §1.98(b))		Applicant Beth Marcus, et al	
		Filing Date October 11, 2005	Group Art Unit 2629

Other Documents (include Author, Title, Date, and Place of Publication)		
Examiner Initial	Desig. ID	Document
	AT	THE XFREE86 PROJECT, INC: "XMODMAP(l) manual page"[Online], 18 January 2002, XP002421135, Retrieved from the Internet: URL: http://www.xfree86.org/4.2.0/xmodmap.1.html >, pp. 1-5.
	AU	THE XFREE86 PROJECT, INC: "XFree86 Release 4.2.1"[Online], 8 May 2006, XP002421136, Retrieved from the Internet: URL: http://www.xfree86.org/releases/rel420.html >, pp. 1-2.
	AV	TOMAN, K. and; PASCAL, I. U., "How to Further Enhance XKB Configuration"[Online], 25 November 2002, XP002421137, Retrieved from the Internet: URL: http://www.xfree86.org/4.5.0/XKB-Enhancing.pdf >, pp. 1-9.
	AW	Ranta, et al., "Human Interface Device (HID) Profile, Version 1.0 Adopted", <u>Bluetooth HID Profile, Version 1.0</u> , May 22, 2003
	AX	"Welcome to iGo!, Stowaway Travel Mouse", http://www.thinkoutside.com/btmouse_product.html , retrieved from the internet May 2, 2007
	AY	"Broadcom Targets Wireless Keyboard, Mouse with First Bluetooth SoC", Broadcom Press Release, June 10, 2003
	AZ	"Gameboard EGB-10 – Overview – Sony Ericsson", http://www.sonyericsson.com/spg.jsp?cc=my&lc=en&ver=4000&template=piol&pid=1011 , retrieved from the internet May 2, 2007
	AAA	"Sprint PCS Accessories: Accessory Listing for Samsung A600", http://www.sprintpcsaccessories.com/direct/sp/accessory.jsp?prod=1595 , May 2, 2007
	ABB	

Examiner Signature	Date Considered
EXAMINER: Initials citation considered. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.	

Electronic Patent Application Fee Transmittal

Application Number:	11249009
Filing Date:	11-Oct-2005
Title of Invention:	HUMAN INTERFACE INPUT ACCELERATION SYSTEM
First Named Inventor/Applicant Name:	Elaine Chen
Filer:	Hwa C. Lee/Susan Sesnovich
Attorney Docket Number:	19146-005001

Filed as Small Entity

Utility Filing Fees

Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Basic Filing:				
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Petition fee- 37 CFR 1.17(h) (Group III)	1464	1	130	130

Patent-Appeals-and-Interference:

Post-Allowance-and-Post-Issuance:

Extension-of-Time:

Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Miscellaneous:				
Request for continued examination	2801	1	395	395
Total in USD (\$)				525

Electronic Acknowledgement Receipt

EFS ID:	1742380
Application Number:	11249009
International Application Number:	
Confirmation Number:	9446
Title of Invention:	HUMAN INTERFACE INPUT ACCELERATION SYSTEM
First Named Inventor/Applicant Name:	Elaine Chen
Customer Number:	20985
Filer:	Hwa C. Lee/mary ann reed
Filer Authorized By:	Hwa C. Lee
Attorney Docket Number:	19146-005001
Receipt Date:	03-MAY-2007
Filing Date:	11-OCT-2005
Time Stamp:	17:22:25
Application Type:	Utility

Payment information:

Submitted with Payment	yes
Payment was successfully received in RAM	\$ 525
RAM confirmation Number	801
Deposit Account	061050

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)	Multi Part /.zip	Pages (if appl.)
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1	Foreign Reference	EP0251477.pdf	1200347	no	19
Warnings:					
Information:					
2	NPL Documents	XFREE86Releaseonline.pdf	45620	no	2
Warnings:					
Information:					
3	NPL Documents	XMODMAP1manualpage.pdf	224061	no	5
Warnings:					
Information:					
4	NPL Documents	Opensourcetechnology.pdf	100935	no	2
Warnings:					
Information:					
5	NPL Documents	ZawinskiXKeyCapsManual.pdf	130825	no	14
Warnings:					
Information:					
6	NPL Documents	ZawinskiXKeyCapsonline.pdf	73906	no	3
Warnings:					
Information:					
7	NPL Documents	BroadcommPressrelease.pdf	20567	no	2
Warnings:					
Information:					
8	NPL Documents	HIDSpec.pdf	2019948	no	123
Warnings:					
Information:					
9	NPL Documents	WelcometoiGo.pdf	111341	no	1
Warnings:					
Information:					

10	NPL Documents	sprintpcsaccessories.pdf	184397	no	2
Warnings:					
Information:					
11	NPL Documents	GameboardEGB10.pdf	132170	no	2
Warnings:					
Information:					
12	NPL Documents	Toman.pdf	210442	no	10
Warnings:					
Information:					
13	Request for Continued Examination (RCE)	RCE.pdf	49986	no	1
Warnings:					
This is not a USPTO supplied RCE SB30 form.					
Information:					
14	Petition to Withdraw from Issue	petitiontowithdraw.pdf	31277	no	1
Warnings:					
Information:					
15	Information Disclosure Statement (IDS) Filed	IDS.pdf	121811	no	3
Warnings:					
Information:					
This is not an USPTO supplied IDS fillable form					
16	Fee Worksheet (PTO-06)	fee-info.pdf	8324	no	2
Warnings:					
Information:					
Total Files Size (in bytes):			4665957		

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.



(19)

(11) Publication number:

**0 251 477
A2**

(12)

EUROPEAN PATENT APPLICATION

(21) Application number: **87304587.6**

(51) Int. Cl.4: **G06F 3/023**

(22) Date of filing: **22.05.87**

The title of the invention has been amended
(Guidelines for Examination in the EPO, A-III,
7.3).

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(30) Priority: **30.05.86 US 868987**

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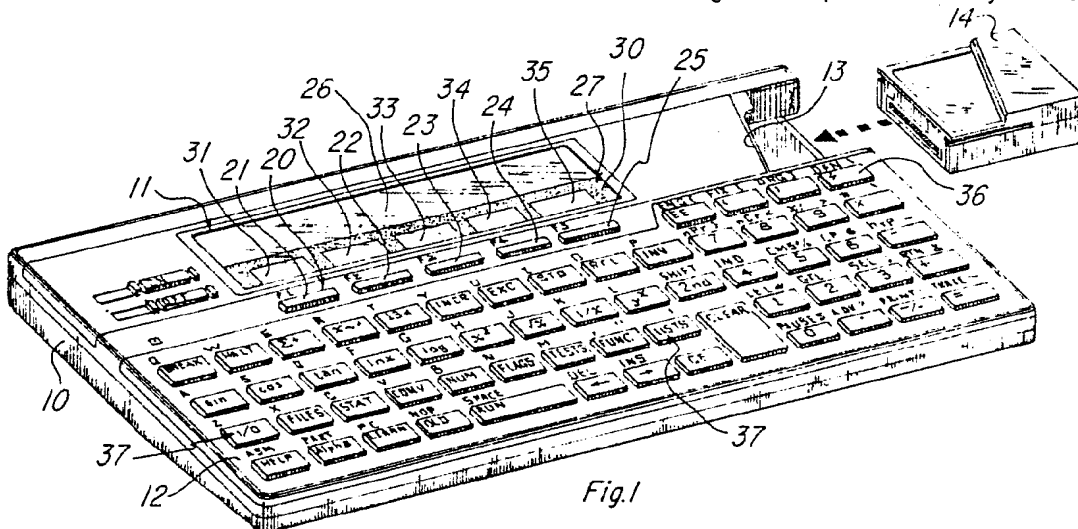
(43) Date of publication of application:
07.01.88 Bulletin 88/01

(64) Designated Contracting States:
DE FR GB IT NL

(74) Representative: **Abbott, David John et al
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(54) **Electronic calculator having function keys with programmable labels.**

(57) Calculator having a keyboard (12) in which one or more keys (20) have labels (31-35) created by a display (11) and subject to changing interactively as the user desires. Typically, advanced scientific-programmable calculators may have too many functions to be adequately included on the keys of the keyboard associated therewith. In such calculators, certain functions require a plurality of keys to be actuated in order to be performed. Thus, such keyboards tend to be cluttered and confusing to the user. Thus, a keyboard (12) is proposed having a small number of keys (21-25) labeled with different functional labels (31-35) as the user proceeds through a menu or tree structure containing all the desired functions. Keys (21-25) in a certain group of keys (20) on the keyboard are thereby subject to redefinition or relabeling so as to provide a variety of functions.



EP 0 251 477 A2

Fig. 1

**ELECTRONIC CALCULATOR HAVING KEYBOARD WITH CERTAIN FUNCTION KEYS PROVIDED WITH
PROGRAMMABLE ALTERABLE INTERACTIVE KEY LABELS**

This invention relates generally to a data processing apparatus having a keyboard with a plurality of keys for entering data into the data processing unit of the apparatus, wherein the keys are required to have more than one function and must be labelled in some manner to identify the respective functions therefor. More particularly, this invention concerns an electronic calculator having a keyboard in which one or more
 5 keys have labels visually observable on a display associated with the keys wherein the respective key labels may be changed interactively as the operator of the calculator desires.

Background of the Invention

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It is most often advantageous in data processing devices to have an ability and a flexibility to change functional operating capabilities so as to enhance the versatility of the data processing device in a variety of situations where different data solutions are required. Such function-changing of a data processing device may typically involve the use of a keyboard having a plurality of keys which may be assigned dual
 15 functions, or in a more complex environment three or more functions, with respective mode keys to denote which particular function applies to a given key at any one time instant.

For example, a simple four-function electronic calculator may have four individual operation mode keys respectively labelled as the four basic arithmetic functions--addition, subtraction, multiplication and division. In this instance, the number of keys required for a keyboard of a calculator of this character is not
 20 excessive, thereby creating no problem in key-labelling. As the complexity of the data processing device increases, however, the matter of key-labelling begins to create a problem because of the added functions required by the device and the restrictions space and operability place upon the type of key-labelling to be used on the keyboard of such a device. Thus, by adding the trigonometric functions of sine, cosine, tangent and arc cosine to the calculator, more keys having the appropriate labels applied thereto are required for
 25 the keyboard.

By continuing to add to the functional capability of the calculator, more and more keys are necessary for the keyboard, and a point is reached where keys must serve dual function roles and even beyond if all of the desired functions of the calculator are to be possible via keyboard entry. It will be appreciated that there is some higher limit as to the number of keys which may be added to a keyboard without causing a
 30 breakdown in operator performance. In the latter respect, as the number of keys included on a keyboard for a data processing apparatus increases beyond a certain point, operator performance begins to decline and then drops rapidly because of the confusion brought on by the clutter of keys, the difficulty in accomplishing the desired information processing, and intimidation because of keyboard complexity.

Thus, one of the limiting factors in the design of an operator interactive data processing apparatus, such as an electronic calculator, is the human factor in the ability of an operator in properly assessing and
 35 understanding the respective keys included in a data entry keyboard having a multiple number of function keys which input data to the processing unit of the apparatus in permitting the apparatus to perform a diverse number of processing applications. Perhaps the human factor limitation achieves its most distinctive character in association with a hand-held calculator, for example, because of the space restrictions
 40 necessary for a keyboard of such a device.

Hand-held calculators have been constructed to perform a wide variety of computational tasks, such as business, basic mathematics, scientific, etc. with keyboards whose layout and number of keys are generally along the same lines with little change in size and complexity. One example of a calculator whose keyboard
 45 includes a number of keys at or approaching the upper limit of an operator to reasonably understand and use the keys in the manner for which they are designed in the operation of the calculator is disclosed in U. S. Patent 4,208,720 Harrison. The calculator in U. S. Patent 4,208,720 Harrison is a hand-held calculator with forty keys having seventy-nine labels associated therewith.

One approach toward minimizing the number of keys and labels therefor as required in a data processing apparatus has been the use of separate memory modules, each with its own set of key
 50 functions and its own particular computational tasks, with the basic data processing apparatus. In this approach, a plug-in memory module, which may take the form of a read-only-memory (ROM), a programmable read-only-memory (PROM), or a magnetic tape, for example, is electrically connected to the data processing unit of the apparatus by insertion into an appropriate electrical socket provided in the apparatus housing for that purpose. This memory module will supplement the basic operation functions of the data

processing apparatus with additional functions and supply any necessary new data to enable the data processing apparatus to perform the added functions. The substitution of memory modules in this manner in a data processing apparatus equipped to make use of such memory modules is primarily limited to the augmentation of the permanent functions built into the data processing apparatus, and is of less utility in
 5 enabling the data processing apparatus to perform computational tasks based upon significantly different functions attributable to keyboard entry.

Typically, an operator will enter data via a keyboard of the data processing apparatus. Individual keys, which are switches, may be permanently labelled to identify the functions associated therewith. As previously explained, the keys may be given a dual function, or beyond, by the use of appropriate mode
 10 keys, which when actuated from one status to another, will cause the functions of the individual keys to change also. Dual-function labelling of keys is commonly found on business-type and scientific-type hand-held calculators in present use. In some instances, the keyboard may include a set of blank or unlabelled keys adapted to be used with various cardboard or plastic overlays bearing appropriate key-function identifying labels.

Prior to the present invention, efforts have been made to reduce the clutter of keys on keyboards of sophisticated data processing apparatuses, such as electronic hand-held calculators designed for advanced scientific use. Two such prior efforts are disclosed in U. S. Patents 4,078,257 Bagley and 4,385,366 Housey, both of which are hereby incorporated by reference. Bagley and Housey each make use of transparent keys in which the transparency of each key is a visual display. In Bagley, a plurality of display
 20 planes each containing preselected symbols is provided. A mode selection key enables one of the display planes to be chosen for viewing through the transparent keys comprising the keyboard as a liquid crystal display, thereby labelling the respective keys of the keyboard with the symbols of the chosen display plane. Housey relies upon the use of a particular plug-in memory module to provide label identification for the plurality of keys via liquid crystal displays visible through each transparent key. The plug-in memory
 25 module may be replaced by a different plug-in memory module with a corresponding change in the function labels applicable to the keys. Thus, Bagley is limited to the symbols on specific display planes which may be selectively chosen to identify the functions of the individual keys of the keyboard, whereas Housey is limited to the symbols associated with a particular plug-in memory module as the function labels to be associated with the keys of the keyboard. In each instance, flexibility and versatility of key labelling is
 30 somewhat restricted.

Summary of the Invention

The present invention is directed to a data processing apparatus, a hand-held electronic calculator in a preferred embodiment, having a keyboard in which one or more keys have labels created by a display associated therewith, wherein the labels are subject to being changed interactively as the operator desires. The keyboard for the calculator in accordance with this invention includes a specific group of keys in the overall keyboard which may be said to have a definable function subject to characterization in any one of a
 40 plurality of functions. The functions to be assigned to particular keys within this specific group may be defined for one particular operation of the calculator by three different techniques: (1) via the calculator operating system; (2) via library application as provided by a plug-in memory module; and (3) via an operator-defined program. Each of these techniques is therefore available in a single electronic calculator as a means of defining or re-defining the function labels for the specific group of keys whose functions may be
 45 re-definable at will according to the desires of the operator.

Such a flexible arrangement enables the definable-function keys to be re-labelled in a virtually limitless manner, thereby enabling the calculator to be designed with a keyboard of significant versatility while remaining uncluttered. The key re-labelling aspect in accordance with the present invention by permitting re-definition of the functions of a select group of keys contributes to the ease of use of the calculator,
 50 making it "user friendly".

In a specific aspect of the present invention, the display means of the calculator may include a main display portion where input data and computation results are visually displayed and a dedicated display portion specifically associated with the group of definable-function keys. The dedicated display portion, although part of the display means, is marked by an opaque frame to delineate it from the main display and
 55 includes a plurality of windows defined by the frame and arranged in respective proximity to each of the definable-function keys comprising the group of such keys. The display means may be a liquid crystal display or other suitable type, with the windows of the dedicated portion thereof being provided for the purpose of visually displaying the labels in the form of appropriate symbols for the definable-function keys.

The keyboard further includes appropriate application mode keys or "menu" keys to enable labelling the group of definable-function keys in any one of the three techniques previously described. Actuation of an application mode key by a keystroke causes the data processing unit of the calculator to assign a function to each selected key of the definable-function group. A display driver means or graphic means is operably coupled to the dedicated portion of the display means and to the data processing unit so as to provide a visual symbol or symbols in respective windows of the dedicated display portion as labels for each of the selected definable-function keys.

The re-labelling or re-definition of these special definable-function keys can be accomplished a plurality of times within the same computation application of the calculator such that each definable-function key may assume two or more separate and distinct functions within the same data processing procedure. This plural function aspect for selected ones of the definable-function keys can be achieved by each of the three key-labelling techniques previously mentioned.

While the invention may have general applicability in the re-labelling of keys of a keyboard for a data processing apparatus, it has specific applicability to so-called advanced scientific programmable calculators which typically will have a multiplicity of functions too many in number to fit on the keyboard of such an apparatus, particularly when it is of the hand-held type.

Having briefly summarized the invention, the invention will be described in more detail with reference to the following drawings.

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Brief Description of the Drawings

FIGURE 1 is a perspective view of a data processing apparatus in the form of an electronic calculator constructed in accordance with the present invention;

FIGURE 2 is a block diagram schematic of the calculator shown in FIGURE 1;

FIGURES 3a-3e are enlarged partial plan views of the calculator shown in FIGURE 1, illustrating the display thereof and a dedicated display portion in association with a group of definable-function keys with labels assigned to specific keys in the group visually appearing in the dedicated display portion; and

FIGURES 4a and 4b comprise a flow chart showing a calculator operated procedure for executing an operator-devised program in the re-labelling of the definable-function keys such that the respective functions assigned to the special keys may be identified and displayed to the operator to facilitate running of the program on the calculator.

Detailed Description of the Invention

Referring more specifically to FIGURES 1 and 2 of the drawings, a data processing apparatus as constructed in accordance with the invention is illustrated in the form of an electronic calculator which comprises an outer housing 10 having a visual display means 11 (preferably a liquid crystal display, although other forms of displays such as light-emitting diodes could be employed) disposed on the upper portion of the housing 10 and a keyboard 12 arranged on the lower portion of the housing 10. The individual keys may be push-button contact switches wherein momentary depression of a respective key completes an electrical contact to generate a data input. Other forms of keys may be suitably employed, such as the capacitance touch sensing type disclosed in U.S. Patent 4,385,366, Housey. The housing 10 further includes a slot or socket 13 in the upper right-hand side for receiving a plug-in memory module 14. The memory module 14 may be a read-only-memory (ROM) or a random access memory (RAM) or a combination of both and is inserted within the socket 15 within the housing 10 (FIGURE 2).

The ROM portion of the plug-in memory 14 contains a data library for enabling the data processing unit to accomplish some particular set of functional capabilities. It will be appreciated that a wide variety of data libraries may be provided in ROMs of respective memory modules 14 which may be readily substituted for each other by removing one such memory module 14. Thus, a wide range of functions may be performed by the data processing unit 15 of the calculator, each of which is accompanied by an appropriate set of function labels to be assigned to a specific group of definable-function keys of the keyboard 12 as will be hereinafter described. For example, one memory module may define the functions associated with scientific tasks, another module may define business-related functions, another module may define special engineering-related functions, etc.

The data processing unit 15 has its own built-in memory section including both read-only-memory and random access memory which may be referred to as the system memory 16. The system memory 16 of the data processing unit 15 likewise includes an appropriate set of function labels to be assigned to the definable-function keys. Where the data processing apparatus is an advanced scientific electronic calculator, as in one embodiment, the ROM of the system memory 16 would be provided with one or more sets of function labels for each of the standard operation applications contemplated for the calculator. Thus, the definable-function keys of the special group of keys included as part of the keyboard are subject to being labelled either via the ROM of a plug-in memory module 14 or by the ROM of the system memory 16.

In the illustrated embodiment of the invention, the group of special keys 20 includes a plurality of definable-function keys 21-25 arranged in a row beneath the display means 11. The display means 11 comprises a main display 26 on which data inputs from the keyboard 12 and/or computational results from the data inputs appear. The display means 11 further comprises a dedicated display portion 27 disposed beneath the main display 26 and in proximity to the underlying row of definable-function keys 21-25 comprising the group 20 of special keys whose functions and the labels therefore may be interactively altered in accordance with the present invention. The dedicated display portion 27 is preferably marked off from the main display by a frame 30 which defines a plurality of display windows in the dedicated display portion 27. The display windows 31-35 correspond to the definable-function keys 21-25 and are respectively vertically aligned in registration with the special key corresponding thereto. Thus, each special key 21-25 has its own particular display window 31-35 of the dedicated display portion 27 as a site for the particular function label symbol assigned to that special key. Since the display windows 31-35 of the dedicated display portion 27 are located just above the respective special keys 21-25 to which they correspond, the function-identifying symbols applied to the display windows 31-35 are readily perceived by the operator of the calculator to be the labels for the special keys 21-25. The frame 30 defining the display windows in the dedicated display portion 27 is preferably opaque, being frosted glass or plastic depending upon the material of the transparent viewing panel of the display means 11.

The embodiment of the keyboard layout with identifying labels applied to individual keys as shown in FIGURE 1 is but one arrangement suitable for use with the electronic calculator in accordance with the present invention. It will be observed that the keys marked F1-F5 of FIGURE 1 are the definable-function keys 21-25 of the special group of keys 20. Furthermore, the function label on each key of the keyboard 12 other than the special group of keys 20 is the primary function for that key, and the upper label above the key is the second function or alpha mode character for that key. The characters or symbols which are shown above some of the keys are the shifted or second function character in alpha mode. In the latter respect, the shift key ordinarily used to provide a capital letter from an alphabet key which is depressed to change the status of certain keys to their second function as shown by the labels appearing above these keys.

As previously explained, the definable-function keys 21-25 may be assigned a function and provided with a label identifying that function via either the system memory 16 or the plug-in memory module 14 as inserted within the socket 13. In addition, the present invention enables key-labelling of the definable-function keys F1-F5 (i.e. keys 21-25) in a user-devised program and to define the program labels where execution of the program will begin when one of these keys F1-F5 is pushed. To this end, a DFN Function is provided. The DFN function has several options, as follows:

DFN CLR clears all definable-function keys
 DFN fx CLR clears the definition for one key
 DFN fx GGG FF defines one key Fx to be labelled GGG in the display window and to begin execution at program label FF
 Fx = keys F1-F5
 GGG = AS0II display label
 FF = AS0II program label

The keyboard 12 further includes a DFN function key 36 generally described as a mode-define key which is used for entering the defined DFN function into a user-devised program. Further, the keyboard 12 includes a plurality of application mode keys or menu keys 37 for performing a designated group of key-function data inputs. Each of the application mode keys 37 upon actuation enables each of the definable-function keys F1-F5 to be individually assigned a function label in a tree structure such that each definable-function key may have a different function attributable thereto for each of the application mode keys 37. As shown in FIGURE 1, the application mode keys or menu keys 37 are aligned in the penultimate row of keys on the keyboard 12 and include the following keys:

I/O - input/output
 FILES - data files

- STAT - statistics
- CONV - conversions
- NUM - numeric functions
- FLAGS - flag manipulation
- 5 TESTS - conditional tests
- FUNC - system functions
- LISTS - list categories

An example using the "CONV" (conversions) menu key 37 is described hereinafter in conjunction with FIGURES 3a-3e.

10 It will be understood that the data processing unit 15 (which may be a microprocessor, such as integrated circuit TMS 70C46 available from Texas Instruments Incorporated of Dallas, Texas, for example) includes a function label-assigning means as a suitable command signal generator responsive to the DFN function as provided by the function-defining mode key 36 in a user-devised program or the application mode keys 37 in a system operation program to assign a function label to each selected definable-function
 15 key F1-F5 (keys 21-25). Graphics means 38 is operably coupled to the function label-assigning means of the data processing unit 15 and is electrically connected to the display means 11 for driving the display means 11 to provide visual symbols as labels on each of the display windows 31-35 of selected special keys F1-F5 indicative of the function assigned thereto. The graphics means 38 may comprise any display driver circuit suitable for selectively energizing components of the display means 11 to provide visible
 20 alphanumeric symbols as appropriate.

The electronic calculator is provided with a suitable power supply (not shown) which may be either line-connected to a source of alternating current or may be one or more batteries. In the illustrated embodiment, the calculator is of a size so as to be bottom thereof for a removable cover exposing a battery chamber when removed. Thus, batteries may be readily replaced when they have been discharged during prolonged
 25 use of the calculator.

By way of example, the definable-function keys F1-F5 may be used in specific problems such as:
 Example: Find the number of liters in 5 gallons.

Referring to FIGURES 3a-3e of the drawings, the sequential operation as performed by the system memory 16 in association with the data processing unit 15 will be described in illustrating how the
 30 definable-function keys F1-F5 (21-25) are provided with an assigned function and are labelled with a visual symbol in the corresponding display window 31-35 of the dedicated display portion 27 corresponding thereto. In FIGURE 3a, the on button on the keyboard 12 has been pressed to actuate the electronic calculator, and the actuated state of the calculator is identified by the symbol "0" appearing in the main display 26 of the display means 11. The conversion key CONV (i.e. an application mode or menu key 37) of the keyboard 12 is then depressed, and the display means 11 takes on the form illustrated in FIGURE 3b.
 35 In this state, the main display 26 identifies the system program application to be performed by the legend "CONVERSIONS", while the respective window displays 31-35 of the dedicated display portion 27 visually show the following legends for the respective definable-function keys F1-F5:

<u>Key</u>	<u>Label</u>	<u>Meaning</u>
F1	M E T	METRIC CONVERSIONS
F2	D R G	DEGREES, RADIANS, GRADS
F3	D M S	DEGREES, MINUTES, SECONDS
F4	P - R	POLAR TO RECTANGULAR
F5	B A S	NUMBER BASE CONVERSIONS

Thereafter, the definable-function key F1 (key 21) is pressed to indicate that a metric conversion is desired. As depicted in FIGURE 3c, the main display 26 now shows the legend "METRIC CONV.", whereas the
 50 respective display windows 31-35 of the dedicated display portion 27 now show the symbol labels, as follows:

Key	Label	Meaning
F1	F - C	FAHRENHEIT-CENTIGRADE
F2	G - L	GALLONS - LITERS
F3	# - K	POUNDS - KILOGRAMS
F4	I - C	INCHES - CENTIMETERS
F5	F - M	FEET - METERS

Thereafter, since the problem is expressed as finding the number of liters in 5 gallons, the key representing the number "5" is pressed, and the number "5" is displayed in the main display 26, as depicted in FIGURE 3d.

Since the definable-function key F2 (key 22) is effective to provide the conversion from gallons to liters, it is then pressed, and the computational result is displayed in the main display 26 as "LITR 18.92705892", as shown in FIGURE 3e.

The symbols used in the foregoing example are defined in accordance with the CONV key program application function, i.e. conversions. Redefinable-function labels for the definable-function keys 21-25 as adopted for use with specific application mode or menu keys 37 found on the illustrated embodiment of the keyboard 12 of the electronic calculator shown in FIGURE 1 are as follows:

			: CS1: 1 VARIABLE STATISTICS
	: CLR: CLEAR STATISTICS REGISTERS		: CS2: 2 VARIABLE STATISTICS
	: FRG: FREQUENCY FOR ENTRY		(1 VARIABLE)
	: MN : MEAN		: N : NUMBER OF POINTS
STAT -----	: M-B: SLOPE - INTERCEPT		/: Sx : SUM OF X'S
(STATISTICS)	: S : STANDARD DEVIATION		: Sxx: SUM OF X^2'S
	: R : CORRELATION COEFFICIENT		: Lx : LAST X ENTERED
	: Y ' : PREDICTED Y VALUE		: LFR: LAST FREQUENCY
	: SHW: SHOW STATISTICS VALUES----		(2 VARIABLE)
	: INT: INTEGER		: N : NUMBER OF POINTS
	: FRC: FRACTION		: Sx : SUM OF X'S
	: R# : RANDOM NUMBER		: Sy : SUM OF Y'S
NUM -----	: RND: ROUND INTERNAL VALUE		: Sxy: SUM OF XY'S
(NUMERIC	: SGN: SIGNUM		: Sxx: SUM OF X^2'S
FUNCTIONS)	: LCM: LEAST COMMON MULTIPLE		: Syy: SUM OF Y^2'S
	: PF : PRIME FACTORS		: LFR: LAST FREQUENCY

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: ABS: ABSOLUTE VALUE           : Ly : LAST Y ENTERED
: PUT: PUT PGM OR DATA IN FILES
: GET: GET PGM OR DATA FROM FILES
FILES----- : CAT: CATALOG DIRECTORY
: CD : CLEAR DIRECTORY
: CF : CLEAR FILE
: NAM: NAME MODULE
: TAP: TAPE STORAGE FUNCTIONS---- : RD : READ FROM TAPE
: VFY: VERIFY TAPE
: CIO: CALL I/O SUBROUTINE
: DEV: PRINTER DEVICE #
I/O ----- : PRT: PRINTER SETUP ----- : WID: PRINTER WIDTH
(INPUT/      : KW : KEY WAIT                : WS : WORD BREAK AT
OUTPUT)      :                               :     END OF LINE
: IF>: IF GREATER THAN
: IF<: IF LESS THAN
TESTS----- : IF=: IF EQUAL
(CONDITIONAL : DSZ: DECREMENT AND SKIP IF ZERO
TESTS)       : Y/N: YES / NO INPUT TEST
: STB: STORE BYTE
FUNC-----  : RCB: RECALL BYTE
(SYSTEM      : SBA: SUBROUTINE ASSEMBLY LANGUAGE
FUNCTIONS)
: DEL: DELETE ALPHA CHARACTER
: INS: INSERT ALPHA CHARACTER
ALPHA----- : CHR: ENTER ASCII CHARACTER "###"
: LC : SET LOWER CASE MODE
: RCA: RECALL ALPHA REGISTER
: STA: STORE ALPHA REGISTER
: MRG: MERGE ALPHA REGISTER
: COL: MOVE CURSOR TO COLUMN "###"
: F-C: FAHRENHEIT-CENTIGR.
DE
: G-L: GALLONS-LITERS
: #-K: POUNDS-KILOGRAMS
: MET: METRIC CONVERSIONS----- : I-C: INCHES-CENTIMETERS
: F-M: FEET-METERS
CONV----- : DMS: DEGREES, MINUTES, SECONDS
(conversions): : D-R: DEGREES TO RADIANS
: ANG: DEGREES, RADIANS, GRADS---- : D-G: DEGREES TO GRADS
: R-G: RADIANS TO GRADS
: P-R: POLAR TO RECTANGULAR      : DEC: DECIMAL
: HEX: HEX
: BAS: NUMBER BASE CONVERSIONS--- : OCT: OCTAL
: 2sC: 2's COMPLEMENT
: UN : UNFORMATTED

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: CLR: CLEAR
 5 : SF : SET FLAG
 : RF : RESET FLAG
 : TF : TEST FLAG

: REG: LIST REGISTERS
 10 : PGM: LIST PROGRAM
 : LBL: LIST PROGRAM LABELS
 : ST : LIST MACHINE STATUS

A function key memory map for the disclosed embodiment is provided for each of a system-defined application and a user-defined application. In the latter connection, it will be understood that the user-defined application will also apply to the use of an external memory module 14 which has a particular data library included in ROM. The following organization is utilized.

15 SYSTEM F1 DISPLAY F1 ADDRESS
 DEFINED F2 DISPLAY F2 ADDRESS
 20 F3 DISPLAY F3 ADDRESS
 F4 DISPLAY F4 ADDRESS
 25 F5 DISPLAY F5 ADDRESS

30 USER F1 DISPLAY F1 FLAGS F1 ADDRESS
 DEFINED F2 DISPLAY F2 FLAGS F2 ADDRESS
 F3 DISPLAY F3 FLAGS F3 ADDRESS
 F4 DISPLAY F4 FLAGS F4 ADDRESS
 35 F5 DISPLAY F5 FLAGS F5 ADDRESS

The RAM in system memory 16 may be provided with a dedicated location for each of the key-labels with an associated address in a physically adjacent location with respect thereto in the system memory 16. A second set of user-label and associated addresses may likewise be assigned to physically adjacent dedicated locations in the system memory 16 which may be adjacent to the first set of dedicated locations if desired.

In the adopted embodiment of the calculator, the system-defined RAM allocation is as follows.

Byte #	Contents
1-3	Display characters
4-6	Address of routine for key F1

50 Bytes 1-6 are repeated for keys F2-F5.

The user-defined RAM allocation takes the following form.

55

Byte #	Contents
1-3	Display characters
4	Flags: 0=key F1 not defined
	7 1=label addressing,
	0=absolute addressing
	6 1=defined from library
	cartridge
	5 1=defined from user program
	area
	4 1=defined from a program
	file
	3-1 Not used
	0 1=file in RAM cartridge.
	0=file on board
5-7	File name (if program file)
8-9	Label or address of routine for
	key F1

Bytes 1-9 repeated for keys F2-F5

30 The definable-function keys F1-F5 can be defined by the system, the user or operator, or may be undefined. The user-DFN-in effect and system-DFN-in-effect flags determine which set of definitions is used. If neither of these two flags is on, pressing any of the keys F1-F5 has no effect. The user definitions for the keys F1-F5 can be recalled at any time, even if the system has redefined them, because two separate areas of RAM are used for the definitions.

35 The function key definitions for the definable-function keys F1-F5 can be cleared as a group by executing DFN and CLR, or individually by executing (DFN Fx CLR). The keys F1-F5 are defined one key at a time by executing (DFN Fx:ddd@aa), where ddd represents the characters to be displayed in the appropriate display window of the dedicated display portion, and aa is the label of the routine to be executed when Fx is next pressed.

40 With respect to the use of replaceable plug-in memory modules 14 with the electronic calculator, it will be understood that the substitution of one such memory module 14 for a memory module as inserted in the electrical socket 13 will change the data library provided by such a memory module such that the function-defining means of the system operation is effective to assign a function label to each of the definable-function keys 21-25 reflecting the character of the data stored in the read-only-memory portion of the plug-in memory module 14.

45 The third technique available in the electronic calculator according to the present invention for changing the functions to be assigned to the definable-function keys 21-25 is via an operator-defined program. A calculator-operated procedure for executing a user-devised program is illustrated in the flow chart comprising FIGURES 4a and 4b. However, it will be understood that the same operating procedure is applicable to the execution of a system program such as initiated by pressing an application mode key or menu key 37 or as introduced by a memory module 14. Minor differences may include the program source being maintained in ROM rather than RAM. Referring to FIGURE 4a, the user-devised program is initiated by pressing the "RUN" key on the keyboard 12 as at 40 to initiate the program. Thereafter, the data processing unit 15 accesses a step from the program source A as at 41, the program source being maintained in a random access memory (RAM) portion of the internal system memory 16, and the accessing of a step from the program being shown at 42. The procedure then compares the accessed step with a predetermined data signature indicative of the function attributed to the mode-define key "DFN" as at 43. If the step is not the "DFN" function, the appropriate function called for by the step is executed as at 44, and the procedure loops back to access another step from the program in the manner previously

described. If the step is the "DFN" function, the procedure continues along the "yes" data path, and the next step is accessed from the program as at 45. This program step is compared to the data definition for the "CLR" function as at 46. If the comparison establishes that the step represents the "CLR" function, the procedure continues along the "yes" data path to reset the user-DFN-in-effect flag as at 47, the user-DFN characters, flags, and addresses are cleared as at 48, and the procedure returns to the program source A as at 41.

If the decision is made that the program step at 46 is some function other than the function "CLR", the procedure continues along the "no" data path to a subsequent decision block 50 for determining whether the step represents the function to be defined for any of the special keys F1-F5. If the step does not conform to the function for any of the special keys F1-F5, the procedure continues along the "no" data path and returns to the program source A as at 41. If the decision is that the step is a definable function for any of the special keys F1-F5, the procedure continues along the "yes" data path, and the next step is accessed from the program as at 51. The procedure then reinstates a determination as to whether this subsequent step has the function "CLR" as at 52. If the answer is "yes", the user-DFN-in-effect flag is set, and the characters, address and flags for a single user DFN definable-function key Fx are cleared as at 53. Thereafter, a decision is made as at 54 as to whether any other special keys F1-F5 are user-defined as to their functions. If "no", the user-DFN-in-effect flag is reset as at 55 and the procedure returns to the program source A as at 41. If there are other special keys F1-F5 whose functions are user-defined, the procedure continues along the "yes" data path from the decision block 54, returning to the program source A as at 41.

From the decision block 52, if it is determined that the program step in question is not the function "CLR", the procedure continues along the "no" data path which is continued in FIGURE 4b. The procedure then accesses four more steps from the user-defined program as at 58. The total of five steps is then subjected to a comparison with the data format thereof as at 59 to determine whether all five steps are in the ASCII code. If "no", an illegal field error as at 60 occurs, and the user must restate the user-devised program to place it in the proper code format, in this instance requiring the data of the program steps to be described in ASCII code. If the decision from the comparison of the program steps to appropriate ASCII code as at 59 is "yes", the procedure continues so as to move the first three ASCII characters entered to display the characters for the user DFN special key Fx as at 61. Thereafter, an appropriate flag byte is stored, including bits for the label run, and port flags for the PGM (program), file, or library, are established as at 62. The current file name then is moved to the address information for the user DFN special key Fx as at 63, the last two ASCII characters are saved, being entered as the label for the user DFN special key Fx as at 64, and the user-DFN-in-effect flag is set as at 65, with the procedure then returning to the program source A as at 41. The user-devised program is now ready to be executed with the assigned functions to the function-definable keys 21-25 being subject to display in the appropriate window displays 31-35 as labels identifying the functions attributable to each special key 21-25 in accordance with the previously-described procedure illustrated in the flow chart of FIGURES 4a and 4b.

Using the procedure illustrated in flow chart form in FIGURES 4a and 4b, a program may be run in which labels are assigned to the respective special keys F1-F5 (keys 21-25) during execution of the program. For example, assume that the user-devised program is directed toward solving for the length of the hypotenuse side of a right triangle, with sides a and b. Such a program enables the sides a and b of the right triangle to be entered by using the appropriate definable-function keys therefor. Upon pressing <CAL>, the program calculates the length of the hypotenuse. (If the keyboard is not in lowercase lock, [2nd] A and [2nd] B used to enter the lowercase letters a and b.)

<u>PC=</u>	<u>Program Mnemonics</u>	<u>Comments</u>
5 0000	'ENTER SIDES'	Creates menu title
0011	DFN F1:a oSA	Defines F1
0018	DFN F2:b oSB	Defines F2
10 0025	DFN F5:CALoCH	Defines F5
0032	HLT	Stops program and displays menu
0033	LBL SA	Labels segment
15 0036	STO A HLT	Stores side a in reg. A
0039	LBL SB	Labels segment
0042	STO B HLT	Stores side b in reg. B
20 0045	LBL CH	Labels segment
0048	(RCL A x^2	Calculates hypotenuse
0052	+ RCL B x^2) SQR	
0058	'HYP='	Creates alpha message
25 0062	COL 16 MRG =	Merges result
0066	HLT	Stops program

30 Thus, an electronic calculator has been disclosed in accordance with the present invention in which a plurality of definable-function keys F1-F5 (special keys 21-25 of FIGURE 1) have been provided, the functions of which may be assigned and labeled via three different techniques --i.e. the calculator operating system, library application as provided by a specific plug-in memory module, and a user-devised program.

35 Although preferred embodiments of the invention have been specifically described, it will be understood that the invention is to be limited only by the appended claims, since variations and modifications of the preferred embodiments will occur to those skilled in the art.

Claims

40 1. A data processing apparatus comprising;
a data processing unit for receiving data inputs and providing data outputs indicative of the data inputs and/or computations from such data inputs;
a keyboard including a plurality of individual keys operably associated with said data processing unit for providing data inputs thereto in response to actuation of individual keys;
45 at least one key of said keyboard having a definable function subject to recharacterization to any one of a plurality of functions;
means operably associated with said data processing unit to define a specific function to said at least one definable-function key;
said data processing unit including means responsive to said function-defining means to assign a function
50 label to said at least one definable-function key;
display means operably associated with said data processing unit on which the data inputs from the actuation of individual keys and/or computations resulting from such data inputs visually appear, said display means being associated with said at least one key for visually indicating key label symbols defining the function attributable to said key; and
55 graphic means operably associated with said function label-assigning means for providing a visual symbol on said display means as a label for said at least one key indicative of the function assigned thereto.

2. A data processing apparatus as set forth in Claim 1, wherein said keyboard includes a plurality of keys having respective definable functions subject to recharacterization to any one of a plurality of functions; and

5 said function-defining means being effective to define respective specific functions to each of said plurality of definable-function keys, said function label-assigning means being effective to assign respective function labels to each of said plurality of definable-function keys, and said graphic means being effective to provide visual symbols on said display means as respective labels indicative of the functions assigned to each of said definable-function keys.

10 3. A data processing apparatus as set forth in Claim 2, wherein said function-defining means is a mode-define key on said keyboard separate from said definable-function keys and operable upon actuation to enable data inputs from keys other than the definable-function keys to define the functions attributable to each said definable-function key.

15 4. A data processing apparatus as set forth in Claim 3, wherein said keyboard further includes a plurality of application mode keys for selective operation in performing a designated group of key-function data inputs, each said application mode key upon actuation enabling each of said plurality of definable-function keys to be individually assigned a function label in a tree structure such that each of said plurality of definable-function keys may have a different function attributable thereto for each of the plurality of application mode keys in response to the actuation thereof in the performance or respective groups of functions assignable to the plurality of definable-function keys.

20 5. A data processing apparatus as set forth in Claim 2, wherein each of said plurality of definable-function keys is arranged on said keyboard in the same localized area thereon in proximity to said display means.

6. A data processing apparatus as set forth in Claim 2, wherein each of the keys of said keyboard has plural at least first and second separate functions assignable thereto; and

25 at least one additional function-assigning key being included on said keyboard, said one additional function-assigning key have first and second status positions and being alternatively positioned in one of the first and second positions upon actuation to assign a first set of functions to the remainder of the keys on said keyboard separate from said definable-function keys and actuatable to its second status position to assign a second set of functions different from said first set of functions to said remaining keys.

30 7. A data processing apparatus as set forth in Claim 2, further including replaceable memory means operably associated with said data processing unit and responsive to said function-defining means to assign a function label to each of said definable-function keys reflecting the character of the data stored therein.

35 8. A data processing apparatus as set forth in Claim 2, wherein said keyboard further includes program key means for selective actuation by an operator in defining an operator program, said function-defining means being responsive to the selective actuation by said operator of said program key means to assign respective function labels to each of said plurality of definable-function keys tailored to the use of such definable-function keys in carrying out the operator-defined program.

9. A data processing apparatus comprising:

40 a data processing unit for receiving data inputs and providing data outputs indicative of the data inputs and/or computations from such data inputs;

a keyboard including a plurality of individual keys operably associated with said data processing unit for providing data inputs thereto in response to actuation of individual keys;

at least one key of said keyboard having a definable function subject to recharacterization to any one of a plurality of functions;

45 means operably associated with said data processing unit to define a specific function to said at least one definable-function key;

said data processing unit including means responsive to said function-defining means to assign a function label to said at least one definable-function key;

50 display means operably associated with said data processing unit on which the data inputs from the actuation of individual keys and/or computations resulting from such data inputs visually appear, said display means including a dedicated display portion associated with said at least one key for visually indicating key label symbols defining the function attributable to said key; and

graphic means operably associated with said function label-assigning means for providing a visual symbol on said dedicated display portion as a label for said at least one key indicative of the function assigned thereto.

10. A data processing apparatus as set forth in Claim 9, wherein said keyboard includes a plurality of keys having respective definable functions subject to recharacterization to any one of a plurality of functions;

said dedicated display portion of said display means having a plurality of separate dedicated display windows respectively corresponding to each of said plurality of definable-function keys for visually indicating the respective key label symbols defining the function attributable to each of said definable-function keys;

5 said function-defining means being effective to define respective specific functions to each of said plurality of definable-function keys, said function label-assigning means being effective to assign respective function labels to each of said plurality of definable-function keys, and said graphic means being effective to provide a visual symbol on each of said plurality of dedicated display windows of said dedicated display portion as respective labels indicative of the functions assigned to each of said definable-function keys.

10 11. A data processing apparatus as set forth in Claim 10, wherein said function-defining means is a mode-define key on said keyboard separate from said definable-function keys and operable upon actuation to enable data inputs from keys other than the definable-function keys to define the functions attributable to each said definable-function key.

12. A data processing apparatus as set forth in Claim 11 wherein said keyboard further includes a
15 plurality of application mode keys for selective operation in performing a designated group of key-function data inputs, each said application mode key upon actuation enabling each of said plurality of definable-function keys to be individually assigned a function label in a tree structure such that each of said plurality of definable-function keys may have a different function attributable thereto for each of the plurality of application mode keys in response to the actuation thereof in the performance of respective groups of
20 functions assignable to the plurality of definable-function keys.

13. A data processing apparatus as set forth in Claim 10, wherein each of said plurality of definable-function keys is arranged on said keyboard in the same localized area thereon in proximity to said display means, each of said plurality of definable-function keys being disposed in registration with the corresponding dedicated display window in said dedicated display portion of said display means.

25 14. A data processing apparatus as set forth in Claim 10, wherein each of the keys of said keyboard has plural at least first and second separate functions assignable thereto; and at least one additional function-assigning key being included on said keyboard, said one additional function-assigning key having first and second status positions and being alternatively positioned in one of the first and second status positions upon actuation to assign a first set of functions to the remainder of the keys on
30 said keyboard separate from said definable-function keys and actuatable to its second status position to assign a second set of functions different from said first set of functions to said remaining keys.

15. A data processing apparatus as set forth in Claim 10, further including replaceable memory means operably associated with said data processing unit and responsive to said function-defining means to assign a function label to each of said definable-function keys reflecting the character of the data stored therein.

35 16. A data processing apparatus as set forth in Claim 10, wherein said keyboard further includes program key means for selective actuation by an operator in defining an operator program, said function-defining means being responsive to the selective actuation by said operator of said program key means to assign respective function labels to each of said plurality of definable-function keys tailored to the use of such definable-function keys in carrying out the operator-defined program.

40 17. A data processing apparatus as set forth in Claim 10, further including a housing in which said data processing unit is disposed, said keyboard being arranged on said housing below said display means; said display means being disposed on said housing to position the dedicated display portion thereof as the lower portion of said display means in juxtaposition with said plurality of definable-function keys therebelow, with each of said definable-function keys being positioned in vertically registering alignment with the
45 corresponding dedicated display window of said dedicated display portion relating thereto.

18. A data processing apparatus as set forth in Claim 17, wherein said apparatus is a hand-held electronic calculator.

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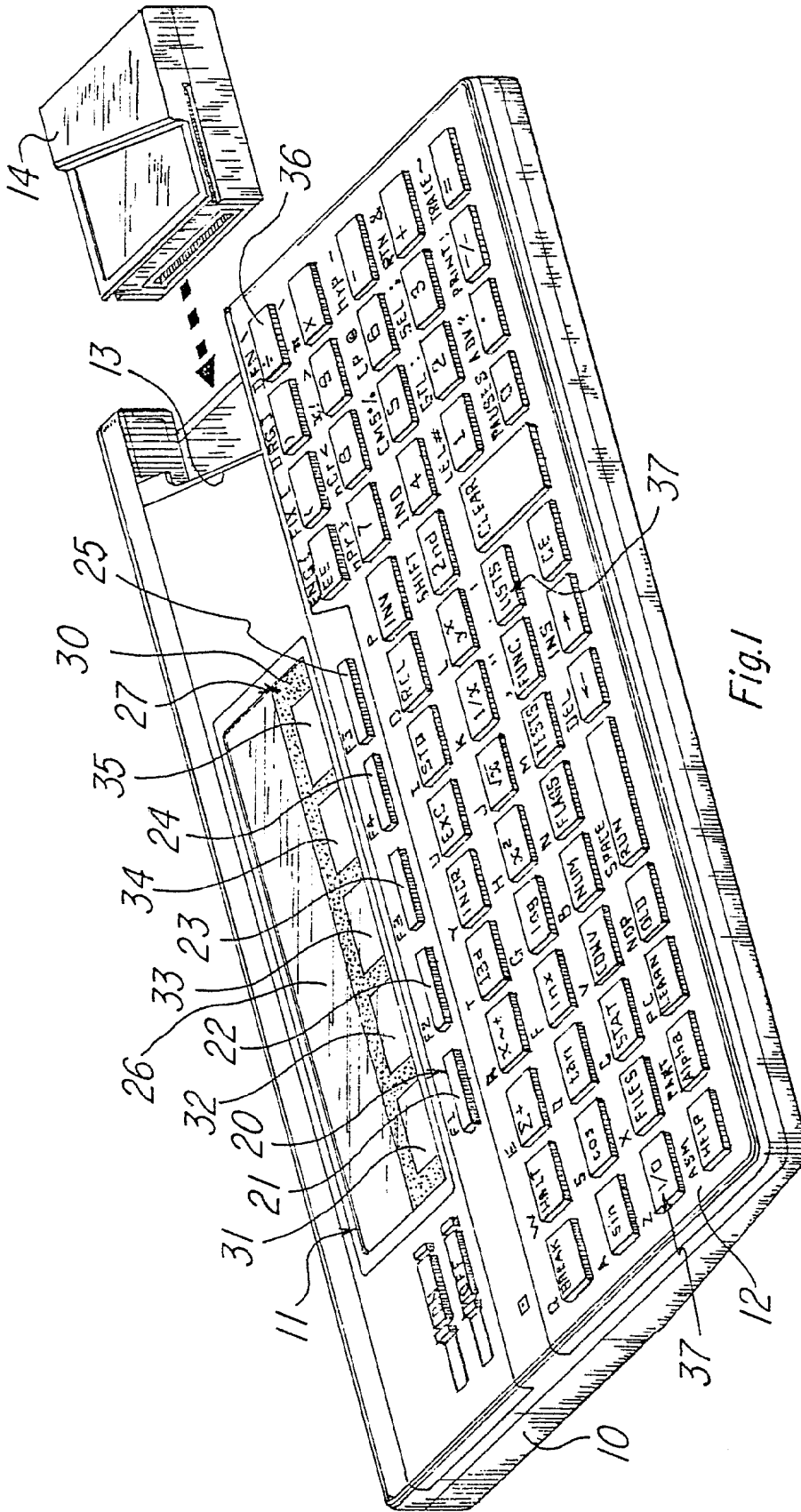
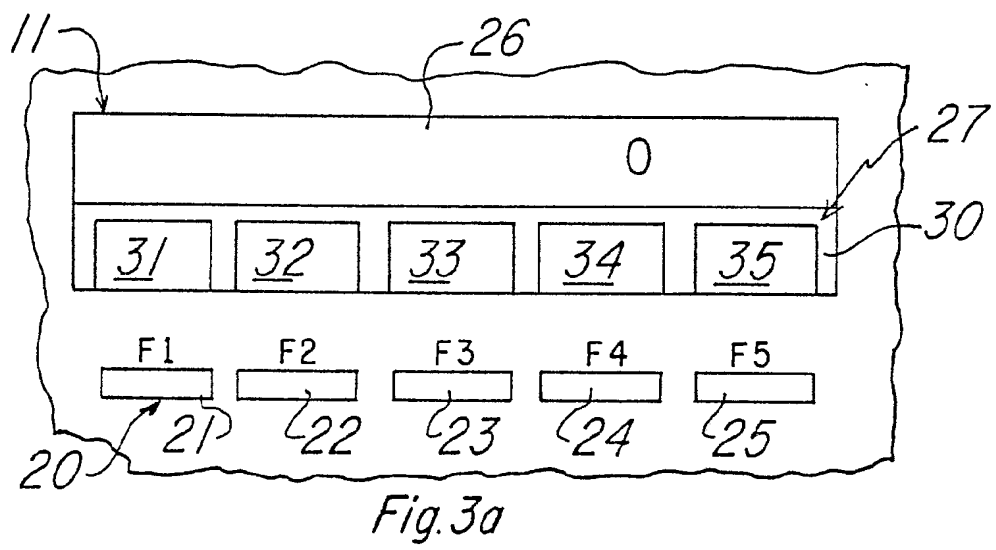
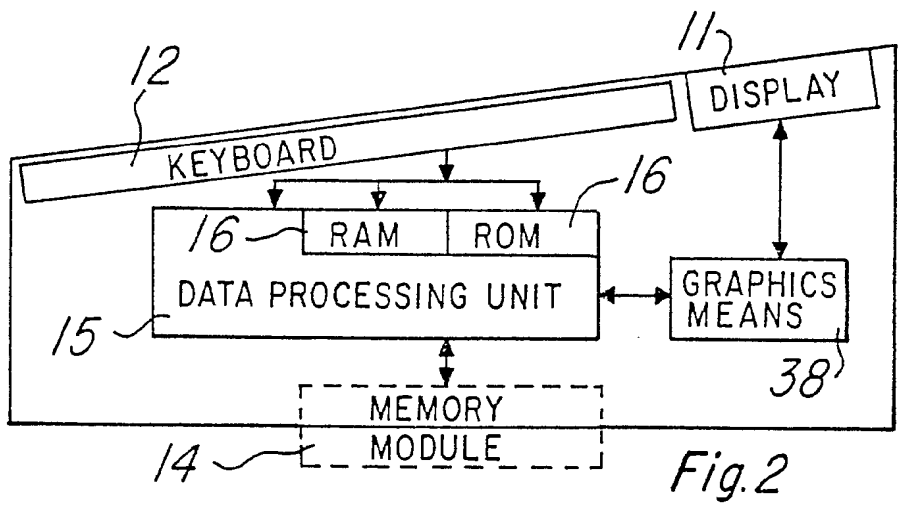


Fig. 1



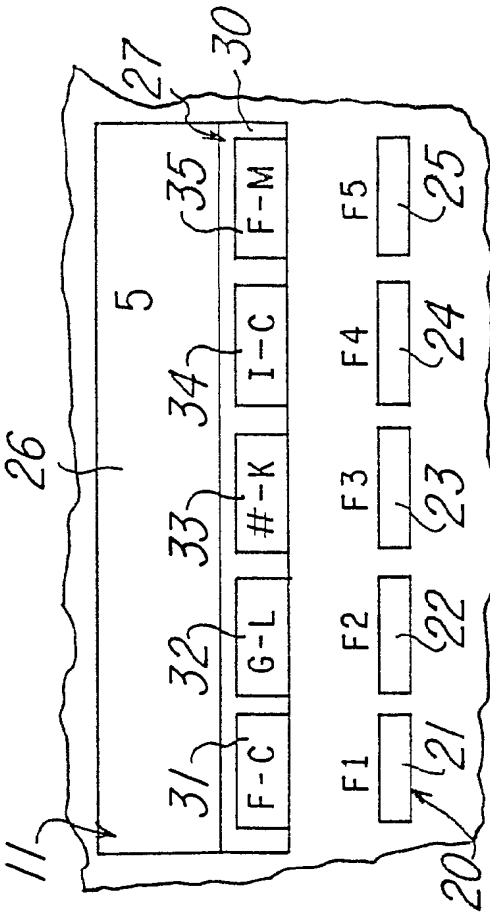


Fig. 3d

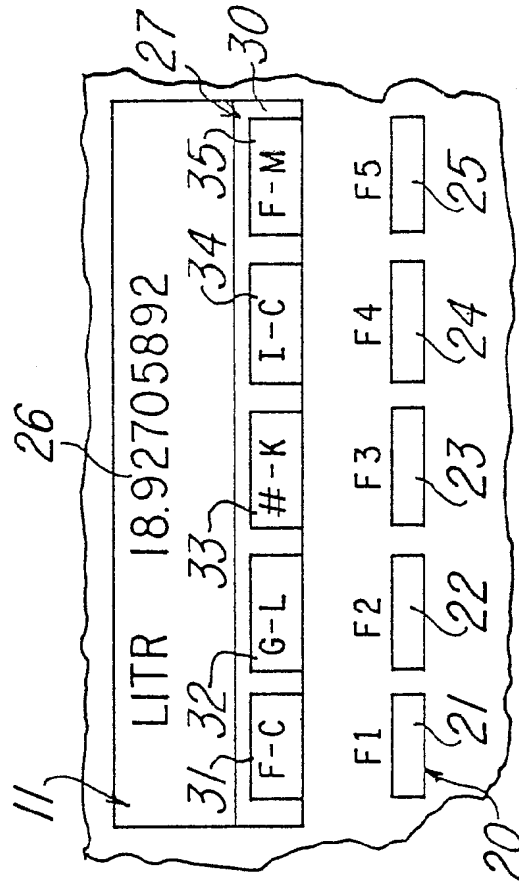


Fig. 3e

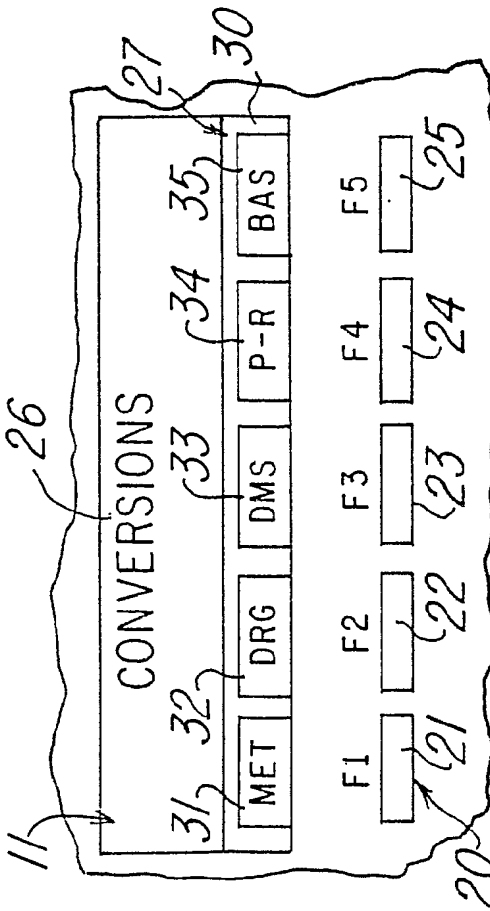


Fig. 3b

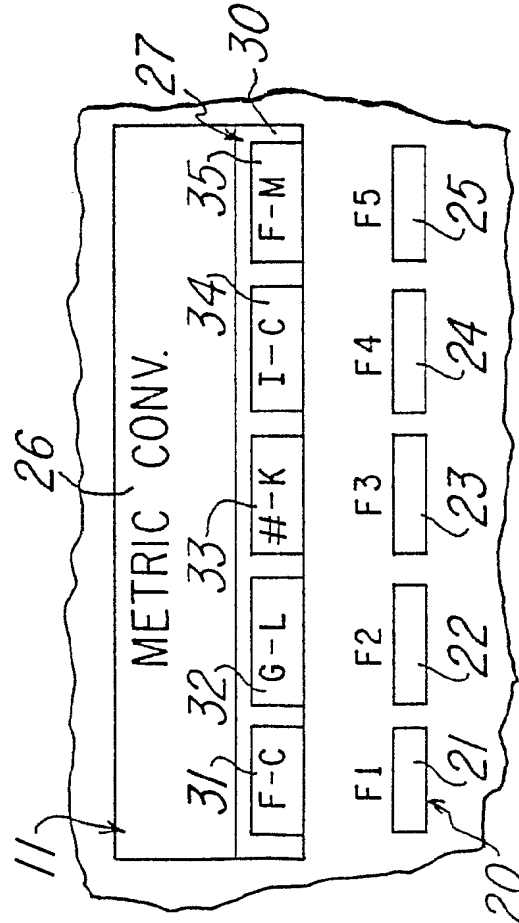


Fig. 3c

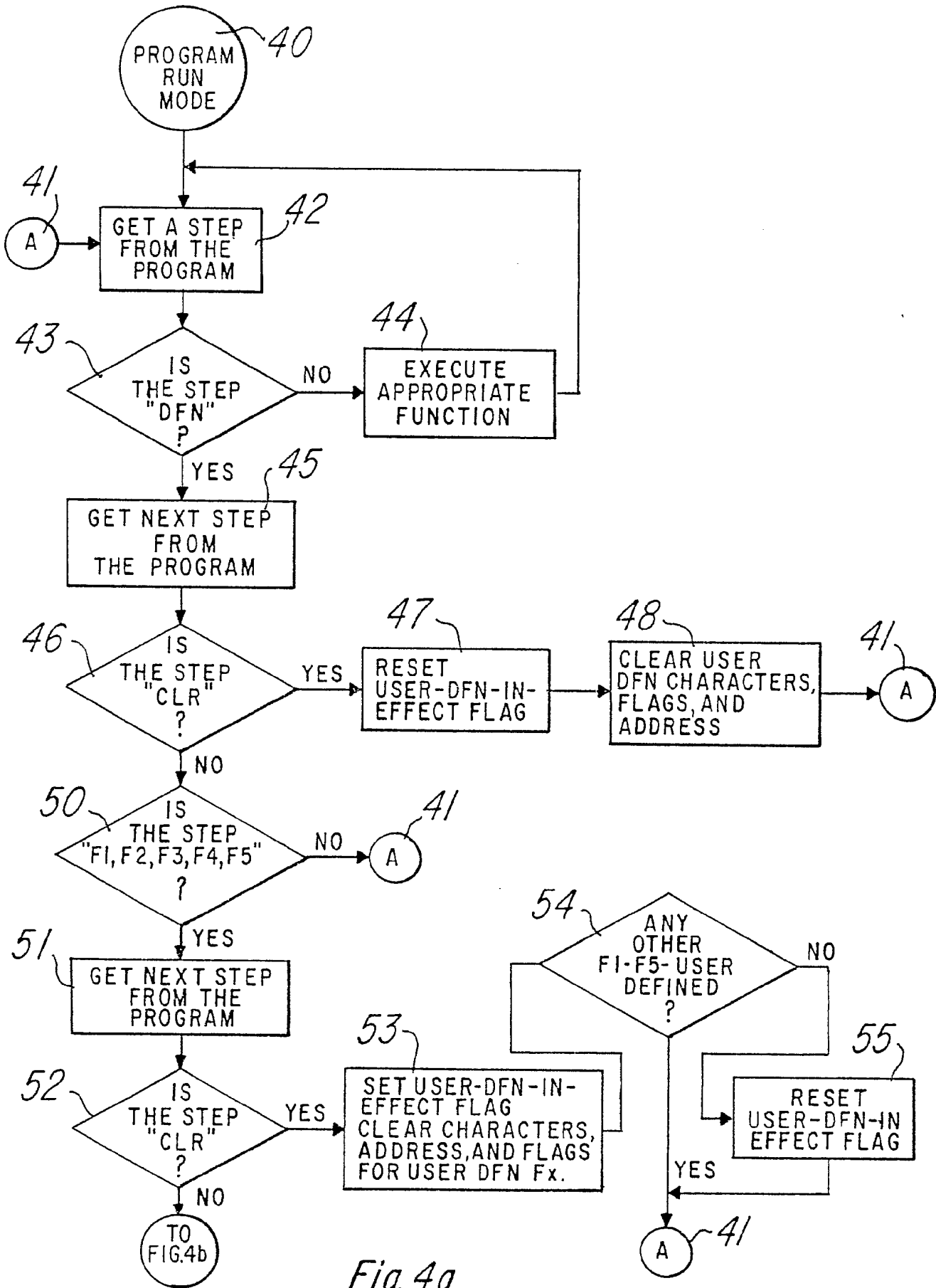


Fig. 4a

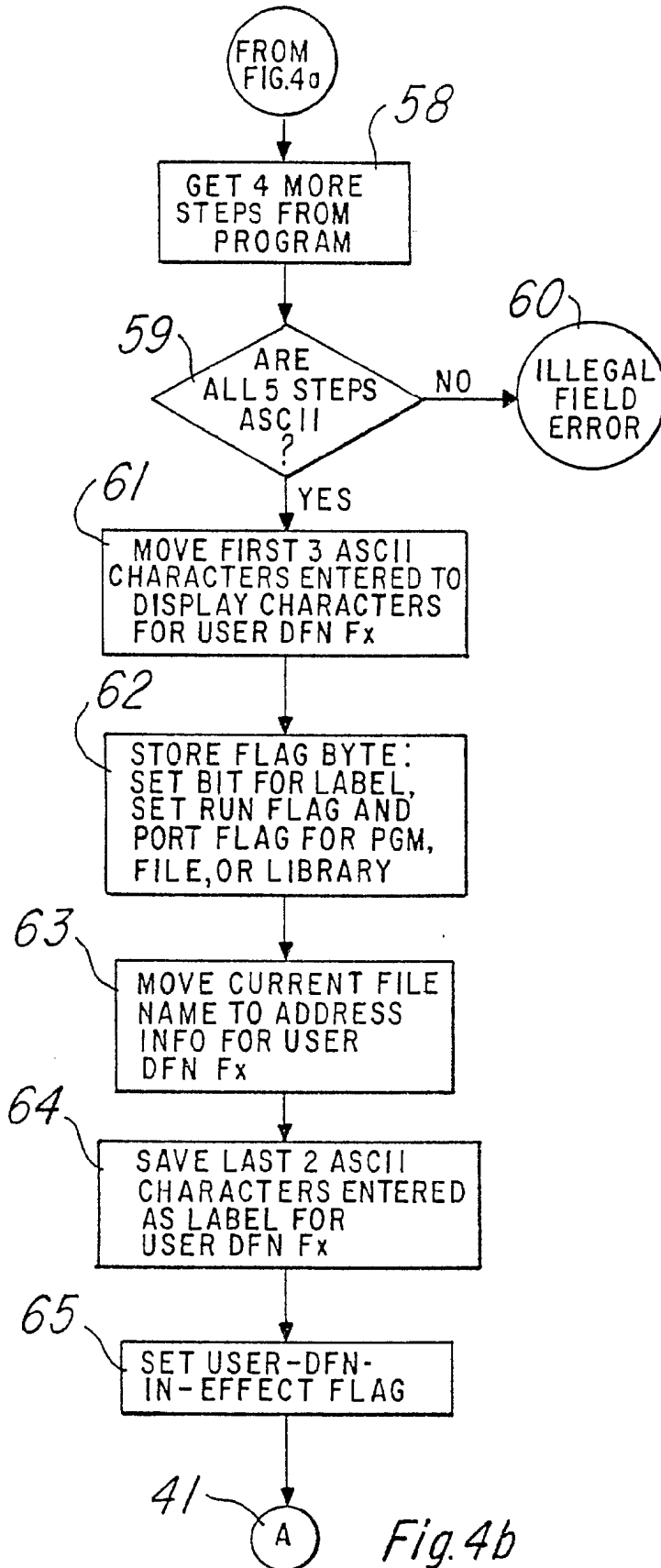


Fig. 4b

Electronic Patent Application Fee Transmittal

Application Number:	11249009
Filing Date:	11-Oct-2005
Title of Invention:	HUMAN INTERFACE INPUT ACCELERATION SYSTEM
First Named Inventor/Applicant Name:	Elaine Chen
Filer:	John P. Schnurer/Carroll Allman
Attorney Docket Number:	19146-005001

Filed as Small Entity

Utility Filing Fees

Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Basic Filing:				
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
Utility Appl issue fee	2501	1	700	700
Publ. Fee- early, voluntary, or normal	1504	1	300	300

Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Extension-of-Time:				
Miscellaneous:				
Total in USD (\$)				1000

Electronic Acknowledgement Receipt

EFS ID:	1715195
Application Number:	11249009
International Application Number:	
Confirmation Number:	9446
Title of Invention:	HUMAN INTERFACE INPUT ACCELERATION SYSTEM
First Named Inventor/Applicant Name:	Elaine Chen
Customer Number:	20985
Filer:	John P. Schnurer/Susan Sesnovich
Filer Authorized By:	John P. Schnurer
Attorney Docket Number:	19146-005001
Receipt Date:	25-APR-2007
Filing Date:	11-OCT-2005
Time Stamp:	16:11:42
Application Type:	Utility

Payment information:

Submitted with Payment	yes
Payment was successfully received in RAM	\$ 1000
RAM confirmation Number	417
Deposit Account	061050

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)	Multi Part /.zip	Pages (if appl.)
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1		19146005001IssueFee.PDF	311140	yes	2
Multipart Description/PDF files in .zip description					
		Document Description	Start	End	
		Post Allowance Communication - Incoming	1	1	
		Issue Fee Payment (PTO-85B)	2	2	
Warnings:					
Information:					
2	Fee Worksheet (PTO-06)	fee-info.pdf	8282	no	2
Warnings:					
Information:					
Total Files Size (in bytes):			319422		
<p>This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.</p> <p><u>New Applications Under 35 U.S.C. 111</u> If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.</p> <p><u>National Stage of an International Application under 35 U.S.C. 371</u> If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.</p> <p><u>New International Application Filed with the USPTO as a Receiving Office</u> If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.</p>					

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant : Beth Marcus, et al	Art Unit : 2629
Serial No. : 11/249,009	Examiner : Ricardo Osorio
Filed : October 11, 2005	Confirmation No.: 9446
	Notice of Allowance Date: February 21, 2007
Title : HUMAN INTERFACE INPUT ACCELERATION SYSTEM	

MAIL STOP ISSUE FEE

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

RESPONSE TO NOTICE OF ALLOWANCE

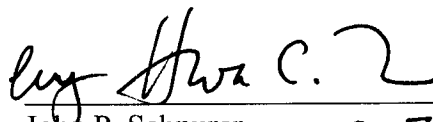
In response to the Notice of Allowance mailed February 21, 2007, enclosed is a completed issue fee transmittal form PTOL-85b. Please apply \$1000 for a small entity for the required issue fee and publication fee to Deposit Account No. 06-1050.

COMMENTS ON EXAMINER'S REASONS FOR ALLOWANCE

It is agreed that the limitations recited in the examiner's Reasons for Allowance are not taught or suggested by the art of record, and that the allowed independent claims 1, 16 and 27 are distinguished from the cited prior art for at least the reasons stated in the Reasons for Allowance. Applicant does not concede that the stated reasons are the only grounds for patentability of the allowed claims, that the limitations excluded from the Reasons for Allowance are taught or suggested by the art of record, or that all of the limitations are necessary for patentability of the allowed claims or other claims directed to the disclosed subject matter. For example, other claims including different limitations are patentable over the cited prior art.

Please apply any additional charges or credits to our Deposit Account No. 06-1050.

Respectfully submitted,



John P. Schnurer
Reg. No. 52,196

59,747

Date: April 25, 2007

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
11/249,009	10/11/2005	Elaine Chen	19146-005001	9446
20985	7590	04/19/2007	EXAMINER	
FISH & RICHARDSON, PC P.O. BOX 1022 MINNEAPOLIS, MN 55440-1022			OSORIO, RICARDO	
			ART UNIT	PAPER NUMBER
			2629	
			MAIL DATE	DELIVERY MODE
			04/19/2007	PAPER

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APPLICATION NO./ CONTROL NO.	FILING DATE	FIRST NAMED INVENTOR / PATENT IN REEXAMINATION	ATTORNEY DOCKET NO.
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EXAMINER

ART UNIT	PAPER
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20070403

DATE MAILED:

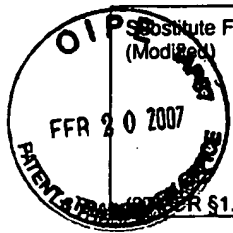
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Commissioner for Patents

The Information Disclosure Statement filed 2/20/2007 has been entered and considered by the examiner. A copy of the initialed, signed and dated by examiner related 1449 is provided herewith.

RICARDO OSORIO
PRIMARY EXAMINER

RICARDO OSORIO
PRIMARY EXAMINER



Substitute Form PTO-1449 (Modified)	U.S. Department of Commerce Patent and Trademark Office	Attorney's Docket No. 19146-005001	Application No. 11/249,009
Information Disclosure Statement by Applicant (Use several sheets if necessary)		Applicant Beth Marcus, et al	
(Fee \$1.98(b))		Filing Date October 11, 2005	Group Art Unit 2629

U.S. Patent Documents							
Examiner Initial	Desig. ID	Document Number	Publication Date	Patentee	Class	Subclass	Filing Date If Appropriate
/RO/	AA	2003/048205	3/13/2003	He	X		
	AB	2004/020881	10/21/2004	Dechene			
	AC	5,515,305	5/7/1996	Register, et al.			
	AD	6,107,877	8/22/2000	Phillipps			
	AE	6,297,752	10/2/2001	Ni			
	AF	6,909,424	6/21/2005	Liebenow, et al.			
	AG	6,947,028	9/20/2005	Shkolnikov			
	AH	7,072,975	7/4/2006	Kato			
	AI						
	AJ						
	AK						

Foreign Patent Documents or Published Foreign Patent Applications								
Examiner Initial	Desig. ID	Document Number	Publication Date	Country or Patent Office	Class	Subclass	Translation	
							Yes	No
	AL							
	AM							
	AN							
	AO							
	AP							

Other Documents (include Author, Title, Date, and Place of Publication)		
Examiner Initial	Desig. ID	Document
/RO/	AQ	BUXTON, W., "A Directory of Sources for Input Technologies", May 12, 2006, retrieved from the internet at http://www.billbuxton.com/InputSources.html
/RO/	AR	Roche, et al., "Managing Content-Initiated Application Delivery with a Client-Side Agent", Proceedings of the 2 nd IASTED International Conference Communications, Internet and Information Technology, November 17-19, 2003, Scottsdale, Arizona, USA, pp. 334-339
/RO/	AS	"Verizon to launch mobile chaperone service", Reuters, published on ZDNet News: June 10, 2006, retrieved from the internet http://news.zdnet.com , 11/3/2006

Examiner Signature /Ricardo Osorio/	Date Considered 04/03/2007
--	-------------------------------

EXAMINER: Initials citation considered. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

Substitute Form PTO-1449 (Modified) Information Disclosure Statement by Applicant (Use several sheets if necessary) (37 CFR §1.98(b))	U.S. Department of Commerce Patent and Trademark Office	Attorney's Docket No. 19146-005001	Application No. 11/249,009
	Applicant Beth Marcus, et al		
	Filing Date October 11, 2005		Group Art Unit 2629

Other Documents (include Author, Title, Date, and Place of Publication)		
Examiner Initial	Desig. ID	Document
/RO/	AT	"Hasbro introduces CHATNOW! Now Tweens Can Talk, Send Text Messages and Take Photographs with No Airtime Charges or Calling Plan", February 10, 2005; retrieved from the internet http://www.hasbro.com/media/content/printable.cfm?release=290 , 11/9/2006
	AU	"Family Center Family Locator" "Locate your Kid's phone with GPS technology" retrieved from the internet, <a href="http://www.disneymobile.go.com/disneymobile/home.do?C<P=KAC-GOOG_SEM">http://www.disneymobile.go.com/disneymobile/home.do?C<P=KAC-GOOG_SEM , 11/9/2006
	AV	"Are you ever worried where your children are?" <u>Child Locate</u> , retrieved from the internet, http://www.childlocate.co.uk , 11/3/2006
	AW	"Frequently Asked Questions", <u>ChildLocate</u> , retrieved from the internet, http://www.childlocate.co.uk/faq.html , 11/3/2006
	AX	"About Sprint Family Locator", retrieved from the internet, https://sfl.sprintpcs.com/finder-sprint-family/signIn.html , 11/3/2006
	AY	"Welcome to Kidswireless.com; RAZR and Migo Verizon Family Plan", retrieved from the internet http://www.kidswireless.com/phone/RAZR-and-Migo , 11/3/2006
	AZ	"Welcome to Kidswireless.com; LG Migo Verizon Wireless" retrieved from the internet http://www.kidswireless.com/phones/LG-Mio- , 11/3/2006
	AAA	"Welcome to Kidswireless.com; Verizon Chaperone and Child Zone", retrieved from the internet http://www.kidswireless.com/articles/verizon-wireless-chaperon/ , 11/3/2006
	ABB	"Teletrac Partners with Ryder and Cingular in Fleet Management Offering", retrieved from the internet http://www.gpsworld.com/gpslbs/article/articleDetail.jsp?id=359057 , 11/3/2006
	ACC	"Never Lose Your Children at the Mall Again", retrieved from the internet http://www.brickhousesecurity.com/vbsik.html , 11/3/2006
	ADD	"CHILD LOCATOR - \$30 Child Personal Safety Alarm", retrieved from the internet http://www.mypreciouskid.com/child-locator.html , 11/3/2006
	AEE	"Alarm - Personal Alarm", retrieved from the internet http://www.mypreciouskid.com/alarm.html , 11/3/2006
	AFF	"Special Needs Children - Children with Special Needs", retrieved from the internet http://www.mypreciouskid.com/special-needs-children.html , 11/3/2006
	AGG	"Never lose track of your pet", retrieved from the internet http://www.globalpetfinder.com , 11/3/2006
	AHH	"Gadgets track pets with GPS or transfer tapes to DVDs", retrieved from the internet https://www.globalpetfinder.com/article39.html , 11/3/2006
	AII	"TrimTracXS Internet GPS Car Tracking System - Real Time GPS Tracking", retrieved from the internet http://www.brickhousesecurity.com/slimtrak-realtime-gps-tracking-car-locator.html , 11/3/2006
	AJJ	"SecureTrack GPS Tracking Child Locator - Teen Tracking", retrieved from the internet http://www.brickhousesecurity.com/geminitracking-gps-child-locator.html , 11/3/2006
	AKK	"Cingular Firefly Phone - FREE from Kids Wireless.com", retrieved from the internet http://www.kidswireless.com/phones/Firefly , 11/3/2006
	ALL	"Sprint Family Locator Program: Locating your Children via Phone GPS", retrieved from the internet http://www.kidswireless.com/articles/family-locator-program , 11/3/2006
↓	AMM	"TicTalk Parental Controlled Cell Phone - Cell Phone for Kids", retrieved from the internet http://www.mytictalk.com/Leapfrog/ , 11/3/2006

Examiner Signature /Ricardo Osorio/	Date Considered 04/03/2007
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EXAMINER: Initials citation considered. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

Substitute Form PTO-1449 (Modified) Information Disclosure Statement by Applicant (Use several sheets if necessary) (37 CFR §1.98(b))	U.S. Department of Commerce Patent and Trademark Office		Attorney's Docket No. 19146-005001	Application No. 11/249,009
	Applicant Beth Marcus, et al			
	Filing Date October 11, 2005		Group Art Unit 2629	

Other Documents (include Author, Title, Date, and Place of Publication)		
Examiner Initial	Desig. ID	Document
/RO/	ANN	"tiger - chatnowabout", retrieved from the internet http://www.hasbro.com/tiger/default.cfm?page=chatnowabout , 11/3/2006
/RO/	AOO	"TicTalk Parent Controlled Cell Phone" user manual, 2005 Enfora© L.P.
	APP	
	AQQ	
	ARR	
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Examiner Signature /Ricardo Osorio/	Date Considered 04/03/2007
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APPLICATION NUMBER	FILING OR 371(c) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
11/249,009	10/11/2005	Elaine Chen	19146-005001

CONFIRMATION NO. 9446

20985
FISH & RICHARDSON, PC
P.O. BOX 1022
MINNEAPOLIS, MN55440-1022

Title: HUMAN INTERFACE INPUT ACCELERATION SYSTEM**Publication No.** US-2007-0080931-A1**Publication Date:** 04/12/2007

NOTICE OF PUBLICATION OF APPLICATION

The above-identified application will be electronically published as a patent application publication pursuant to 37 CFR 1.211, et seq. The patent application publication number and publication date are set forth above.

The publication may be accessed through the USPTO's publicly available Searchable Databases via the Internet at www.uspto.gov. The direct link to access the publication is currently <http://www.uspto.gov/patft/>.

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NOTICE OF ALLOWANCE AND FEE(S) DUE

20985 7590 02/21/2007
FISH & RICHARDSON, PC
P.O. BOX 1022
MINNEAPOLIS, MN 55440-1022

EXAMINER
OSORIO, RICARDO

ART UNIT PAPER NUMBER

2629
DATE MAILED: 02/21/2007

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
11/249,009	10/11/2005	Elaine Chen	19146-005001	9446

TITLE OF INVENTION: HUMAN INTERFACE INPUT ACCELERATION SYSTEM

APPLN. TYPE	SMALL ENTITY	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	YES	\$700	\$300	\$0	\$1000	05/21/2007

THE APPLICATION IDENTIFIED ABOVE HAS BEEN EXAMINED AND IS ALLOWED FOR ISSUANCE AS A PATENT. PROSECUTION ON THE MERITS IS CLOSED. THIS NOTICE OF ALLOWANCE IS NOT A GRANT OF PATENT RIGHTS. THIS APPLICATION IS SUBJECT TO WITHDRAWAL FROM ISSUE AT THE INITIATIVE OF THE OFFICE OR UPON PETITION BY THE APPLICANT. SEE 37 CFR 1.313 AND MPEP 1308.

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20985 7590 02/21/2007

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(Depositor's name)
(Signature)
(Date)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
11/249,009	10/11/2005	Elaine Chen	19146-005001	9446

TITLE OF INVENTION: HUMAN INTERFACE INPUT ACCELERATION SYSTEM

APPLN. TYPE	SMALL ENTITY	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	YES	\$700	\$300	\$0	\$1000	05/21/2007

EXAMINER	ART UNIT	CLASS-SUBCLASS
OSORIO, RICARDO	2629	345-156000

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3. ASSIGNEE NAME AND RESIDENCE DATA TO BE PRINTED ON THE PATENT (print or type)

PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. If an assignee is identified below, the document has been filed for recordation as set forth in 37 CFR 3.11. Completion of this form is NOT a substitute for filing an assignment.

(A) NAME OF ASSIGNEE _____ (B) RESIDENCE: (CITY and STATE OR COUNTRY) _____

Please check the appropriate assignee category or categories (will not be printed on the patent) : Individual Corporation or other private group entity Government

<p>4a. The following fee(s) are submitted:</p> <p><input type="checkbox"/> Issue Fee</p> <p><input type="checkbox"/> Publication Fee (No small entity discount permitted)</p> <p><input type="checkbox"/> Advance Order - # of Copies _____</p>	<p>4b. Payment of Fee(s): (Please first reapply any previously paid issue fee shown above)</p> <p><input type="checkbox"/> A check is enclosed.</p> <p><input type="checkbox"/> Payment by credit card. Form PTO-2038 is attached.</p> <p><input type="checkbox"/> The Director is hereby authorized to charge the required fee(s), any deficiency, or credit any overpayment, to Deposit Account Number _____ (enclose an extra copy of this form).</p>
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5. Change in Entity Status (from status indicated above)

a. Applicant claims SMALL ENTITY status. See 37 CFR 1.27. b. Applicant is no longer claiming SMALL ENTITY status. See 37 CFR 1.27(g)(2).

NOTE: The Issue Fee and Publication Fee (if required) will not be accepted from anyone other than the applicant; a registered attorney or agent; or the assignee or other party in interest as shown by the records of the United States Patent and Trademark Office.

Authorized Signature _____ Date _____

Typed or printed name _____ Registration No. _____

This collection of information is required by 37 CFR 1.311. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, Virginia 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, Virginia 22313-1450.

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Table with columns: APPLICATION NO., FILING DATE, FIRST NAMED INVENTOR, ATTORNEY DOCKET NO., CONFIRMATION NO., EXAMINER, ART UNIT, PAPER NUMBER. Includes application details for Elaine Chen and examiner OSORIO, RICARDO.

Determination of Patent Term Adjustment under 35 U.S.C. 154 (b)
(application filed on or after May 29, 2000)

The Patent Term Adjustment to date is 0 day(s). If the issue fee is paid on the date that is three months after the mailing date of this notice and the patent issues on the Tuesday before the date that is 28 weeks (six and a half months) after the mailing date of this notice, the Patent Term Adjustment will be 0 day(s).

If a Continued Prosecution Application (CPA) was filed in the above-identified application, the filing date that determines Patent Term Adjustment is the filing date of the most recent CPA.

Applicant will be able to obtain more detailed information by accessing the Patent Application Information Retrieval (PAIR) WEB site (http://pair.uspto.gov).

Any questions regarding the Patent Term Extension or Adjustment determination should be directed to the Office of Patent Legal Administration at (571)-272-7702. Questions relating to issue and publication fee payments should be directed to the Customer Service Center of the Office of Patent Publication at 1-(888)-786-0101 or (571)-272-4200.

Notice of Allowability

Application No.	Applicant(s)	
11/249,009	CHEN ET AL.	
Examiner	Art Unit	
RICARDO L. OSORIO	2629	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

- 1. This communication is responsive to 12/20/2006.
- 2. The allowed claim(s) is/are 1-38.
- 3. Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 - a) All b) Some* c) None of the:
 - 1. Certified copies of the priority documents have been received.
 - 2. Certified copies of the priority documents have been received in Application No. _____.
 - 3. Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).


* Certified copies not received: _____.

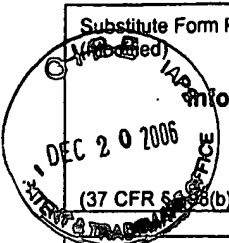
Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.
THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

- 4. A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.
 - 5. CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
 - (a) including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
 - 1) hereto or 2) to Paper No./Mail Date _____.
 - (b) including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.
- Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).
- 6. DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

- 1. Notice of References Cited (PTO-892)
- 2. Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3. Information Disclosure Statements (PTO/SB/08),
Paper No./Mail Date 12/20/2006
- 4. Examiner's Comment Regarding Requirement for Deposit of Biological Material
- 5. Notice of Informal Patent Application
- 6. Interview Summary (PTO-413),
Paper No./Mail Date _____
- 7. Examiner's Amendment/Comment
- 8. Examiner's Statement of Reasons for Allowance
- 9. Other _____


Ricardo Osorio
PRIMARY EXAMINER



Substitute Form PTO-1449 (37 CFR 501.98(b))	U.S. Department of Commerce Patent and Trademark Office	Attorney's Docket No. 19146-005001	Application No. 11/249,009
Information Disclosure Statement by Applicant (Use several sheets if necessary)		Applicant Beth Marcus, et al	
		Filing Date October 11, 2005	Group Art Unit 2819

U.S. Patent Documents

Examiner Initial	Desig. ID	Document Number	Publication Date	Patentee	Class	Subclass	Filing Date If Appropriate
RO	AA	RE37723	6/4/2002	Michael Goren			
	AB	2003/193418	10/16/2003	Shi			
	AC	2003/169188	9/11/2003	Chang et al.			
	AD	2002/163504	11/7/2002	Pallakoff			
	AE	2003/061103	3/27/2003	Kanai			
	AF	2003/020692	1/30/2003	Griffin, et al.			
	AG	4,793,312	12/27/1988	Doinaga et al.			
	AH	4,867,028	09/19/1989	Peter S. Jones			
	AI	4,891,777	01/02/1990	James M. Lapeyre			
	AJ	4,896,554	01/30/1990	Craig F. Culver			
	AK	4,912,462	03/27/1990	Washizuka et al.			
	AL	5,189,416	02/23/1993	Mark D. Estes			
	AM	5,365,589	11/15/1994	Howard A. Gutowitz			
	AN	5,432,510	7/11/1995	Walter S. Matthews			
	AO	5,473,325	12/05/1995	Peter J. McAlindon			
	AP	5,512,919	04/30/1996	Yoshitsugu Araki			
	AQ	5,612,690	03/18/1997	David Levy			
	AR	5,782,642	7/21/1998	Michael Goren			
	AS	5,824,931	10/20/1998	M. G. Papadopoulos			
	AT	5,859,629	01/12/1999	Bruce Tognazzini			
	AU	5,900,864	05/04/1999	Bruce W. Macdonald			
	AV	5,973,621	10/26/1999	David Levy			
	AW	6,005,496	12/21/1999	Hargreaves et al.			
	AX	6,084,576	07/04/2000	Leu et al.			
	AY	6,115,028	9/5/2000	Balakrishnan et al.			
	AZ	6,184,804	02/06/2001	Shelton E. Harrison			
✓	BA	6,219,731	4/17/2001	Howard A. Gutowitz			

Examiner Signature /Ricardo Osorio/	Date Considered 02/05/2007
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EXAMINER: Initials citation considered. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

Substitute Form PTO-1449 (Modified) Information Disclosure Statement by Applicant (Use several sheets if necessary) (37 CFR §1.98(b))	U.S. Department of Commerce Patent and Trademark Office	Attorney's Docket No. 19146-005001	Application No. 11/249,009
	Applicant Beth Marcus, et al		Filing Date October 11, 2005
			Group Art Unit 2819

U.S. Patent Documents							
Examiner Initial	Desig. ID	Document Number	Publication Date	Patentee	Class	Subclass	Filing Date If Appropriate
RO	BB	6,228,709	5/8/2001	Wen-Yi Hsieh			
	BC	6,232,956	05/15/2001	Daniel S. Mailman			
	BD	6,377,685	04/23/2002	Ravi C. Krishnan			
	BE	6,512,511	1/28/2003	Willner et al.			
	BF	6,520,699	02/18/2003	Toshiyasu Abe			
	BG	6,541,715	04/01/2003	Philip Swanson			
	BH	6,542,091	04/01/2003	Wayne Allen Rasanen			
	BI	6,546,239	04/08/2003	Pazdersky et al.			
	BJ	6,573,844	6/3/2003	Venolia et al.			
	BK	6,606,486	8/12/2003	Cubbage et al.			
	BL	6,654,733	11/25/2003	Goodman et al.			
	BM	6,703,963	3/9/2004	Timothy B. Higginson			
	BN	6,738,045	5/18/2004	Hinkley et al.			
	BO	6,741,235	5/25/2004	Michael Goren			
	BP	6,760,013	7/6/2004	Willner et al.			
	BQ	6,865,718	3/8/2005	Levi Montalcini			
	BR	6,885,317	4/26/2005	Howard A. Gutowitz			
	BS	6,885,318	4/26/2005	Matthew J. Bickerton			
	BT	6,911,608	6/28/2005	David H. Levy			
	BU	6,980,200	12/27/2005	Michael Goren			

Foreign Patent Documents or Published Foreign Patent Applications								
Examiner Initial	Desig. ID	Document Number	Publication Date	Country or Patent Office	Class	Subclass	Translation	
							Yes	No
RO	BV	1103883	5/30/2001	EPO				
RO	BW	0585730	3/9/1994	EPO				
RO	BX	03/042805	5/22/2003	WIPO				

Examiner Signature /Ricardo Osorio/	Date Considered 02/05/2007
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		Filing Date October 11, 2005	Group Art Unit 2819

Other Documents (include Author, Title, Date, and Place of Publication)		
Examiner Initial	Desig. ID	Document
RO	CA	BUXTON, B., "A Directory of Sources for Input Technologies," Input Devices Sources & Resources, October 1, 2003, retrieved from the internet at http://www.billbuxton.com/InputSources.html , on October 31, 2003, pp. 1-48.
	CB	BROOKS, M., "Introducing the Dvorak Keyboard," July 8, 2000, retrieved from the internet at http://www.mwbrooks.com/dvorak , on October 31, 2003, pp. 1-2.
	CC	Cirque Pocket Keyboard, "Pocket Keyboard," Innovative Ergonomic Solutions, retrieved from the internet at http://www.iesproducts.com/key-misc-pocket.html , on October 31, 2003, pp. 1-2.
	CD	BUXTON, W., et al., "Human Input to Computer Systems: Theories, Techniques and Technology," 2002, retrieved from the internet at http://billbuxton.com/inputManuscript.html , on October 31, 2003, pp. 1-4.
	CE	BUXTON, "An Introduction to Human Input to Computers", 6 April 1999, found on the internet at http://www.billbuxton.com/input01.Introduction.pdf ,
	CF	Unidentified and Undated Document discussing alternative designs to QWERTY Keyboard, pages 2-10.
	CG	DONNER, J., "Research Approaches to Mobile Use in Developing World: A Review of the Literature.," International Conference on Mobile Communication and Asian Modernities City University of Hong Kong, June 7-8 2005, pp. 1-20
	CH	LIN, M. et al, "Graphics Matter: A Case Study of Mobile Phone Keypad Design for Chinese Input," CHI 2005, Late Breaking Results: Posters, Portland, Oregon. April 2-7, 2005, pp. 1593-1596
	CI	MacKENZIE, S., et. al., "Text Entry for Mobile Computing: Models and Methods, Theory and Practice," Human-Computer Interaction, Volume 17, pp. 147-198, found on the internet at http://www.yorku.ca/mack/hci3-2002.pdf
	CJ	STARNER, T., "Keyboards Redux: Fast Mobile Text Entry". Pervasive Computing, July - September 2004, pp. 97-101, found on the internet at http://www.cc.gatech.edu/fac/Thad.Starner/p/magazine/2004-3-keyboard-redux.pdf
	CK	BUTTS, L., et al., "An Evaluation of Mobile Phone Text Input Methods.," Third Australasian Conference on User Interfaces, January 01, 2002, Melbourne, Victoria, Australia, pp.55-59, found on the internet at http://www.crpit.com/confpapers/CRPITV7Butts.pdf
	CL	WIGDOR, D., "Chording and Tilting for Rapid, Unambiguous Text to Mobile Phone," 2004, pp. 1- - describes chordtap and tiltap (also covered in depth in the paper referenced below) found on the internet at http://www.dgp.toronto.edu/~dwigdor/research/thesis/submitted.html
	CM	WIGDOR, D., et al., "A Comparison of Consecutive and Concurrent Input Text Entry Techniques for Mobile Phones," Conference on Human Factors, April 24-29, 2004, Volume 6, Number 1, pp. 81-88, found on the internet at http://portal.acm.org/citation.cfm?id=985703 http://www.dgp.toronto.edu/~ravin/papers/chi2004_concurrenttextinput.pdf
	CN	ONISZCZAK, A., et. al, "A Comparison of Two Input Methods for Keypads on Mobile Devices," Proceedings of NordiCHI 2004, pp. 101-104. New York: ACM, found on the internet at http://www.yorku.ca/mack/nordichi2004.pdf
	CO	LYONS, K., "Everyday Wearable Computer Use: A Case Study of an Expert User," In Proceedings of Mobile HCI 2003, pages 61-75, 2003, found on the internet at http://www.cc.gatech.edu/ccg/publications/everyday_case.pdf
	CP	LYONS, K., etl al., "Twiddler Typing: One-Handed Chording Text Entry for Mobile Phones," Proc. Conf. Human Factors in Computing Systems (SIGCHI 01), ACM Press, 2004, pp. 671-678, found on the internet at http://www.cc.gatech.edu/fac/Thad.Starner/p/030_10_MTE/twiddler-chi04.pdf
Examiner Signature /Ricardo Osorio/		Date Considered 02/05/2007
EXAMINER: Initials citation considered. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.		

Substitute Form PTO-1449 (Modified) Information Disclosure Statement by Applicant (Use several sheets if necessary) (37 CFR §1.98(b))	U.S. Department of Commerce Patent and Trademark Office	Attorney's Docket No. 19146-005001	Application No. 11/249,009
	Applicant Beth Marcus, et al		Filing Date October 11, 2005
			Group Art Unit 2819

Other Documents (include Author, Title, Date, and Place of Publication)		
Examiner Initial	Desig. ID	Document
RO	CQ	WIGDOR, D., et al., "TiltText: Using Tilt for Text Input to Mobile Phones," Proceedings of the 16th Annual ACM Symposium on User Interface Software and Technology, November 02-05, 2003, Vancouver, Canada, pp. 81-90, found on the internet at http://portal.acm.org/citation.cfm?id=964705 http://www.dgp.toronto.edu/~ravin/papers/uist2003_tilttext.pdf
	CR	DUNLOP, M. D., et al., "Dictionary Based Text Entry Method for Mobile Phones," Proceedings of Second Workshop on Human Computer Interaction with Mobile Devices, August 1999, pp. 1-4, found on the internet at http://www.cis.strath.ac.uk/~mdd/research/publications/99dunlopcrossan.pdf
	CS	PAVLOVYCH, A., et al., "Less-Tap: A Fast And Easy-To-Learn Text Input Technique For Phones," Graphics Interface 2003, 97-104, found on the internet at http://www.graphicsinterface.org/cgi-bin/DownloadPaper?name=2003/170/paper170.pdf
	CT	MacKENZIE, S. et al., "Letterwise: Prefix-Based Disambiguation for Mobile Text Input," Proceedings of the 14th Annual ACM Symposium on User Interface Software and Technology, November 11-14, 2001, Orlando, Florida.
	CU	KOBER, H., et al., "Linguistically Optimized Text Entry on a Cell Phone," In Proceedings of the CHI 2001, found on the internet at http://www.eatoni.com/research/chi.pdf
	CV	GOLDSTEIN, M., et al., "The Finger-Joint-Gesture Wearable Keypad," Ericsson Radio Systems AB., pp. 9-18.
	CW	ROSENBERG, R., "Computing without Mice and Keyboards: Text and Graphic Input Devices for Mobile Computing," Ph.D. Thesis, Dept. of Computer Science, University College, London, 1998, pp. 1-201, found on the internet at http://www.obscure.org/rosenberg/ .
	CX	MacKAY, B., et al., "Walk 'N Scroll: A Comparison of Software-Based Navigation Techniques for Different Levels of Mobility," In Proceedings of the 7th international Conference on Human Computer interaction with Mobile Devices & Services (Salzburg, Austria, September 19 - 22, 2005). MobileHCI '05, vol. 111. ACM Press, New York, NY, pp. 183-190, found on the internet at http://portal.acm.org/citation.cfm?id=1085808&coll=GUIDE&dl=GUIDE&CFID=66591340&CFTOKEN=6294934
	CY	KRANZ, M., et al., "DistScroll - A New One-handed Interaction Device," In Proceedings of the 5th International Workshop on Smart Appliances and Wearable Computing, June 10, 2005, found on the internet at http://www.hcilab.org/documents/DistScrollAnewOneHandedInteractionDevice-KranzHolleisSchmidt-IWSAWC2005.pdf
	CZ	FÄLLMANA, D., et al., "ScrollPad: Tangible Scrolling with Mobile Devices," Proceedings of the Proceedings of the 37th Annual Hawaii International Conference on System Sciences (HICSS'04) - Track 9, p.90286.3, January 05-08, 2004. http://portal.acm.org/citation.cfm?id=963347&coll=GUIDE&dl=GUIDE&CFID=66483658&CFTOKEN=36023921 , found on the internet at http://daniel.fallman.org/resources/papers/fallman-hicss37.pdf
	DA	CHIPMAN, L. E., et al., "SlideBar: Analysis of a Linear Input Device," Behav. Inf. Tech. 23, 1 (Jan. 2004), pp. 1-10, found on the internet at http://portal.acm.org/citation.cfm?id=993182.993184# http://www.cs.umd.edu/Library/TRs/CS-TR-4471/CS-TR-4471.pdf
↓	DB	DARNAUER, J., "Orientation-based interaction for Mobile Devices," Stanford University, pp. 1-4, found on the internet at http://hci.stanford.edu/srk/cs377a-mobile/project/final/darnauer-garrity-kim.pdf

Examiner Signature /Ricardo Osorio/	Date Considered 02/05/2007
EXAMINER: Initials citation considered. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.	

Substitute Form PTO-1449 (Modified) Information Disclosure Statement by Applicant (Use several sheets if necessary) (37 CFR §1.98(b))	U.S. Department of Commerce Patent and Trademark Office	Attorney's Docket No. 19146-005001	Application No. 11/249,009
	Applicant Beth Marcus, et al		Filing Date October 11, 2005
			Group Art Unit 2819

Other Documents (include Author, Title, Date, and Place of Publication)		
Examiner Initial	Desig. ID	Document
RO	DC	REKIMOTO, J., "Tilting Operations for Small Screen Interfaces (Tech Note)," Proceedings of the 9th annual ACM symposium on User Interface software and technology, November 06-08, 1996, Seattle, pp. 167-168, found on the internet at http://portal.acm.org/citation.cfm?id=237115&coll=GUIDE&dl=GUIDE&CFID=66483658&CFTOKEN=36023921
	DD	HINCKLEY, K., et. al., "Foreground and Background Interaction with Sensor-enhanced Mobile Devices," ACM TOCHI (Transactions on Computer-Human Interaction) Special Issue on Sensor-Based Interaction, Vol. 12, No.1, March 2005, pp. 1-22, found on the internet at http://portal.acm.org/citation.cfm?id=1057240&coll=GUIDE&dl=GUIDE&CFID=66591340&CFTOKEN=6294934
	DE	HINCKLEY, K., et al., "Quantitative Analysis of Scrolling Techniques," In Proceedings of the SIGCHI Conference on Human Factors in Computing Systems: Changing Our World, Changing Ourselves (Minneapolis, Minnesota, USA, April 20 - 25, 2002). CHI '02. ACM Press, New York, NY, Volume 4, No. 1, pp. 65-72, http://doi.acm.org/10.1145/503376.503389
	DF	HARRISON, B. L., et. al., "Squeeze Me, Hold Me, Tilt me! An Exploration of Manipulative User Interfaces," In Proceedings of the SIGCHI Conference on Human Factors in Computing Systems (Los Angeles, California, United States, April 18 - 23, 1998). C. Karat, A. Lund, J. Coutaz, and J. Karat, Eds. Conference on Human Factors in Computing Systems. ACM Press/Addison-Wesley Publishing Co., New York, NY, pp. 17-24, found on the internet at http://portal.acm.org/citation.cfm?id=274647&coll=Portal&dl=GUIDE&CFID=66588306&CFTOKEN=73460863&CFID=66588306&CFTOKEN=73460863#
	DG	KAWACHIYA, K., et al., "NaviPoint: An Input Device for Mobile Information Browsing," Proceedings of the SIGCHI conference on Human factors in computing systems, April 18-23, 1998, Los Angeles, California, United States, pp. 1-8, found on the internet at http://portal.acm.org/citation.cfm?id=274645&coll=Portal&dl=GUIDE&CFID=66588306&CFTOKEN=73460863
	DH	HINKLEY, K., et al., "Sensing Techniques for Mobile Interaction," UIST 2000: ACM Symposium on User Interface Software and Technology, CHI Letters, Vol. 2 No. 2, pp. 91-100, found on the internet at http://portal.acm.org/citation.cfm?id=354417&coll=GUIDE&dl=GUIDE&CFID=66483658&CFTOKEN=36023921
	DI	BAILLIE, L., et al., "Rolling, Rotating and Imagining in a Virtual Mobile World," In Proceedings of the 7th international Conference on Human Computer interaction with Mobile Devices & Services (Salzburg, Austria, September 19 - 22, 2005). MobileHCI '05, Vol. 111. ACM Press, New York, NY, pp. 283-286, found on the internet at http://doi.acm.org/10.1145/1085777.1085833
	DJ	KARLSON, A. K., et al. "AppLens and LaunchTile: Two Designs for One-Handed Thumb Use on Small Devices," pp. 1-12, found on the internet at http://hcil.cs.umd.edu/trs/2004-37/2004-37.html
	DK	ROTO, V., "Browsing on Mobile Phones," Nokia Research., found on the internet at http://www.research.att.com/~rjana/WF12_Paper1.pdf
	DL	BUCHANAN, L., "The Future of Mobile?" Qualcomm Slingshot, pp. 1-3, found on the internet at http://wireless.ign.com/articles/657/657041p1.html
✓	DM	WHENHAM, T. O. "Source: New Launches," December 12, 2005, pg. 1, found on the internet at http://www.mobilemag.com/content/100/345/CS578/

Examiner Signature /Ricardo Osorio/	Date Considered 02/05/2007
EXAMINER: Initials citation considered. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.	

Substitute Disclosure Form (PTO-1449)

Substitute Form PTO-1449 (Modified) Information Disclosure Statement by Applicant (Use several sheets if necessary) (37 CFR §1.98(b))	U.S. Department of Commerce Patent and Trademark Office	Attorney's Docket No. 19146-005001	Application No. 11/249,009
	Applicant Beth Marcus, et al		Filing Date October 11, 2005
			Group Art Unit 2819

Other Documents (include Author, Title, Date, and Place of Publication)

Examiner Initial	Desig. ID	Document
RO	DN	PILATO, F., Kyocera Candid KX16, August 8, 2005, pg. 1, found on the internet at http://www.mobilemag.com/content/100/340/C4392/
	DO	"Gaming on the go with EXG," XEG Mobile Phone Pad, November 10, 2005, pp. 1-8, found on the internet at http://us.gizmodo.com/gadgets/cellphones/gaming-on-the-go-with-xeg-136414.php http://www.ahabarnews.com/en/news-10615-XEG%2C+the+mobile+phone+pad.html
	DP	Samsung Game Pad – A620, pp. 1-6, found on the internet at http://www.cellphonemall.net/wireless/store/accessorydetail.asp?id=23198&phoneid=334
	DQ	Thumbscript®, pp. 1-6, found on the internet at http://www.thumbscript.com/index.html http://www.thumbscript.com/howitworks.html http://www.thumbscript.com/technotes.html
	DR	Exideas, pp. 1-4, found on the internet at http://www.exideas.com/ME/index.html http://www.exideas.com/ME/HardKey.html
	DS	"KeyStick Text Entry System," NE-Ware, pp. 1-21, found on the internet at http://www.n-e-ware.com/Downloads/KeyStick/330/KSUserManual330_01.pdf
	DT	"MobileTouch Product Brief," Synaptics, pp. 12-2, found on the internet at http://www.synaptics.com/products/pdf/mobiletouch_pb.pdf
	DU	"Solutions > Mobile Phones," Atrua: sensor company, pp. 1-3, found on the internet at http://www.atrua.com/s-mobilephones.html
	DV	"Worlds Smallest Joystick for Mobile Devices," Varatouch: Sensor Company, December 22, 2004, pg. 1, found on the internet at http://www.esato.com/news/article.php?id=388
	DW	Elektex Smart Fabric Touchpads," Eleksen, pp. 1-2, found on the internet at www.eleksen.com
	DX	"Sharp ZTCJ01 Remote Control for Sharp Mobile Phone," Sharp, January 12, 2005, pp. 1-6, found on the internet at http://www.slashphone.com/93/3123.html
	DY	Killer Cell Phone Game Controller, October 14, 2005, pg. 1, found on the internet at http://www.kotaku.com/gaming/cell-phones/killer-cell-phone-game-controller-130968.php
	DZ	COMBEE, B., "Review: CLIE™ Game Controller PEGA-GC10," October 3, 2002. pp. 1-2, found on the internet at http://www.palminfocenter.com/view_story.asp?ID=4295
	EA	"The i-Blue Bluetooth GPS Receiver," January 15, 2006, pg.1, found on the internet at http://mobilitytoday.com/news/005986/mobility_buyGPSnow_i-Blue_bluetooth_GPS
	EB	Alphagrip AG-5 User's Manual, pp. 7, found on the internet at http://www.alphagrips.com/AlphagripAG5UsersManual.pdf
	EC	T9® Adaptive Text Input, pp. 1-4, found on the internet at http://www.tegic.com/pdfs/salessheets/T9%20Adaptive%20Text%20Input%20Sales%20Sheet%201.pdf http://www.tegic.com/pdfs/salessheets/T9%20Adaptive%20Text%20Input%20Sales%20Sheet%202.pdf http://www.tegic.com/pdfs/salessheets/T9%20Adaptive%20Text%20Input%20Sales%20Sheet%203.pdf http://www.tegic.com/pdfs/salessheets/Sloppy%20Type%20Sales%20Sheet.pdf
	ED	Zicorp – eZiTap, pp. 1-3, found on the internet at http://www.zicorp.com/eZiTap.htm
↓	EE	Motorola – iTAP, pg. 1, found on the internet at http://news.zdnet.co.uk/hardware/mobile/0,39020360,39118435,00.htm

Examiner Signature <p style="text-align: center;">/Ricardo Osorio/</p>	Date Considered <p style="text-align: center;">02/05/2007</p>
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EXAMINER: Initials citation considered. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

Substitute Form PTO-1449 (Modified) Information Disclosure Statement by Applicant (Use several sheets if necessary) (37 CFR §1.98(b))	U.S. Department of Commerce Patent and Trademark Office	Attorney's Docket No. 19146-005001	Application No. 11/249,009
	Applicant Beth Marcus, et al		Filing Date October 11, 2005
			Group Art Unit 2819

Other Documents (include Author, Title, Date, and Place of Publication)		
Examiner Initial	Desig. ID	Document
RO	EF	DigitWireless: FastTap, pp. 1-3, found on the internet at http://www.digitwireless.com/flash/download/fastap.pdf
	EG	Microth KeyWheel, pp. 1-4, found on the internet at http://www.microth.com/circumscript/overview.asp
	EH	"One Keypad for All Your Needs," Yuvee. www.yuvee.com , pp. 1-3, found on the internet at http://www.yuvee.com/builtin1.shtml http://www.yuvee.com/built_in_b.shtml http://www.yuvee.com/testdrive2.shtml
	EI	"Twiddler 2 Key Map Download," September 7, 2001, pp. 1-10, found on the internet at http://www.handykey.com/ http://www.handykey.com/Keymap.pdf
	EJ	"VRMS - Applications," Sengital Ltd., pp. 1-4, found on the internet at http://sengital.manufacturer.globalsources.com/si/6008823523892/ProductDetail/PDA-keyboard/product_id-1001050135/action-GetProduct.htm
	EK	Howard.co.kr - The mouse phone, pg. 1, found on the internet at http://www.howard.co.kr/computer/mouse/mousephone.htm
	EL	Nokia 6620 User Guide, pp. 1-141, found on the internet at http://nds2.nokia.com/files/support/nam/phones/guides/6620_US_en.PDF
	EM	"Sega now into Phones Making? Sure Seems Like It," pp. 1-2, found on the internet at http://www.phoneyworld.com/newspage.aspx?n=1745
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	EO	KÖLSCH, M., et al., "Keyboards without Keyboards: A Survey of Virtual Keyboards," UCSB Technical Report 2002-21, July 12, 2002, found on the internet at http://www.cs.ucsb.edu/research/tech_reports/reports/2002-21.pdf
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	ES	LUMSDEN, J., et al., "Mobile Note Taking: Investigating the Efficacy of Mobile Text Entry," In Proc. of Mobile Human-Computer Interaction (MobileHCI 2004), Glasgow, UK, Sept. 2004; In S. Brewster and M. Dunlop (Eds.). Mobile Human-Computer-Interaction - MobileHCI 2004, Lecture Notes in Computer Science, Vol. 3160, Berlin: Springer, 156--168.
↓	ET	MacKENZIE, I. S., et al., "Phrase sets for Evaluating Text Entry Techniques," Extended Abstracts of the ACM Conference on Human Factors in Computing Systems - CHI 2003, pp. 754-755 New York: ACM

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	Applicant Beth Marcus, et al		Filing Date October 11, 2005
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Other Documents (include Author, Title, Date, and Place of Publication)		
Examiner Initial	Desig. ID	Document
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	EV	SOUKOREFF, R. W., et al., "Recent Developments in Text-Entry Error Rate Measurement," CHI 2004, Late Breaking Results Paper, Vienna Austria, April 24-29, 2004, pp. 1425-1428.
	EW	LEE, S., et al., "Chording as a Text Entry Method in Mobile Phones," In Proceedings of the MobileHCI 2004: 6th International Symposium, Glasgow, UK, September 13-16, 2004, pp. 454-460.
	EX	GREEN, N., et al., "A Reduced QWERTY Keyboard for Mobile Text Entry," In CHI '04 Extended Abstracts on Human Factors in Computing Systems (Vienna, Austria, April 24 - 29, 2004). CHI '04. ACM Press, New York, NY, pp. 1429-1432, found on the internet at http://portal.acm.org/citation.cfm?id=986082&coll=GUIDE&dl=GUIDE&CFID=66591340&CFTOKEN=6294934
	EY	PARTRIDGE, K., et al., "TiltType: Accelerometer-Supported Text Entry for Very Small Devices," Proceedings of the 15th annual ACM symposium on User interface software and technology, October 27-30, 2002, Paris, France, pp. 201-204.
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	FB	ESLAMBOLCHILAR, P., et al., "Tilt-Based Automatic Zooming and Scaling in Mobile Devices - A State-Space Implementation," In Proc. of Mobile Human-Computer Interaction (MobileHCI 2004), Glasgow, UK, Sept. 2004: In S. Brewster and M. Dunlop (Eds.). Mobile Human-Computer-Interaction - MobileHCI 2004, Lecture Notes in Computer Science, Vol. 3160, Berlin: Springer, pp. 120-131.
	FC	ZHAI, S., et al., "Improving Browsing Performance: A Study of Four Input Devices for Scrolling and Pointing Tasks," Proceedings of the IFIP TC13 Interational Conference on Human-Computer Interaction, July 14-18, 1997, pp.286-293.
	FD	WOBBROCK, J. O., et al., "WebThumb: Interaction Techniques for Small-Screen Browsers," Proc. UIST, ACM Press (2002), pp. 205-208.
	FE	LEE, S., et al., "Designing a Universal Keyboard Using Chording Gloves," SIGCAPH Comput. Phys. Handicap. , 73-74 (Jun. 2002), pp. 142-147, found on the internet at http://doi.acm.org/10.1145/960201.957230
	FF	PIRHONEN, A., et al., "Gestural and Audio Metaphors as a Means of Control for Mobile Devices," In Proceedings of the SIGCHI Conference on Human Factors in Computing Systems: Changing Our World, Changing Ourselves (Minneapolis, Minnesota, USA, April 20 - 25, 2002). CHI '02. ACM Press, New York, NY, pp. 291-298, found on the internet at http://doi.acm.org/10.1145/503376.503428


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	Applicant Beth Marcus, et al		
	Filing Date October 11, 2005		Group Art Unit 2819

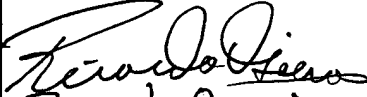
Other Documents (include Author, Title, Date, and Place of Publication)		
Examiner Initial	Desig. ID	Document
RO	FG	KJELDSKOV, J., et al. "A Review of Mobile HCI Research Methods," In Proc. of Mobile Human-Computer Interaction (MobileHCI 2003), Udine Italy, Sept. 2003; In L. Chittaro (Ed.). Mobile Human-Computer-Interaction - MobileHCI 2003, Lecture Notes in Computer Science, Vol. 2795, Berlin: Springer, pp. 317-335.
	FH	KJELDSKOV, J., et al., "New Techniques for Usability Evaluation of Mobile Systems," International Journal of Human-Computer Studies, May 2004, 60 (5-6): 599-620.
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	FJ	Eleksen, "Eletek® Powers Fashion-Conscious Professionals with iPod®-enabled Tailored Suit," September 13, 2006, retrieved from the internet at http://www.eleksen.com/?page=news/index.asp&newsID=60 , printed on December 11, 2006, pp. 1-2.
	FK	Eleksen, "Belkin Selects ElekTex to Power New-to the-Market SportCommand Product," September 19, 2006, retrieved from the internet at http://www.eleksen.com/?page=news/index.asp&newsID=61 , on December 11, 2006, pp. 1-2.
	FL	XEG, , retrieved from the internet at http://www.xeg.co.kr/xeg/xeguse/xeg_use02_2.htm , on December 12, 2006, pp. 1-8.
	FM	TomTom, Protatable GPS car navigation sytems, "TomTom Navigator 5 - Bluetooth," retrieved from the internet at http://www.tomtom.com/products/features.php?ID=103&Category=2&Lid=4 , on December 12, 2006, pp. 1-4.
↓	FN	Verizon Wireless, "Bluetooth Portable Accessory," retrieved from the internet at http://www.verizonwireless.com/b2c/store/controller?item=accessoryMart&action=viewBluetoothAccessories&model=Capable%20Devices&make=Bluetooth@reg , on December 12, 2006, pg. 1.

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Substitute Disclosure Form (PTO-1449)

Issue Classification 	Application/Control No. 11/249,009	Applicant(s)/Patent under Reexamination CHEN ET AL.
	Examiner RICARDO L. OSORIO	Art Unit 2629

ISSUE CLASSIFICATION													
ORIGINAL				INTERNATIONAL CLASSIFICATION									
CLASS		SUBCLASS		CLAIMED				NON-CLAIMED					
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CROSS REFERENCES													
CLASS	SUBCLASS (ONE SUBCLASS PER BLOCK)												
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(Assistant Examiner) (Date)	 Ricardo Osorio (Primary Examiner) (Date) 2/5/07	Total Claims Allowed: 38
(Legal Instruments Examiner) (Date)		O.G. Print Claim(s) 1 O.G. Print Fig. 4

<input type="checkbox"/> Claims renumbered in the same order as presented by applicant		<input type="checkbox"/> CPA		<input type="checkbox"/> T.D.		<input type="checkbox"/> R.1.47	
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2	2	37	32	62	92	122	182
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Bib Data Sheet

CONFIRMATION NO. 9446

SERIAL NUMBER 11/249,009	FILING OR 371(c) DATE 10/11/2005 RULE	CLASS 345	GROUP ART UNIT 2629	ATTORNEY DOCKET NO. 19146-005001
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APPLICANTS
 Elaine Chen, Arlington, MA;
 Rob Podoloff, Framingham, MA;
 Lorraine Wheeler, Billerica, MA;
 Beth Marcus, Bedford, MA;

**** CONTINUING DATA ******* *NO RLO*

**** FOREIGN APPLICATIONS ******* *NO RLO*

IF REQUIRED, FOREIGN FILING LICENSE GRANTED SMALL ENTITY ****
**** 11/02/2005**

Foreign Priority claimed <input type="checkbox"/> yes <input checked="" type="checkbox"/> no	STATE OR COUNTRY MA	SHEETS DRAWING 13	TOTAL CLAIMS 38	INDEPENDENT CLAIMS 3
35 USC 119 (a-d) conditions met <input type="checkbox"/> yes <input checked="" type="checkbox"/> no <input type="checkbox"/> Met after Allowance				
Verified and Acknowledged <i>[Signature]</i> Examiner's Signature	<i>RLO</i> Initials			

ADDRESS
20985

TITLE
HUMAN INTERFACE INPUT ACCELERATION SYSTEM

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Applicant : Beth Marcus, et al
Serial No. : 11/249,009
Filed : October 11, 2005
Page : 2 of 2

Attorney's Docket No.: 19146-005001

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Respectfully submitted,

Date: _____

2/15/07

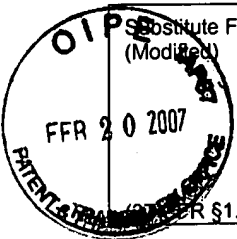
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John P. Schnurer
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(Modified)

U.S. Department of Commerce
Patent and Trademark Office

Attorney's Docket No.
19146-005001

Application No.
11/249,009

**Information Disclosure Statement
by Applicant**
(Use several sheets if necessary)

Applicant
Beth Marcus, et al

Filing Date
October 11, 2005

Group Art Unit
2629

Fee \$1.98(b)

U.S. Patent Documents

Examiner Initial	Desig. ID	Document Number	Publication Date	Patentee	Class	Subclass	Filing Date If Appropriate
	AA	2003/048205	3/13/2003	He			
	AB	2004/020881	10/21/2004	Dechene			
	AC	5,515,305	5/7/1996	Register, et al.			
	AD	6,107,877	8/22/2000	Phillipps			
	AE	6,297,752	10/2/2001	Ni			
	AF	6,909,424	6/21/2005	Liebenow, et al.			
	AG	6,947,028	9/20/2005	Shkolnikov			
	AH	7,072,975	7/4/2006	Kato			
	AI						
	AJ						
	AK						

Foreign Patent Documents or Published Foreign Patent Applications

Examiner Initial	Desig. ID	Document Number	Publication Date	Country or Patent Office	Class	Subclass	Translation	
							Yes	No
	AL							
	AM							
	AN							
	AO							
	AP							

Other Documents (include Author, Title, Date, and Place of Publication)

Examiner Initial	Desig. ID	Document
	AQ	BUXTON, W., "A Directory of Sources for Input Technologies", May 12, 2006, retrieved from the internet at http://www.billbuxton.com/InputSources.html
	AR	Roche, et al., "Managing Content-Initiated Application Delivery with a Client-Side Agent", Proceedings of the 2 nd IASTED International Conference Communications, Internet and Information Technology, November 17-19, 2003, Scottsdale, Arizona, USA, pp. 334-339
	AS	"Verizon to launch mobile chaperone service", Reuters, published on ZDNet News: June 10, 2006, retrieved from the internet http://news.zdnet.com , 11/3/2006

Examiner Signature	Date Considered
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	Applicant Beth Marcus, et al		
	Filing Date October 11, 2005		Group Art Unit 2629

Other Documents (include Author, Title, Date, and Place of Publication)		
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	AT	"Hasbro introduces CHATNOW! Now Tweens Can Talk, Send Text Messages and Take Photographs with No Airtime Charges or Calling Plan", February 10, 2005; retrieved from the internet http://www.hasbro.com/media/content/printable.cfm?release=290 , 11/9/2006
	AU	"Family Center Family Locator" "Locate your Kid's phone with GPS technology" retrieved from the internet, <a href="http://www.disneymobile.go.com/disneymobile/home.do?C<P=KAC-GOOG_SEM">http://www.disneymobile.go.com/disneymobile/home.do?C<P=KAC-GOOG_SEM , 11/9/2006
	AV	"Are you ever worried where your children are?" <u>Child Locate</u> , retrieved from the internet, http://www.childlocate.co.uk , 11/3/2006
	AW	"Frequently Asked Questions", <u>ChildLocate</u> , retrieved from the internet, http://www.childlocate.co.uk/faq.html , 11/3/2006
	AX	"About Sprint Family Locator", retrieved from the internet, https://sfl.sprintpcs.com/finder-sprint-family/signIn.html , 11/3/2006
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	AZ	"Welcome to Kidswireless.com; LG Migo Verizon Wireless" retrieved from the internet http://www.kidswireless.com/phones/LG-Mio- , 11/3/2006
	AAA	"Welcome to Kidswireless.com; Verizon Chaperone and Child Zone", retrieved from the internet http://ww.kidswireless.com/articles/verizon-wireless-chaperon/ , 11/3/2006
	ABB	"Teletrac Partners with Ryder and Cingular in Fleet Management Offering", retrieved from the internet http://www.gpsworld.com/gpslbs/article/articleDetail.jsp?id=359057 , 11/3/2006
	ACC	"Never Lose Your Children at the Mall Again", retrieved from the internet http://www.brickhousesecurity.com/vbsik.html , 11/3/2006
	ADD	"CHILD LOCATOR - \$30 Child Personal Safety Alarm", retrieved from the internet http://www.mypreciouskid.com/child-locator.html , 11/3/2006
	AEE	"Alarm - Personal Alarm", retrieved from the internet http://www.mypreciouskid.com/alarm.html , 11/3/2006
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	AGG	"Never lose track of your pet", retrieved from the internet http://www.globalpetfinder.com , 11/3/2006
	AHH	"Gadgets track pets with GPS or transfer tapes to DVDs", retrieved from the internet https://www.globalpetfinder.com/article39.html , 11/3/2006
	AII	"TrimTracXS Internet GPS Car Tracking System - Real Time GPS Tracking", retrieved from the internet http://www.brickhousesecurity.com/slimtrak-realtime-gps-tracking-car-locator.html , 11/3/2006
	AJJ	"SecureTrack GPS Tracking Child Locator - Teen Tracking", retrieved from the internet http://www.brickhousesecurity.com/geminitracking-gps-child-locator.html , 11/3/2006
	AKK	"Cingular Firefly Phone - FREE from Kids Wireless.com", retrieved from the internet http://www.kidswireless.com/phones/Firefly , 11/3/2006
	ALL	"Sprint Family Locator Program: Locating your Children via Phone GPS", retrieved from the internet http://www.kidswireless.com/articles/family-locator-program , 11/3/2006
	AMM	"TicTalk Parental Controlled Cell Phone - Cell Phone for Kids", retrieved from the internet http://www.mytictalk.com/Leapfrog/ , 11/3/2006

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	Applicant Beth Marcus, et al		
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Other Documents (include Author, Title, Date, and Place of Publication)		
Examiner Initial	Desig. ID	Document
	ANN	"tiger – chatnowabout", retrieved from the internet http://www.hasbro.com/tiger/default.cfm?page=chatnowabout , 11/3/2006
	AOO	"TicTalk Parent Controlled Cell Phone" user manual, 2005 Enfora© L.P.
	APP	
	AQQ	
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In re Application of :
Chen, et al. :
Application No. 11/249,009 :
Filed: October 11, 2005 :
Attorney Docket No. 19146-005001 :

OFFICE OF PETITIONS

ON PETITION

This is a decision on the petition under 37 CFR 1.182 to change the order of inventors in the above-cited application.

The petition is **granted**.

The order of the inventors for the above-cited application is now:

1. Elaine Chen
2. Rob Podoloff
3. Lorraine Wheeler
4. Beth Marcus

A corrected filing receipt is enclosed.

The application file is being forwarded to Technology Center 2600, GAU 2629 for further processing.

Telephone inquiries concerning this matter may be directed to the undersigned at (571) 272-3222.

Kenya A. McLaughlin
 Kenya A. McLaughlin
 Petitions Attorney
 Office of Petitions

Enclosure: Corrected Filing Receipt


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APPL NO.	FILING OR 371 (c) DATE	ART UNIT	FIL FEE REC'D	ATTY. DOCKET NO	DRAWINGS	TOT CLMS	IND CLMS
11/249,009	10/11/2005	2629	1015	19146-005001	13	38	3

CONFIRMATION NO. 9446

 20985
 FISH & RICHARDSON, PC
 P.O. BOX 1022
 MINNEAPOLIS, MN 55440-1022

CORRECTED FILING RECEIPT


OC000000022133019

Date Mailed: 01/24/2007

Receipt is acknowledged of this regular Patent Application. It will be considered in its order and you will be notified as to the results of the examination. Be sure to provide the U.S. APPLICATION NUMBER, FILING DATE, NAME OF APPLICANT, and TITLE OF INVENTION when inquiring about this application. Fees transmitted by check or draft are subject to collection. Please verify the accuracy of the data presented on this receipt. **If an error is noted on this Filing Receipt, please mail to the Commissioner for Patents P.O. Box 1450 Alexandria Va 22313-1450. Please provide a copy of this Filing Receipt with the changes noted thereon. If you received a "Notice to File Missing Parts" for this application, please submit any corrections to this Filing Receipt with your reply to the Notice. When the USPTO processes the reply to the Notice, the USPTO will generate another Filing Receipt incorporating the requested corrections (if appropriate).**

Applicant(s)

 Elaine Chen, Arlington, MA;
 Rob Podoloff, Framingham, MA;
 Lorraine Wheeler, Billerica, MA;
 Beth Marcus, Bedford, MA;

Power of Attorney:

 David Feigenbaum--30378
 Scott Harris--32030
 John Phillips--35322
 John Hayden--37640
 Bing Ai--43312
 Jan Rohlicek--43349
 William Hunter--47671
 John Schnurer--52196

Domestic Priority data as claimed by applicant
Foreign Applications
If Required, Foreign Filing License Granted: 11/02/2005
The country code and number of your priority application, to be used for filing abroad under the Paris Convention, is US11/249,009
Projected Publication Date: 04/12/2007
Non-Publication Request: No

Early Publication Request: No

**** SMALL ENTITY ****

Title

HUMAN INTERFACE INPUT ACCELERATION SYSTEM

Preliminary Class

345

PROTECTING YOUR INVENTION OUTSIDE THE UNITED STATES

Since the rights granted by a U.S. patent extend only throughout the territory of the United States and have no effect in a foreign country, an inventor who wishes patent protection in another country must apply for a patent in a specific country or in regional patent offices. Applicants may wish to consider the filing of an international application under the Patent Cooperation Treaty (PCT). An international (PCT) application generally has the same effect as a regular national patent application in each PCT-member country. The PCT process **simplifies** the filing of patent applications on the same invention in member countries, but **does not result** in a grant of "an international patent" and does not eliminate the need of applicants to file additional documents and fees in countries where patent protection is desired.

Almost every country has its own patent law, and a person desiring a patent in a particular country must make an application for patent in that country in accordance with its particular laws. Since the laws of many countries differ in various respects from the patent law of the United States, applicants are advised to seek guidance from specific foreign countries to ensure that patent rights are not lost prematurely.

Applicants also are advised that in the case of inventions made in the United States, the Director of the USPTO must issue a license before applicants can apply for a patent in a foreign country. The filing of a U.S. patent application serves as a request for a foreign filing license. The application's filing receipt contains further information and guidance as to the status of applicant's license for foreign filing.

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For information on preventing theft of your intellectual property (patents, trademarks and copyrights), you may wish to consult the U.S. Government website, <http://www.stopfakes.gov>. Part of a Department of Commerce initiative, this website includes self-help "toolkits" giving innovators guidance on how to protect intellectual property in specific countries such as China, Korea and Mexico. For questions regarding patent enforcement issues, applicants may call the U.S. Government hotline at 1-866-999-HALT (1-866-999-4158).

LICENSE FOR FOREIGN FILING UNDER Title 35, United States Code, Section 184 Title 37, Code of Federal Regulations, 5.11 & 5.15

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license has been issued under 37 CFR 5.15(b). The license is subject to revocation upon written notification. The date indicated is the effective date of the license, unless an earlier license of similar scope has been granted under 37 CFR 5.13 or 5.14.

This license is to be retained by the licensee and may be used at any time on or after the effective date thereof unless it is revoked. This license is automatically transferred to any related applications(s) filed under 37 CFR 1.53(d). This license is not retroactive.

The grant of a license does not in any way lessen the responsibility of a licensee for the security of the subject matter as imposed by any Government contract or the provisions of existing laws relating to espionage and the national security or the export of technical data. Licensees should apprise themselves of current regulations especially with respect to certain countries, of other agencies, particularly the Office of Defense Trade Controls, Department of State (with respect to Arms, Munitions and Implements of War (22 CFR 121-128)); the Bureau of Industry and Security, Department of Commerce (15 CFR parts 730-774); the Office of Foreign Assets Control, Department of Treasury (31 CFR Parts 500+) and the Department of Energy.

NOT GRANTED

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Bib Data Sheet

CONFIRMATION NO. 9446

SERIAL NUMBER 11/249,009	FILING OR 371(c) DATE 10/11/2005 RULE	CLASS 345	GROUP ART UNIT 2629	ATTORNEY DOCKET NO. 19146-005001
------------------------------------	---	---------------------	-------------------------------	--

APPLICANTS

Elaine Chen, Arlington, MA;
 Rob Podoloff, Framingham, MA;
 Lorraine Wheeler, Billerica, MA;
 Beth Marcus, Bedford, MA;

**** CONTINUING DATA *******

**** FOREIGN APPLICATIONS *******

IF REQUIRED, FOREIGN FILING LICENSE GRANTED SMALL ENTITY ****

** 11/02/2005

Foreign Priority claimed <input type="checkbox"/> yes <input type="checkbox"/> no	STATE OR COUNTRY MA	SHEETS DRAWING 13	TOTAL CLAIMS 38	INDEPENDENT CLAIMS 3	
35 USC 119 (a-d) conditions met <input type="checkbox"/> yes <input type="checkbox"/> no <input type="checkbox"/> Met after Allowance					
Verified and Acknowledged	Examiner's Signature	Initials			

ADDRESS

20985

TITLE

HUMAN INTERFACE INPUT ACCELERATION SYSTEM

FILING FEE RECEIVED 1015	FEES: Authority has been given in Paper No. _____ to charge/credit DEPOSIT ACCOUNT No. _____ for following:	<input type="checkbox"/> All Fees
		<input type="checkbox"/> 1.16 Fees (Filing)
		<input type="checkbox"/> 1.17 Fees (Processing Ext. of time)
		<input type="checkbox"/> 1.18 Fees (Issue)
		<input type="checkbox"/> Other _____
		<input type="checkbox"/> Credit



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Table with 8 columns: APPLICATION NUMBER, FILING or 371(c) DATE, GRP ART UNIT, FIL FEE REC'D, ATTY.DOCKET.NO, DRAWINGS, TOT CLAIMS, IND CLAIMS. Row 1: 11/249,009, 10/11/2005, 2629, 1015, 19146-005001, 13, 38, 3

CONFIRMATION NO. 9446

CORRECTED FILING RECEIPT

20985
FISH & RICHARDSON, PC
P.O. BOX 1022
MINNEAPOLIS, MN55440-1022

Date Mailed: 01/24/2007

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Applicant(s)

Elaine Chen, Arlington, MA;
Rob Podoloff, Framingham, MA;
Lorraine Wheeler, Billerica, MA;
Beth Marcus, Bedford, MA;

Power of Attorney:

David Feigenbaum--30378 Jan Rohlicek--43349
Scott Harris--32030 William Hunter--47671
John Phillips--35322 John Schnurer--52196
John Hayden--37640
Bing Ai--43312

Domestic Priority data as claimed by applicant

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The country code and number of your priority application, to be used for filing abroad under the Paris Convention, is US11/249,009

Projected Publication Date: 04/12/2007

Non-Publication Request: No

Early Publication Request: No

** SMALL ENTITY **

Title

HUMAN INTERFACE INPUT ACCELERATION SYSTEM

Preliminary Class

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NOT GRANTED

No license under 35 U.S.C. 184 has been granted at this time, if the phrase "IF REQUIRED, FOREIGN FILING LICENSE GRANTED" DOES NOT appear on this form. Applicant may still petition for a license under 37 CFR 5.12, if a license is desired before the expiration of 6 months from the filing date of the application. If 6 months has lapsed from the filing date of this application and the licensee has not received any indication of a secrecy order under 35 U.S.C. 181, the licensee may foreign file the application pursuant to 37 CFR 5.15(b).



IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant: Beth Marcus, et al Art Unit: 2629
Serial No.: 11/249,009 Examiner: Ricardo Osorio
Filed: October 11, 2005 Conf. No.: 9446
Title: HUMAN INTERFACE INPUT ACCELERATION SYSTEM

Mail Stop RCE
Petitions Branch
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

PETITION UNDER 37 CFR § 1.182
To Correct Order Of Inventorship

Applicants hereby petition to change the order of inventorship for the above-referenced application. Without any deceptive intention, the above-captioned application was filed naming Beth Marcus, Elaine Chen, Rob Podoloff and Lorraine Wheeler, rather than ELAINE CHEN, ROB PODOLOFF, LORRAINE WHEELER AND BETH MARCUS, in that order. This error was discovered after the application was filed.

Please change the order of inventorship for this application to ELAINE CHEN, ROB PODOLOFF, LORRAINE WHEELER AND BETH MARCUS. Please apply the petitions fee, and any other fees or credits, to Deposit Account No. 06-1050.

Date: December 14, 2006

Handwritten signature of John P. Schnurer
John P. Schnurer
Reg. No. 52,196
59,747

Fish & Richardson P.C.
PTO Customer No. 20985
12390 El Camino Real
San Diego, California 92130
Telephone: (858) 678-5070
Facsimile: (858) 678-5099

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10666647.doc

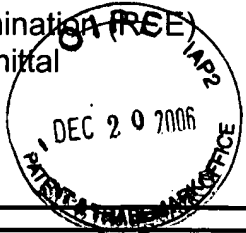
CERTIFICATE OF MAILING BY FIRST CLASS MAIL
I hereby certify under 37 CFR §1.8(a) that this correspondence is being deposited with the United States Postal Service as first class mail with sufficient postage on the date indicated below and is addressed to the Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

12/20/2006 HNGUYEN1 00000063 061050 11249009
03 FC:1462 400.00 DA

December 14, 2006
Date of Deposit
Handwritten signature of Julie H. Giordano
Signature
Julie H. Giordano
Typed or Printed Name of Person Signing Certificate

FW
RCE

<p style="text-align: center;">Request For Continued Examination (RCE) Transmittal</p> <p>Address to: Mail Stop RCE Commissioner for Patents P.O. Box 1450 Alexandria, VA 22313-1450</p>	Application Number	11/249,009
	Filing Date	October 11, 2005
	First Named Inventor	Beth Marcus, et al
	Group Art Unit	2629
	Examiner Name	Ricardo Osorio
	Attorney Docket Number	19146-005001



This is a Request for Continued Examination (RCE) under 37 C.F.R. §1.114 of the above-identified application.
Request for Continued Examination (RCE) practice under 37 CFR 1.114 does not apply to any utility or plant application filed prior to June 8, 1995, or to any design application. See Instruction Sheet for RCEs (not to be submitted to the USPTO) on page 2.

1. **Submission required under 37 C.F.R. §1.114** Note: If the RCE is proper, any previously filed unentered amendments and amendments enclosed with the RCE will be entered in the order in which they were filed unless applicant instructs otherwise. If applicant does not wish to have any previously filed unentered amendment(s) entered, applicant must request non-entry of such amendment(s)

a. Previously submitted. If a final Office action is outstanding, any amendment filed after the final Office action may be considered as a submission even if this box is not checked.

 i. Consider the arguments in the Appeal Brief or Reply Brief previously filed on _____

 ii. Other _____

b. Enclosed

 i. Amendment/Reply

 ii. Affidavit(s)/Declaration(s)

 iii. Information Disclosure Statement (IDS)

 iv. Other ADS, Petition to correct inventorship

2. **Miscellaneous**

a. Suspension of action on the above-identified application is requested under 37 C.F.R. §1.103(c) for a period of _____ months. (Period of suspension shall not exceed 3 months; Fee under 37 C.F.R. §1.17(i) required)

b. Other _____

3. **Fee** The RCE fee under 37 C.F.R. §1.17(e) is required by 37 C.F.R. §1.114 when the RCE is filed.

a. The Director is hereby authorized to charge the following fees, or credit any overpayments, to Deposit Account No. 06-1050

 i. RCE fee required under 37 CFR 1.17(e)

 ii. Extension of time fee (37 CFR 1.136 and 1.17)

 iii. Other Any deficiencies

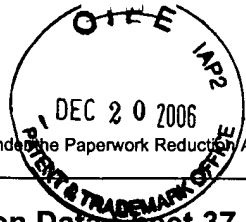
b. Check in the amount of \$_____ enclosed

c. Payment by credit card (Form PTO-2038 enclosed)

12/20/2006 NNGUYEN1 00000063 061050 11249009
01 FC:2001 395.00 DA

SIGNATURE OF APPLICANT, ATTORNEY OR AGENT REQUIRED			
Name (Print/Type)	John P. Schnurer	Registration No. (Attorney/Agent)	52,196
Signature	<i>John P. Schnurer</i>	Date	December 14, 2006

CERTIFICATE OF MAILING OR TRANSMISSION			
I hereby certify that this correspondence is being deposited with the United States Postal Service as first class mail in an envelope addressed to Mail Stop RCE, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450 or facsimile transmitted to the U.S. Patent and Trademark Office on the date shown below.			
Name (Print/Type)	Julie H. Giordano	Date	December 14, 2006
Signature	<i>Julie H. Giordano</i>	Date	December 14, 2006



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PTO/SB/14 (08-05)
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 U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	19146-005001
		Application Number	11/249,009
Title of Invention	Human Interface Input Acceleration System		
<p>The application data sheet is part of the provisional or nonprovisional application for which it is being submitted. The following form contains the bibliographic data arranged in a format specified by the United States Patent and Trademark Office as outlined in 37 CFR 1.76. This document may be completed electronically and submitted to the Office in electronic format using the Electronic Filing System (EFS) or the document may be printed and included in a paper filed application.</p>			


Secrecy Order 37 CFR 5.2

Portions or all of the application associated with this Application Data Sheet may fall under a Secrecy Order pursuant to 37 CFR 5.2 (Paper filers only. Applications that fall under Secrecy Order may not be filed electronically.)



Applicant Information:

Applicant 1					
Applicant Authority		<input checked="" type="radio"/> Inventor		<input type="radio"/> Legal Representative under 35 U.S.C. 117	
				<input type="radio"/> Party of Interest under 35 U.S.C. 118	
Prefix	Given Name	Middle Name	Family Name	Suffix	
	Elaine		Chen		
Residence Information (Select One)					
		<input checked="" type="radio"/> US Residency		<input type="radio"/> Non US Residency	
				<input type="radio"/> Active US Military Service	
City	Arlington	State/Province	MA	Country of Residence i	US
Citizenship under 37 CFR 1.41(b) i		US			
Mailing Address of Applicant:					
Address 1	118 Thorndike Street				
Address 2					
City	Arlington	State/Province	MA		
Postal Code	02474	Country i	US		
Applicant 2					
Applicant Authority		<input checked="" type="radio"/> Inventor		<input type="radio"/> Legal Representative under 35 U.S.C. 117	
				<input type="radio"/> Party of Interest under 35 U.S.C. 118	
Prefix	Given Name	Middle Name	Family Name	Suffix	
	Rob		Podoloff		
Residence Information (Select One)					
		<input checked="" type="radio"/> US Residency		<input type="radio"/> Non US Residency	
				<input type="radio"/> Active US Military Service	
City	Framingham	State/Province	MA	Country of Residence i	US
Citizenship under 37 CFR 1.41(b) i		US			
Mailing Address of Applicant:					
Address 1	20 Gaslight Lane				
Address 2					
City	Framingham	State/Province	MA		
Postal Code	01702	Country i	US		
Applicant 3					
Applicant Authority		<input checked="" type="radio"/> Inventor		<input type="radio"/> Legal Representative under 35 U.S.C. 117	
				<input type="radio"/> Party of Interest under 35 U.S.C. 118	
Prefix	Given Name	Middle Name	Family Name	Suffix	
	Lorraine		Wheeler		
Residence Information (Select One)					
		<input checked="" type="radio"/> US Residency		<input type="radio"/> Non US Residency	
				<input type="radio"/> Active US Military Service	
City	Billerica	State/Province	MA	Country of Residence i	US

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Application Data Sheet 37 CFR 1.76		Attorney Docket Number	19146-005001	
		Application Number		
Title of Invention	Human Interface Input Acceleration System			
Citizenship under 37 CFR 1.41(b) i	US			
Mailing Address of Applicant:				
Address 1	105 Dudley Rd			
Address 2				
City	Billerica	State/Province	MA	
Postal Code	01821	Country ⁱ	US	
Applicant 4				
Applicant Authority	<input checked="" type="radio"/> Inventor	<input type="radio"/> Legal Representative under 35 U.S.C. 117	<input type="radio"/> Party of Interest under 35 U.S.C. 118	
Prefix	Given Name	Middle Name	Family Name	Suffix
	Beth	Marcus		
Residence Information (Select One) <input checked="" type="radio"/> US Residency <input type="radio"/> Non US Residency <input type="radio"/> Active US Military Service				
City	Bedford	State/Province	MA	Country of Residence ⁱ
				US
Citizenship under 37 CFR 1.41(b) i	US			
Mailing Address of Applicant:				
Address 1	2 Donovan Drive			
Address 2				
City	Bedford	State/Province	MA	
Postal Code	01730	Country ⁱ	US	
All Inventors Must Be Listed - Additional Inventor Information blocks may be generated within this form by selecting the Add button. 				

Correspondence Information:

Enter either Customer Number or complete the Correspondence Information section below. For further information see 37 CFR 1.33(a).	
<input type="checkbox"/> An Address is being provided for the correspondence information of this application.	
Customer Number	20985
Email Address	 

Application Information:

Title of the Invention	Human Interface Input Acceleration System		
Attorney Docket Number	19146-005001	Small Entity Status Claimed	<input checked="" type="checkbox"/>
Application Type	Nonprovisional		
Subject Matter	Utility		
Suggested Class (if any)		Sub Class (if any)	
Suggested Technology Center (if any)			
Total Number of Drawing Sheets (if any)	13	Suggested Figure for Publication (if any)	

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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	19146-005001
	Application Number	
Title of Invention	Human Interface Input Acceleration System	

Publication Information:	
<input type="checkbox"/>	Request Early Publication (Fee required at time of Request 37 CFR 1.219)
<input type="checkbox"/>	Request Not to Publish. I hereby request that the attached application not be published under 35 U.S.C. 122(b) and certify that the invention disclosed in the attached application has not been and will not be the subject of an application filed in another country, or under a multilateral agreement, that requires publication at eighteen months after filing.

Representative Information:

Representative information should be provided for all practitioners having a power of attorney in the application. Providing this information in the Application Data Sheet does not constitute a power of attorney in the application (see 37 CFR 1.32). Enter either Customer Number or complete the Representative Name section below. If both sections are completed the Customer Number will be used for the Representative Information during processing.			
Please Select One:	<input checked="" type="radio"/> Customer Number	<input type="radio"/> US Patent Practitioner	<input type="radio"/> US Representative (37 CFR 11.9)
Customer Number	20985		

Domestic Priority Information:

This section allows for the applicant to claim benefit under 35 U.S.C. 119(e), 120, 121, or 365(c). Providing this information in the application data sheet constitutes the specific reference required by 35 U.S.C. 119(e) or 120, and 37 CFR 1.78(a)(2) or CFR 1.78(a)(4), and need not otherwise be made part of the specification.			
Prior Application Status		<input type="button" value="Remove"/>	
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)
Additional Domestic Priority Data may be generated within this form by selecting the Add button.			

Foreign Priority Information:

This section allows for the applicant to claim benefit of foreign priority and to identify any prior foreign application for which priority is not claimed. Providing this information in the application data sheet constitutes the claim for priority as required by 35 U.S.C. 119(b) and 37 CFR 1.55(a).			
<input type="button" value="Remove"/>			
Application Number	Country ⁱ	Parent Filing Date (YYYY-MM-DD)	Priority Claimed
			<input type="radio"/> Yes <input type="radio"/> No
Additional Foreign Priority Data may be generated within this form by selecting the Add button.			

Assignee Information:

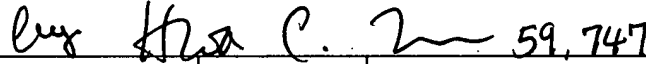
Providing this information in the application data sheet does not substitute for compliance with any requirement of part 3 of Title 37 of the CFR to have an assignment recorded in the Office.	
Assignee 1	
If the Assignee is an Organization check here.	<input checked="" type="checkbox"/>

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	19146-005001
		Application Number	
Title of Invention	Human Interface Input Acceleration System		

Organization Name	Zeetoo, Inc.		
Mailing Address Information:			
Address 1	P.O. Box 882		
Address 2			
City	Bedford	State/Province	MA
Country	US	Postal Code	01730
Phone Number		Fax Number	
Email Address			
Additional Assignee Data may be generated within this form by selecting the Add button.			

Signature:

A signature of the applicant or representative is required in accordance with 37 CFR 1.33 and 10.18. Please see 37 CFR 1.4(d) for the form of the signature.					
Signature				Date (YYYY-MM-DD)	2006-11-21
First Name	John P.	Last Name	Schnurer	Registration Number	52196

This collection of information is required by 37 CFR 1.76. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 23 minutes to complete, including gathering, preparing, and submitting the completed application data sheet form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. **DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**



IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant: Beth Marcus, et al Art Unit: 2629
Serial No.: 11/249,009 Examiner: Ricardo Osorio
Filed: October 11, 2005 Conf. No.: 9446
Title: HUMAN INTERFACE INPUT ACCELERATION SYSTEM

MAIL STOP AF

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

INFORMATION DISCLOSURE STATEMENT

Applicants request consideration of the references listed on the attached PTO-1449 form.
Copies of foreign patent documents and/or non-patent literature and listed articles are enclosed.

This statement is being filed after a Notice of Allowance, but before payment of the issue fee. Please apply the \$180 late submission fee of §1.17(p) and any other charges or credits to Deposit Account No. 06-1050.

Respectfully submitted,

Date: December 14, 2006

Handwritten signature of John P. Schnurer and handwritten number 59,747.

Fish & Richardson P.C.
12390 El Camino Real
San Diego, California 92130
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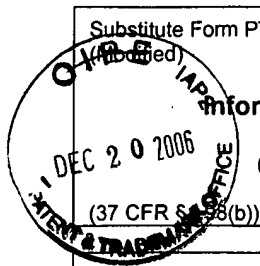
I hereby certify under 37 CFR §1.8(a) that this correspondence is being deposited with the United States Postal Service as first class mail with sufficient postage on the date indicated below and is addressed to the Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

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December 14, 2006
Date of Deposit

Handwritten signature of Julie H. Giordano
Signature

Julie H. Giordano
Typed or Printed Name of Person Signing Certificate



Substitute Form PTO-1449 (If needed)	U.S. Department of Commerce Patent and Trademark Office	Attorney's Docket No. 19146-005001	Application No. 11/249,009
Information Disclosure Statement by Applicant (Use several sheets if necessary) (37 CFR § 1.318(b))		Applicant Beth Marcus, et al	
		Filing Date October 11, 2005	Group Art Unit 2819

U.S. Patent Documents

Examiner Initial	Desig. ID	Document Number	Publication Date	Patentee	Class	Subclass	Filing Date If Appropriate
	AA	RE37723	6/4/2002	Michael Goren			
	AB	2003/193418	10/16/2003	Shi			
	AC	2003/169188	9/11/2003	Chang et al.			
	AD	2002/163504	11/7/2002	Pallakoff			
	AE	2003/061103	3/27/2003	Kanai			
	AF	2003/020692	1/30/2003	Griffin, et al.			
	AG	4,793,312	12/27/1988	Doinaga et al.			
	AH	4,867,028	09/19/1989	Peter S. Jones			
	AI	4,891,777	01/02/1990	James M. Lapeyre			
	AJ	4,896,554	01/30/1990	Craig F. Culver			
	AK	4,912,462	03/27/1990	Washizuka et al.			
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	AO	5,473,325	12/05/1995	Peter J. McAlindon			
	AP	5,512,919	04/30/1996	Yoshitsugu Araki			
	AQ	5,612,690	03/18/1997	David Levy			
	AR	5,782,642	7/21/1998	Michael Goren			
	AS	5,824,931	10/20/1998	M. G. Papadopoulos			
	AT	5,859,629	01/12/1999	Bruce Tognazzini			
	AU	5,900,864	05/04/1999	Bruce W. Macdonald			
	AV	5,973,621	10/26/1999	David Levy			
	AW	6,005,496	12/21/1999	Hargreaves et al.			
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	AZ	6,184,804	02/06/2001	Shelton E. Harrison			
	BA	6,219,731	4/17/2001	Howard A. Gutowitz			

Examiner Signature	Date Considered
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EXAMINER: Initials citation considered. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

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	Applicant Beth Marcus, et al		
	Filing Date October 11, 2005		Group Art Unit 2819

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Examiner Initial	Desig. ID	Document Number	Publication Date	Patentee	Class	Subclass	Filing Date If Appropriate
	BB	6,228,709	5/8/2001	Wen-Yi Hsieh			
	BC	6,232,956	05/15/2001	Daniel S. Mailman			
	BD	6,377,685	04/23/2002	Ravi C. Krishnan			
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	BF	6,520,699	02/18/2003	Toshiyasu Abe			
	BG	6,541,715	04/01/2003	Philip Swanson			
	BH	6,542,091	04/01/2003	Wayne Allen Rasanen			
	BI	6,546,239	04/08/2003	Pazdersky et al.			
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	BL	6,654,733	11/25/2003	Goodman et al.			
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	BN	6,738,045	5/18/2004	Hinkley et al.			
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	BR	6,885,317	4/26/2005	Howard A. Gutowitz			
	BS	6,885,318	4/26/2005	Matthew J. Bickerton			
	BT	6,911,608	6/28/2005	David H. Levy			
	BU	6,980,200	12/27/2005	Michael Goren			

Foreign Patent Documents or Published Foreign Patent Applications								
Examiner Initial	Desig. ID	Document Number	Publication Date	Country or Patent Office	Class	Subclass	Translation	
							Yes	No
	BV	1103883	5/30/2001	EPO				
	BW	0585730	3/9/1994	EPO				
	BX	03/042805	5/22/2003	WIPO				

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	Applicant Beth Marcus, et al		
	Filing Date October 11, 2005		Group Art Unit 2819

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Examiner Initial	Desig. ID	Document
	CA	BUXTON, B., "A Directory of Sources for Input Technologies," Input Devices Sources & Resources, October 1, 2003, retrieved from the internet at http://www.billbuxton.com/InputSources.html , on October 31, 2003, pp. 1-48.
	CB	BROOKS, M., "Introducing the Dvorak Keyboard," July 8, 2000, retrieved from the internet at http://www.mwbrooks.com/dvorak , on October 31, 2003, pp. 1-2.
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	CD	BUXTON, W., et al., "Human Input to Computer Systems: Theories, Techniques and Technology," 2002, retrieved from the internet at http://billbuxton.com/inputManuscript.html , on October 31, 2003, pp. 1-4.
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	CM	WIGDOR, D., et al., "A Comparison of Consecutive and Concurrent Input Text Entry Techniques for Mobile Phones," Conference on Human Factors, April 24-29, 2004, Volume 6, Number 1, pp. 81-88, found on the internet at http://portal.acm.org/citation.cfm?id=985703 http://www.dgp.toronto.edu/~ravin/papers/chi2004_concurrenttextinput.pdf
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	CO	LYONS, K., "Everyday Wearable Computer Use: A Case Study of an Expert User," In Proceedings of Mobile HCI 2003, pages 61--75, 2003, found on the internet at http://www.cc.gatech.edu/ccg/publications/everyday_case.pdf
	CP	LYONS, K., etl al., "Twiddler Typing: One-Handed Chording Text Entry for Mobile Phones," Proc. Conf. Human Factors in Computing Systems (SIGCHI 01), ACM Press, 2004, pp. 671-678, found on the internet at http://www.cc.gatech.edu/fac/Thad.Starner/p/030_10_MTE/twiddler-chi04.pdf

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	Applicant Beth Marcus, et al		
	Filing Date October 11, 2005		Group Art Unit 2819

Other Documents (include Author, Title, Date, and Place of Publication)		
Examiner Initial	Desig. ID	Document
	CQ	WIGDOR, D., et al., "TiltText: Using Tilt for Text Input to Mobile Phones," Proceedings of the 16th Annual ACM Symposium on User Interface Software and Technology, November 02-05, 2003, Vancouver, Canada, pp. 81-90, found on the internet at http://portal.acm.org/citation.cfm?id=964705 http://www.dgp.toronto.edu/~ravin/papers/uist2003_tilttext.pdf
	CR	DUNLOP, M. D., et al., "Dictionary Based Text Entry Method for Mobile Phones," Proceedings of Second Workshop on Human Computer Interaction with Mobile Devices, August 1999, pp. 1-4, found on the internet at http://www.cis.strath.ac.uk/~mdd/research/publications/99dunlopcrossan.pdf
	CS	PAVLOVYCH, A., et al., "Less-Tap: A Fast And Easy-To-Learn Text Input Technique For Phones," Graphics Interface 2003, 97-104, found on the internet at http://www.graphicsinterface.org/cgi-bin/DownloadPaper?name=2003/170/paper170.pdf
	CT	MacKENZIE, S. et al., "Letterwise: Prefix-Based Disambiguation for Mobile Text Input," Proceedings of the 14th Annual ACM Symposium on User Interface Software and Technology, November 11-14, 2001, Orlando, Florida.
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	CV	GOLDSTEIN, M., et al., "The Finger-Joint-Gesture Wearable Keypad," Ericsson Radio Systems AB., pp. 9-18.
	CW	ROSENBERG, R., "Computing without Mice and Keyboards: Text and Graphic Input Devices for Mobile Computing," Ph.D. Thesis, Dept. of Computer Science, University College, London, 1998, pp. 1-201, found on the internet at http://www.obscurer.org/rosenberg/ .
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	CZ	FÄLLMANA, D., et al., "ScrollPad: Tangible Scrolling with Mobile Devices," Proceedings of the Proceedings of the 37th Annual Hawaii International Conference on System Sciences (HICSS'04) - Track 9, p.90286.3, January 05-08, 2004. http://portal.acm.org/citation.cfm?id=963347&coll=GUIDE&dl=GUIDE&CFID=66483658&CFTOKEN=36023921 , found on the internet at http://daniel.fallman.org/resources/papers/fallman-hicss37.pdf
	DA	CHIPMAN, L. E., et al., "SlideBar: Analysis of a Linear Input Device," Behav. Inf. Tech. 23, 1 (Jan. 2004), pp. 1-10, found on the internet at http://portal.acm.org/citation.cfm?id=993182.993184# http://www.cs.umd.edu/Library/TRs/CS-TR-4471/CS-TR-4471.pdf
	DB	DARNAUER, J., "Orientation-based interaction for Mobile Devices," Stanford University, pp. 1-4, found on the internet at http://hci.stanford.edu/srk/cs377a-mobile/project/final/darnauer-garrity-kim.pdf

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	Applicant Beth Marcus, et al		
	Filing Date October 11, 2005		Group Art Unit 2819

Other Documents (include Author, Title, Date, and Place of Publication)

Examiner Initial	Desig. ID	Document
	DC	REKIMOTO, J., "Tilting Operations for Small Screen Interfaces (Tech Note)," Proceedings of the 9th annual ACM symposium on User Interface software and technology, November 06-08, 1996, Seattle, pp. 167-168, found on the internet at http://portal.acm.org/citation.cfm?id=237115&coll=GUIDE&dl=GUIDE&CFID=66483658&CFTOKEN=36023921
	DD	HINCKLEY, K., et al., "Foreground and Background Interaction with Sensor-enhanced Mobile Devices," ACM TOCHI (Transactions on Computer-Human Interaction) Special Issue on Sensor-Based Interaction, Vol. 12, No.1, March 2005, pp. 1-22, found on the internet at http://portal.acm.org/citation.cfm?id=1057240&coll=GUIDE&dl=GUIDE&CFID=66591340&CFOKEN=6294934
	DE	HINCKLEY, K., et al., "Quantitative Analysis of Scrolling Techniques," In Proceedings of the SIGCHI Conference on Human Factors in Computing Systems: Changing Our World, Changing Ourselves (Minneapolis, Minnesota, USA, April 20 - 25, 2002). CHI '02. ACM Press, New York, NY, Volume 4, No. 1, pp. 65-72, http://doi.acm.org/10.1145/503376.503389
	DF	HARRISON, B. L., et al., "Squeeze Me, Hold Me, Tilt me! An Exploration of Manipulative User Interfaces," In Proceedings of the SIGCHI Conference on Human Factors in Computing Systems (Los Angeles, California, United States, April 18 - 23, 1998). C. Karat, A. Lund, J. Coutaz, and J. Karat, Eds. Conference on Human Factors in Computing Systems. ACM Press/Addison-Wesley Publishing Co., New York, NY, pp. 17-24, found on the internet at http://portal.acm.org/citation.cfm?id=274647&coll=Portal&dl=GUIDE&CFID=66588306&CFOKEN=73460863&CFID=66588306&CFOKEN=73460863#
	DG	KAWACHIYA, K., et al., "NaviPoint: An Input Device for Mobile Information Browsing," Proceedings of the SIGCHI conference on Human factors in computing systems, April 18-23, 1998, Los Angeles, California, United States, pp. 1-8, found on the internet at http://portal.acm.org/citation.cfm?id=274645&coll=Portal&dl=GUIDE&CFID=66588306&CFOKEN=73460863
	DH	HINKLEY, K., et al., "Sensing Techniques for Mobile Interaction," UIST 2000: ACM Symposium on User Interface Software and Technology, CHI Letters, Vol. 2 No. 2, pp. 91-100, found on the internet at http://portal.acm.org/citation.cfm?id=354417&coll=GUIDE&dl=GUIDE&CFID=66483658&CFTOKEN=36023921
	DI	BAILLIE, L., et al., "Rolling, Rotating and Imagining in a Virtual Mobile World," In Proceedings of the 7th international Conference on Human Computer interaction with Mobile Devices & Services (Salzburg, Austria, September 19 - 22, 2005). MobileHCI '05, Vol. 111. ACM Press, New York, NY, pp. 283-286, found on the internet at http://doi.acm.org/10.1145/1085777.1085833
	DJ	KARLSON, A. K., et al. "AppLens and LaunchTile: Two Designs for One-Handed Thumb Use on Small Devices," pp. 1-12, found on the internet at http://hcil.cs.umd.edu/trs/2004-37/2004-37.html
	DK	ROTO, V., "Browsing on Mobile Phones," Nokia Research., found on the internet at http://www.research.att.com/~rjana/WF12_Paper1.pdf
	DL	BUCHANAN, L., "The Future of Mobile?" Qualcomm Slingshot, pp. 1-3, found on the internet at http://wireless.ign.com/articles/657/657041p1.html
	DM	WHENHAM, T. O. "Source: New Launches," December 12, 2005, pg. 1, found on the internet at http://www.mobilemag.com/content/100/345/C5578/

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	DN	PILATO, F., Kyocera Candid KX16, August 8, 2005, pg. 1, found on the internet at http://www.mobilemag.com/content/100/340/C4392/
	DO	"Gaming on the go with EXG," XEG Mobile Phone Pad, November 10, 2005, pp. 1-8, found on the internet at http://us.gizmodo.com/gadgets/cellphones/gaming-on-the-go-with-xeg-136414.php http://www.akahabaranews.com/en/news-10615-XEG%2C+the+mobile+phone+pad.html
	DP	Samsung Game Pad – A620, pp. 1-6, found on the internet at http://www.cellphonemall.net/wireless/store/accessorydetail.asp?id=23198&phoneid=334
	DQ	Thumbscript®, pp. 1-6, found on the internet at http://www.thumbscript.com/index.html http://www.thumbscript.com/howitworks.html http://www.thumbscript.com/technotes.html
	DR	Exideas, pp. 1-4, found on the internet at http://www.exideas.com/ME/index.html http://www.exideas.com/ME/HardKey.html
	DS	"KeyStick Text Entry System," NE-Ware, pp. 1-21, found on the internet at http://www.n-e-ware.com/Downloads/KeyStick/330/KSUserManual330_01.pdf
	DT	"MobileTouch Product Brief," Synaptics, pp. 12-2, found on the internet at http://www.synaptics.com/products/pdf/mobiletouch_pb.pdf
	DU	"Solutions > Mobile Phones," Atrua: sensor company, pp. 1-3, found on the internet at http://www.atrua.com/s-mobilephones.html
	DV	"Worlds Smallest Joystick for Mobile Devices," Varatouch: Sensor Company, December 22, 2004, pg. 1, found on the internet at http://www.esato.com/news/article.php?id=388
	DW	Elektex Smart Fabric Touchpads," Eleksen, pp. 1-2, found on the internet at www.eleksen.com
	DX	"Sharp ZTCJ01 Remote Control for Sharp Mobile Phone," Sharp, January 12, 2005, pp. 1-6, found on the internet at http://www.slashphone.com/93/3123.html
	DY	Killer Cell Phone Game Controller, October 14, 2005, pg. 1, found on the internet at http://www.kotaku.com/gaming/cell-phones/killer-cell-phone-game-controller-130968.php
	DZ	COMBEE, B., "Review: CLIE™ Game Controller PEGA-GC10," October 3, 2002. pp. 1-2, found on the internet at http://www.palminfocenter.com/view_story.asp?ID=4295
	EA	"The i-Blue Bluetooth Bluetooth GPS Receiver," January 15, 2006, pg.1, found on the internet at http://mobilitytoday.com/news/005986/mobility_buyGPSnow_i-Blue_bluetooth_GPS
	EB	Alphagrip AG-5 User's Manual, pp. 7, found on the internet at http://www.alphagrips.com/AlphagripAG5UsersManual.pdf
	EC	T9® Adaptive Text Input, pp. 1-4, found on the internet at http://www.tegic.com/pdfs/salesheets/T9%20Adaptive%20Text%20Input%20Sales%20Sheet%201.pdf http://www.tegic.com/pdfs/salesheets/T9%20Adaptive%20Text%20Input%20Sales%20Sheet%202.pdf http://www.tegic.com/pdfs/salesheets/T9%20Adaptive%20Text%20Input%20Sales%20Sheet%203.pdf http://www.tegic.com/pdfs/salesheets/Sloppy%20Type%20Sales%20Sheet.pdf
	ED	Zicorp – eZiTap, pp. 1-3, found on the internet at http://www.zicorp.com/eZiTap.htm
	EE	Motorola – iTAP, pg. 1, found on the internet at http://news.zdnet.co.uk/hardware/mobile/0,39020360,39118435,00.htm

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(37 CFR §1.98(b))			

Other Documents (include Author, Title, Date, and Place of Publication)

Examiner Initial	Desig. ID	Document
	EF	DigitWireless: FastTap, pp. 1-3, found on the internet at http://www.digitwireless.com/flash/download/fastap.pdf
	EG	Microth KeyWheel, pp. 1-4, found on the internet at http://www.microth.com/circumscrip/overview.asp
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EXAMINER: Initials citation considered. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.	

Substitute Form PTO-1449 (Modified) Information Disclosure Statement by Applicant (Use several sheets if necessary) (37 CFR §1.98(b))	U.S. Department of Commerce Patent and Trademark Office	Attorney's Docket No. 19146-005001	Application No. 11/249,009
	Applicant Beth Marcus, et al		
	Filing Date October 11, 2005		Group Art Unit 2819

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European Patent Office
Office européen des brevets



(11) EP 1 103 883 A2

(12) EUROPEAN PATENT APPLICATION

(43) Date of publication:
30.05.2001 Bulletin 2001/22

(51) Int Cl.7: G06F 1/16, G06K 11/18

(21) Application number: 00310527.7

(22) Date of filing: 28.11.2000

(84) Designated Contracting States:
AT BE CH CY DE DK ES FI FR GB GR IE IT LI LU
MC NL PT SE TR
Designated Extension States:
AL LT LV MK RO SI

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(54) Input mode selection on a palmtop computer

(57) A palmtop computer (100) for entering characters using one or more input modes (such as alpha, numeric, caps, punctuation). In one example, a physical sensor is coupled to select the input mode. The physical sensor may be in the form of a button (118, 122, 124, 126, 128), rocker switch (200), dial (402), pressure strip (302, 306), moveable bar (612, 814, 832), or accelerometer mounted to the device. The physical sensor may also be mounted to a pen (900, 1002). In another example, a ridge (502, 512) is formed on the digitizer pad (103) and positioned to define input regions (504, 506) associated with particular input modes. In another example, a border (602) is formed around the digitizer pad. The border includes a ridge (604, 606, 608, 610) coupled to select the input mode. The digitizer pad may also be textured (616). A first textured region (702) may be associated with one input mode and a second textured region (704) may be associated with another input mode.

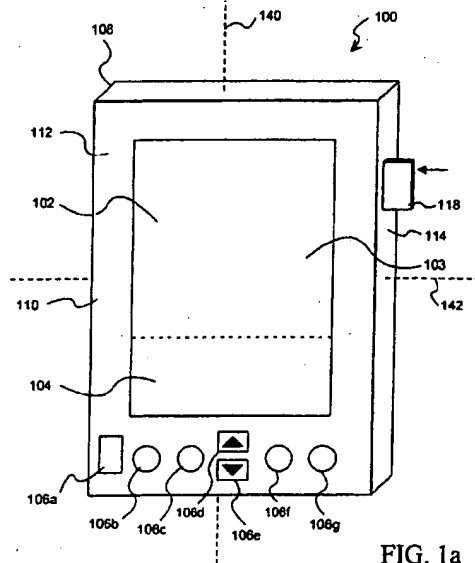


FIG. 1a

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Description

[0001] The present invention relates to the field of palmtop computers and more particularly, though not solely, to the selection of input modes for entering alphanumeric characters on palmtop computers.

[0002] The palmtop computer has evolved as a portable device which provides for easy storage, organization, and recollection of information. Palmtop computers are small, compact computers that generally fit in the palm of a person's hand. The palmtop computer allows for easy operation, as a user simply holds the palmtop computer in one hand (the "non-writing hand") while entering information with the other hand (the "writing hand"). Because of the small size of the palmtop computer, the user may simply place the device in a pocket or briefcase when not in use.

[0003] When the user wishes to enter information, it is desirable to record the information promptly and accurately. Otherwise, a broad range of problems might occur when the user needs to recall the information. A busy professional might miss an important deadline or meeting. A grocery shopper might buy only a portion of the items needed to prepare a meal.

[0004] Conventional palmtop computers generally employ a digitizer pad upon which a user may write with a pen or finger. A handwriting recognition system is generally incorporated to recognize strokes and presses made by the user upon the digitizer pad as individual characters. The handwritten characters are then converted into a machine-readable format such as ASCII code.

[0005] One problem associated with conventional palmtop computers has been the poor performance of handwriting recognition systems. Characters input by the user are often improperly identified. For example, a user may attempt to write the number "1," but the letter "l" is recognized. Similar, the letter "s" may be confused for the number "5." When the user recalls what was entered, the palmtop computer returns the erroneous information. The user must then waste time and energy in attempting to ascertain what he originally wrote.

[0006] Techniques have been developed to differentiate between characters written on the digitizer pad. One way has been to provide for different "modes" of input. In one embodiment, one mode allows for only lowercase letters to be input ("alpha mode"), a second mode is for only uppercase letters ("caps mode"), a third mode is for numbers ("numeric mode"), and a fourth mode is for punctuation ("punctuation mode"). When input modes are used, the number of possible characters which may be confused for a particular stroke is greatly reduced. For example, if alpha mode is selected, the recognition system will not recognize the letter "s" as the number "5." similarly, a lowercase "c" will not be recognized as an uppercase "C."

[0007] Selecting and switching among various input modes using conventional means takes time and effort

on the part of the user. The user must take some action to switch from one mode to another, in addition to the strokes and motions he would otherwise have to make to input the actual characters. For example, some conventional schemes involve the use of "mode change" strokes which the user makes on the digitizer pad to change input modes. These mode change strokes must be interspersed with strokes the user ordinarily would make to enter characters. Such systems present various problems. Additional time is required to make the mode change strokes. The mode change strokes themselves are often confused for input characters. Also, it is often not immediately clear to the user which input mode is being used. The particular mode may be displayed on a display area of the digitizer pad, but the user must still look at the device to determine which mode is active.

[0008] Thus, conventional methods for input mode selection introduce such discontinuities into the input activity that the quality of interaction is reduced. Users often compromise what is input for the ease of inputting it. For example, users may choose not to take the time to capitalize or punctuate when they enter notes because of the time and effort required to change modes. While such informal data entry may be acceptable for personal notes, it may not be acceptable if the user is creating or editing a document that is to be distributed to others.

[0009] The present invention relates to a palmtop computer. Characters may be entered using one or more input modes. The computer includes a casing and a digitizer pad coupled to the casing.

[0010] According to one aspect of the present invention, the computer includes a physical sensor coupled to select an input mode.

[0011] According to another aspect of the present invention, a ridge is formed on the digitizer pad. The ridge is positioned on the pad to define a first input region associated with one input mode and a second input region associated with another input mode.

[0012] According to yet another aspect of the present invention, a border is formed around the digitizer pad. The border includes a ridge coupled to select an input mode.

[0013] According to yet another aspect of the present invention, the digitizer pad has a first textured region associated with one input mode and a second textured region associated with another input mode.

[0014] According to yet another aspect of the present invention, a pen is incorporated. A physical sensor is mounted to the pen and coupled to select an input mode.

[0015] Particular embodiments of the present invention will now be described with reference to the accompanying drawings in which:-

Fig. 1a is a front view of a palmtop computer 100 constructed according to an exemplary embodiment of the present invention;

Fig. 1b is a top view of a plurality of mechanical buttons, mounted to palmtop computer 100, constructed according to a further exemplary embodiment of the present invention;

Figs. 2a, 2b and 2c are side views of a rocker switch 200, mounted to palmtop computer 100, constructed according to a further exemplary embodiment of the present invention;

Fig. 3 is a front view of a palmtop computer 300 incorporating pressure strips constructed according to a further exemplary embodiment of the present invention.

Fig. 4 is a side view of a dial, mounted to palmtop computer 100, constructed according to a further exemplary embodiment of the present invention;

Figs. 5a and 5b are front views of user input areas 500a and 500b of palmtop computers constructed according to further exemplary embodiments of the present invention;

Figs. 6a, 6b and 6c are front views of user input areas 600a, 600b and 600c of palmtop computers constructed according to further exemplary embodiments of the present invention;

Figs. 7a and 7b are front views of user input areas 700a and 700b of palmtop computers constructed according to further exemplary embodiments of the present invention;

Figs. 8a and 8b are partial front views of palmtop computers 800a and 800b with moveable bars constructed according to exemplary embodiments of the present invention;

Fig. 9 shows an exemplary pen 900 for use as part of a palmtop computer system constructed according to a further exemplary embodiment of the present invention; and

Figs. 10a and 10b show exemplary pens 1000a and 1000b for use as part of palmtop computer systems constructed according to further exemplary embodiments of the present invention.

[0016] Fig. 1a shows a palmtop computer 100 which includes a casing 108 made of plastic or any suitable material. Casing 108 has a front panel 110, a left side panel 112, a right side panel 114 and a back panel. Fitted to front panel 110 is a touch sensitive digitizer pad 103 which is capable of detecting presses and movements of a pen or finger. In the embodiment of Fig. 1a, digitizer pad 103 covers a display screen 102 and a user input area 104. Display screen 102 displays information to a user. User input area 104 is used to input text. In one alternative embodiment, digitizer pad 103 covers only user input area 104. In another alternative embodiment, digitizer pad 103 covers a homogenous area which serves as both a display screen and user input area. Other assignments of areas to regions under digitizer pad 103 may be used as should be recognized by those skilled in the art.

[0017] In Fig. 1a, palmtop computer 100 includes a

plurality of mechanical buttons 106a-106g mounted to front panel 110. Buttons 106a-106g provide the user with various functions for operating palmtop computer 100. In the embodiment of Fig. 1a, button 106a is a power button. Buttons 106d and 106e are bi-directional scrolling buttons used to scroll up and down through information shown on display area 102.

[0018] Buttons 106b, 106c, 106f, and 106g are application buttons. In one example, application button 106b is used for a calendar application, application button 106c is used for an address book application, application button 106f is used for a to-do list application, and application button 106g is used for a note pad application. Other applications may be associated with these buttons as will be understood by one skilled in the art. In other exemplary embodiments, buttons 106b, 106c, 106f, and 106g, are generic application buttons which are programmable by the user. Various applications may be assigned to the buttons as designated by the user.

[0019] In one example of palmtop computer 100, when palmtop computer 100 is powered off, pressing any one of application buttons 106b, 106c, 106f, and 106g generates a hardware interrupt signal which is sent to a processor within palmtop computer 100. The hardware interrupt signal "wakes" the processor in the palmtop computer 100 from a "sleep" mode and causes the processor to execute code in a "wake-up" routine. In the wake-up routine, the processor checks a register to determine which application button was pressed.

[0020] When palmtop computer 100 powers up, the default input mode for inputting text in input area 104 is generally alpha mode, although other modes may be programmed by the user as the default input mode. These include but are not limited to caps mode, numeric mode, and punctuation mode.

Using the Non-Writing Hand

[0021] Several exemplary embodiments of the present invention provide for the selection of input modes using the non-writing hand. Some of these embodiments involve one or more physical sensors mounted on the casing of the palmtop computer. The physical sensors are preferably positioned along the sides of the casing to facilitate use by left-handed and right-handed persons. In some embodiments, physical sensors for both types of users are mounted on the same casing. In other embodiments, the physical sensor is positioned for use by either left-handed or right-handed users. For example, in one embodiment, the sensor is mounted on one side of the device for control by one hand, but the user can rotate the device 180 degrees to control the device with the other hand.

[0022] In Fig. 1a, a mechanical button 118 is mounted to casing 108 on right panel 114. The button 118 is preferably positioned along the length of right panel 114 proximate the position of the forefinger or middle finger

of a right-handed user's left hand when holding the device, to facilitate easy switching between modes. A left-handed user may use the same device and switch modes with the thumb of his right hand. In an alternative embodiment, button 118 is positioned along left panel 112 of casing 108, rather than right panel 114. Such is desirable for the left-handed user who holds palmtop computer 100 with his right hand. The user may then operate button 118 with the forefinger or middle finger of his right hand.

[0023] In one exemplary embodiment, button 118 is coupled to the processor within palmtop computer 100. Pressing button 118 sends a signal to the processor instructing the processor to select an input mode. In other exemplary embodiments, software programmed into the processor is used to identify the selection of input modes. In one example, pressing button 118 sends a signal to a register to change one or more status bits representing the particular input mode. Responsive to some external action like lifting the pen, the software checks the status bit and selects the input mode accordingly. In another example, the software simply checks the status bit periodically to determine the input mode. Other implementations for coupling button 118 to select input modes will be recognized by one skilled in the art.

[0024] Particular input modes are selected by pressing mechanical button 118. In one embodiment, successively pressing mechanical button 118 causes computer 100 to cycle through the available input modes: caps, numeric, punctuation, alpha, caps, numeric, etc. In another embodiment, specific combinations or sequences of motions cause system 100 to select particular modes. For example, a press and hold selects caps mode, similar to a "CAPS" key on a typewriter. A double press and hold selects numeric mode. When the button is released, the device returns to alpha mode. Other implementations may be used as should be recognized by the skilled artisan.

[0025] Fig. 1b is a top view of a plurality of mechanical buttons 122, 124, 126, 128 which are mounted to palmtop computer 100. The buttons are mounted along side panel 114 of casing 108, preferably proximate the user's fingers when holding the device. Each of the four mechanical buttons is assigned a particular input mode. In one example, button 122 is designated as alpha mode, button 124 is for caps mode, button 126 is for numeric mode, and button 128 is for punctuation mode. Each of the buttons is coupled to select input modes similar to button 118 of Fig. 1a. In this way, pressing any one of the buttons switches to the respective input mode assigned to that button.

[0026] Figs. 2a-2c illustrate another exemplary embodiment of a physical sensor constructed according to the present invention, in the form of a rocker switch 200. The rocker switch is preferably mounted on a side panel 114 or 112 of palmtop computer 100 and positioned along the side panel similar to mechanical button 118. The rocker switch 200 is coupled to select input modes

for palmtop computer 100, using techniques described above with respect to Figs. 1a and 1b.

[0027] In Fig. 2a, switch 200 sits in a neutral position 202 when not acted upon by external forces. As shown in Fig. 2b, the user may force the switch into an "up" position 204 by rocking the switch in one direction with his finger. As shown in Fig. 2c, the user may also force the switch into a "down" position 206 by rocking the switch in the opposite direction. When the user releases rocker switch 200, the switch springs back to neutral position 202 of Fig. 2a.

[0028] In one exemplary embodiment, alpha mode is selected as the input mode when rocker switch 200 is in neutral position 202. Moving rocker switch 200 to up position 204 changes modes to numeric mode. Rocking the switch 200 down switches to caps input mode. As shown in Fig. 2a, rocker switch 200 may also be pressed into panel 114 to define a "pressed" position 208. Pressing switch 200 in this manner selects another input mode, such as punctuation mode. The various switching configurations discussed above for mechanical button 118 are also applicable to rocker switch 200. Various other assignments of input modes to the available positions for rocker switch 200 are possible, as will be recognized by those skilled in the art.

[0029] In Fig. 3, another embodiment of a physical sensor for switching among input modes is shown. In particular, palmtop computer 300 includes a first pressure strip 302 mounted along first side panel 304 and a second pressure strip 306 mounted along second side panel 308. The pressure strips 302 and 306 are desirably located along the respective side panels such that one of the pressure strips is positioned under the user's fingers and the other pressure strip is positioned under the user's thumb when gripping the device.

[0030] In Fig. 3, the pressure strips 302 and 306 are coupled to select input modes for palmtop computer 300 using hardware and/or software, in similar fashion as described above with respect to the embodiments of Figs. 1a-b, and 2a-c. Preferably, the strips 302 and 306 are coupled such that the computer can detect the activation of both strips, corresponding to the user squeezing the sides of the device with his non-writing hand. In an alternative embodiment, only one pressure strip 302 is mounted on one side panel 304. Pressing the one strip 302, generally while gripping the other side panel 114, selects and switches between input modes.

[0031] In Fig. 4, a dial 402 is mounted to side panel 114 of palmtop computer 100. The dial 402 is positioned along the side panel similar to mechanical button 118 of Fig. 1 or rocker switch 200 of Figs. 2a and 2b. Dial 402 sits in a neutral position 404 when not acted upon by external forces. The dial is moveable to an "up" position 406 by pressing the switch in one direction, and also to a "down" position 408 by pressing the switch in the opposite direction. When the user releases dial 402, the dial returns to neutral position 202.

[0032] Fig. 4 is a side view of a dial 402, mounted to

palmtop computer 100, constructed according to an exemplary embodiment of the present invention. Dial 402 is coupled to select input modes for palmtop computer 100 using similar techniques as described above. Dial 402 rests in a neutral position when not acted upon by external forces. Dial 402 may be rotated in one direction to define an "up" position and in the opposite direction to define a "down" position. Preferably, the up and down positions are offset by about 15 degrees from neutral position. One or more springs are preferably incorporate to cause dial 402 to return to neutral position when the user releases the dial.

[0033] In Fig. 4, dial 402 is configured, in one example, so that neutral position is associated with alpha mode. Moving dial 402 to the up position changes modes to numeric mode, and moving dial 402 to the down position changes the input mode to caps mode. Similar to rocker switch 200, dial 402 may be pressed into side panel 114 to define a pressed position 410 for switching to another input mode, such as punctuation mode. Various other assignments of particular input modes to the available positions for dial 402 are possible, as will be recognized by those skilled in the art.

Haptic Feedback

[0034] In some of the following exemplary embodiments, the input area of the palmtop computer is divided into input mode regions for entering particular kinds of characters. Boundaries between these regions are often delineated by surface textures or ridges, described in more detail below. These boundaries are advantageous as they allow the user to "feel" his way from region to region as he moves a pen or his finger over the input area. The user can thus quickly and easily learn to associate particular input modes with the particular regions so that when using the device, the user will know the region in which he is entering characters without having to look at the device.

[0035] There are several variations on the haptic feedback technique. One variation involves ridges which serve as boundaries to differentiate between input mode regions or zones. In one embodiment, shown in Fig. 5a, a ridge 502 extends vertically across a user input area 500a of a palmtop computer from a top side 508 to a bottom side 510 of input area 500a. In this way, ridge 502 defines a first input zone 504 and a second input zone 506. In an alternative embodiment, (not shown) ridge 502 extends horizontally along input area 500a such that input zones 504 and 506 are defined on upper and lower sides of ridge 502. Ridge 502 is preferably molded as part of the digitizer pad of input area 500a, although ridge 502 may also be formed separately of some suitable material such as plastic and affixed to the digitizer pad by an adhesive.

[0036] In one implementation of input area 500a of Fig. 5a, first input zone 504 is designated as alpha mode, and second input zone 506 is designated as nu-

meric mode. The palmtop computer is programmed so that the regions of the digitizer pad underlying these input zones recognize characters of only that particular mode. Other designations of particular modes may be defined by the user as desired. In addition, a physical sensor such as mechanical button 118 of Fig. 1 may be incorporated to provide for other modes of input. For example, a user may press mechanical button 118 to switch the designations of input zones 504 and 506 from alpha mode and numeric mode to caps mode and punctuation mode, respectively.

[0037] Fig. 5b illustrates an incur area 500b, constructed according to a further exemplary embodiment of the present invention, incorporating a second ridge 512 passing across input area 500b from a left side 514 to a right side 516. Thus, when second ridge 512 is used in conjunction with ridge 502, four input zones are defined. In one example, zone 504 is for alpha mode, zone 506 is for numeric mode, zone 518 is for caps mode, and zone 520 is for punctuation mode. Other designations may be made, as will be recognized by those skilled in the art.

[0038] Fig. 6a illustrates a user input area 600a with a border 602 formed around the input area. The border 602 includes a plurality of ridges 604, 606, 608, 610. A top ridge 604 is positioned along the top of input area 600a, and a bottom ridge 606 lies along the bottom of input area 600a. Left and right ridges 608 and 610 are positioned at the left and right sides of input area 600a, respectively. As shown in Fig. 6a, the ridges 604, 606, 608, 610 have stepped inner edges 612 to provide defined contact points for the user's pen or finger.

[0039] In Fig. 6a, each of the ridges is assigned a particular input mode. In one example, upper ridge 604 is assigned caps mode, and lower ridge 606 is assigned alpha mode. Left ridge 608 is assigned numeric mode, and right ridge 610 is assigned punctuation mode. Other assignments of particular modes to the individual ridges may be programmed by the user, as will be recognized by those skilled in the art. The user can then select the desired input mode by touching the appropriate ridge with the user's pen or finger.

[0040] In one example of the device shown in Fig. 6a, each ridge is made of a pressure sensitive material and coupled to the processor within the palmtop computer independently of the other ridges. Thus, when the user simply touches a particular ridge with a pen or finger, a signal is communicated from that ridge to the processor to select a particular input mode. Alternatively, the selection may be made using software programmed into the processor, as described above. In this example, the ridges may be connected to one another at their respective ends or moveable independent from one another.

[0041] In another example of the device shown in Fig. 6a, each ridge is made of plastic or some similar material and flexible or moveable in a direction away from the opposite ridge on the other side of the input area. In this example, the ridges are preferably not connected to one

another at their respective ends so the ridges can move independently of one another. Each of the ridges is positioned proximate to a pressure or contact sensor. The contact sensors are independently coupled to the palmtop computer processor. A spring or some other expandable device is preferably situated between each ridge and its associated sensor to separate the two during normal operation. To select an input mode, the user activates the appropriate sensor by touching the associated ridge and pressing it into contact with the sensor.

[0042] As shown in Fig. 6a, user input area 600a further includes a relatively smaller inner border 613 formed inside border 602. The inner border 613 may be molded as part of the digitizer pad of input area 600a or formed separately and affixed to the digitizer pad. Inner border 613 is preferably shaped with graded or angled sides similar to ridges 502 and 512 of Figs. 5a and 5b, as opposed to the stepped inner edges 612 of border 602. The inner border 613 thus provides haptic feedback, as the user feels a slight bump when he drags his pen or finger over the inner border towards border 602. In this way, the user can recognize when he is approaching border 602 and avoid inadvertently touching one of ridges 604, 606, 608, 610 when he does not want to change input modes.

[0043] Fig. 6b illustrates another exemplary user input area 600b incorporating border 602 of Fig. 6a for selecting input modes. Border 602 may be realized using the examples described above with respect to Fig. 6a. User input area 600b includes a textured region 616 formed around the input area proximate the ridges that comprise border 602. Textured region 616 provides haptic feedback similar to inner ridge 613. That is, the region provides a warning to the user when he drags his pen or finger close to any of the ridges. The user can recognize when he is approaching border 602 and avoid inadvertently touching one of the ridges to change input modes.

[0044] Fig. 6c illustrates yet another exemplary user input area 600c incorporating ridges. In particular, a top ridge 620 is positioned along the top side of input area 600c, and a bottom ridge 622 is positioned along the bottom of input area 600c. Left and right ridges 624 and 626 are positioned at the left and right sides of input area 600c, respectively. Unlike the stepped ridges of Figs. 6a and 6b, ridges 620, 622, 624, and 626 are shaped with slanted sides similar to ridges 502 and 512 of Figs. 5a and 5b. The ridges of Fig. 6c are preferably moveable independent of one another. Each of ridges 620, 622, 624, and 626 is assigned a particular input mode and coupled to select the mode in similar fashion to the ridges of Figs. 6a and 6b.

[0045] Other exemplary input areas 700a and 700b of palmtop computers constructed according to further embodiments of the present invention are shown in Figs. 7a and 7b, respectively. Input regions 700a and 700b have textured zones or regions to provide haptic feedback so the user can easily determine the region in

which he is writing without having to look at the palmtop computer.

[0046] In Fig. 7a, input area 700a is divided into two input regions, input region 702 and input region 704. The respective regions are demarcated by different textures. In one example, input region 704 has a smooth texture and input region 702 has a relatively rough texture. The palmtop computer is programmed to recognize characters entered in input region 702 as being of one particular mode, and those entered in input region 704 as those of another input mode. In one example, alpha mode is assigned to input region 702, and numeric mode is assigned to input region 704. Other assignments of particular modes to regions 702, 704 may be made as understood by those skilled in the art.

[0047] In Fig. 7b, input area 104 is divided into four regions to provide for additional input regions 706 and 708. Caps mode and punctuation mode are assigned to regions 706 and 708, respectively. Each of input regions 702, 704, 706 and 708 has a distinct texture to distinguish that region from the other regions. The surface textures of Fig. 7b provide haptic feedback as to the particular input region in which the user is writing, so the user can be looking at other things than the palmtop computer when entering characters.

[0048] Fig. 8a is a partial front view of a palmtop computer 800a constructed according to an exemplary embodiment of the present invention. The palmtop computer includes a casing 802 similar to casing 108 of palmtop computer 100 shown in Fig. 1. Fitted to casing 802 is a digitizer pad 803 having a left side 806 and a right side 808. A left trench 810 is formed in an inner wall of casing 802 proximate left side 806 of digitizer pad 803. The left trench 810 runs parallel to left side 806 of digitizer pad 803. Similarly, a right trench 812 is formed in an inner wall of casing 802 proximate to right side 808 of digitizer pad 803 and runs parallel to right side 808.

[0049] In Fig. 8a, a moveable bar 814 is positioned across digitizer pad 803 to define a first input region 804a and a second input region 804b. The palmtop computer 800a is programmed to recognize characters input in region 804a as being of one particular mode such as alpha mode, and characters input in region 804b as of another mode such as caps mode. The bar 814 is made of plastic or any suitably rigid material. In one embodiment, bar 814 is in contact with the user input area, while in other embodiments bar 814 is floating above user input area 804 by the positioning of trenches 810 and 812.

[0050] In Fig. 8a, bar 814 has a left end 816 which fits in left trench 810 and a right end 818 which fits in right trench 812. Two springs are situated on either side of left end 816 in left trench 810. Similarly, two springs are situated on either side of right end 818 in right trench 812. A first pressure sensor 820 is positioned in left trench 810 as shown in Fig. 8a, and a second pressure sensor 822 is positioned as shown in Fig. 8a. Each pressure sensor 820, 822 is coupled to select and switch between modes of input using techniques described

above.

[0051] As the user writes on digitizer pad 803 in input area 804a and input area 804b, he simply pushes bar 814 with his pen or finger in the appropriate direction to select a particular input mode. When the user releases the bar, it springs back to its position as shown in Fig. 8a. In one example, moving bar 814 in the "up" direction to activate pressure sensor 820 selects alpha mode for first input region 804a and caps mode for second input region 804b. Similarly, when bar 814 is pushed in the opposite direction to activate pressure sensor 822, numeric mode is selected for first input region 804a and punctuation mode is selected for second input region 804b. In another example, sensor 820 is used to cycle "up" through a series of input modes with successive presses (e.g., alpha, caps, numeric, punctuation, alpha, etc.), and sensor 822 is for cycling "down" through the input modes (e.g., alpha, punctuation, numeric, caps, alpha, etc.).

[0052] Fig. 8b is a partial front view of another palmtop computer 800b constructed according to an exemplary embodiment of the present invention. Palmtop computer 800b is similar to computer 800a of Fig. 8a in most respects although, in Fig. 8b, movable bar 852 is positioned across digitizer pad 823 substantially perpendicular with respect to bar 814 of Fig. 8a. A top trench 854 is formed in an inner wall of casing 802 proximate a top side 856 of digitizer pad 803. Similarly, a bottom trench 858 is formed in an inner wall of casing 802 proximate to the bottom side 860 of digitizer pad 803.

[0053] In Fig. 8b, moveable bar 852 has ends which fit into trenches 854 and 858. By positioning the bar 852 in this manner, a first input region 862a and a second input region 864b of digitizer pad 803 are defined. Input regions 862 and 864 are designated for entering characters using particular modes of input, similar to input regions 804a and 804b of Fig. 8a. Springs and pressure sensors are positioned in trench 858 similar to trench 810 of Fig. 8a for selecting and switching among various input modes.

Pen Pressure

[0054] Fig. 9 illustrates an exemplary pen 900 for use as part of a palmtop computer system constructed in accordance with a further embodiment of the present invention. The pen 900 includes a retractable tip 902 which is shown in contact with the surface of digitizer pad 103 of the palmtop computer of Fig. 1. A switch 903 is mounted in an inner cavity 904 of pen 900. The switch 903 is in communication with the palmtop computer for selecting and switching among input modes. In one example, communications are supported by a wire coupled between the pen and the palmtop computer. In other examples, wireless communications devices such as RF transmitters and receivers are employed to achieve communications between the pen and palmtop computer.

[0055] When pressure is exerted on pen 900 against the surface of digitizer pad 103, as shown in Fig. 9, tip 902 temporarily retracts into inner cavity 904 of pen 900 until the pressure is released. Retraction of tip 902 activates the switch in inner cavity 904, causing a signal to be sent from pen 900 to the palmtop computer. The signal calls for a particular input mode or changes from one input mode to another. Alternatively, the number of presses may signal a particular input mode.

[0056] In an alternative embodiment, the magnitude of the pressure exerted on the pen controls which input mode is selected. In one example, a "hard" press signals the palmtop computer to change to caps mode. Two hard presses signals the palmtop computer to change to alpha mode. A relatively light press signifies numeric mode. Preferably, the presses are made by tapping the pen on the casing. In other embodiments, the presses are made while writing, preferably at the beginning of a stroke. In these examples, a pressure sensor is mounted in inner cavity 904 instead of the switch to differentiate between the magnitudes of presses.

Active Pens

[0057] In Fig. 10a, a button 1004 is mounted on a pen 1002. Button 1004 is preferably positioned near a writing end 1006 of the pen, as shown in Fig. 10a, such that button 1004 is proximate the user's fingers or thumb when he grips the pen.

[0058] Pressing the button toggles a switch inside pen 1002, causing a signal to be sent to the palmtop computer. Communications between the pen and the palmtop computer are established using techniques similar to those described above with respect to Figs. 9a and 9b. Successive presses of button 1004 cause the computer to cycle through the various input modes, similar to the implementation of mechanical button 118 of Figs. 1a and 1b. Other assignments of button presses and holds to select and switch input modes such as those described above with respect to other embodiments of the present invention, may be implemented as will be appreciated by one skilled in the art.

[0059] In an alternative embodiment, shown in Fig. 10b, a dial 1008 is mounted to the side of pen 1002 in place of button 1004. Rotating the dial causes the palmtop computer to cycle through the various input modes. Pressing dial 1008 selects a particular mode for inputting characters. Other techniques for assigning presses and rotations to select and switch input modes may be implemented as described above, particularly with reference to Figs. 4, 8a, 8b, and 9a.

Tilt Control

[0060] Another exemplary embodiment of a palmtop computer constructed according to the present invention provides for the selection of input modes by tilting the computer in one or more directions. To provide this

functionality, one or more accelerometers are preferably incorporated in the palmtop computer. The ADXL202 accelerometer manufactured by Analog Devices is one model which may be used, although other accelerometers may be used as will be appreciated by one skilled in the art.

[0061] In one embodiment, one or more ADXL202 accelerometers are mounted to casing 108 of palmtop computer 100 of Fig. 1. The accelerometer may be used in place of button 118. The accelerometer or accelerometers are positioned with respect to a longitudinal Y axis 140 and an X axis 142 substantially perpendicular to the Y axis for two-axis tilt sensing. In this way, for example, tilting the computer 100 in one direction (e.g., clockwise) with respect to Y axis 140 selects one input mode, while tilting the computer 100 in the other direction (e.g., counter-clockwise) with respect to Y axis 140 selects another input mode. Similarly, tilting palmtop computer 100 about X axis 142 in clockwise or counter-clockwise directions selects additional input modes. The inclusion and proper positioning of additional accelerometers allows for the selection of additional input modes by tilting the device with respect to the X, Y and other axes. Various assignments of particular input modes to tilting directions may be made, as will be recognized by one skilled in the art.

[0062] The accelerometer or accelerometers are coupled to select input modes using software and/or hardware configurations similar to those described above with respect to other exemplary embodiments of the present invention. Using the ADXL202 accelerometer, digital X and Y output pins are provided which identify the most recent mode selected. These outputs may be coupled directly to the processor within palmtop computer 100 to select and switch input modes. Alternatively, the bits output on the X and Y pins may be clocked and stored as status bits in a register for software-controlled switching.

Audio Feedback

[0063] In the exemplary embodiments described above, audio feedback may be used to signal an input mode change to the user. A speaker mounted to the casing of the palmtop computer serves this purpose. The user can turn on or turn off the speaker, depending on the desired operating environment. In one example, a "beep" is emitted through the speaker anytime the input mode changes. In another example, beeps having different frequencies from one another are associated with the various input modes. The user will know which input mode he has selected upon hearing the particular tone associated with that mode. Such audio feedback facilitates the "heads up" nature of palmtop computers constructed according to the present invention, as the user does not need to look at the device during operation to determine what input mode he has selected.

Conclusion

[0064] The exemplary embodiments described above reduce the task discontinuities associated with conventional palmtop computers which result from having to use specialized strokes to change input modes. The various techniques for selecting input modes and switching among these modes provides for fast, accurate, and easy entering of characters on a palmtop computer. Also, the techniques described above promote a more "heads up" interaction, as the user does not need to look at the palmtop computer when he wants to change modes. The quality of interaction is improved while maintaining the variety of symbols that can be input. Ultimately, the quality of and speed at which documents are produced on handheld devices is improved.

[0065] It should be understood that the particular embodiments described above are only illustrative of the principles of the present invention, and various modifications could be made by those skilled in the art without departing from the scope of the invention.

Claims

1. A palmtop computer (100) for entering characters using an input mode, the computer comprising:
 - a casing (108);
 - a digitizer pad (103) coupled to the casing; and
 - a physical sensor coupled to select the input mode.
2. A palmtop computer as claimed in claim 1, wherein the physical sensor is mounted to the casing.
3. A palmtop computer as claimed in claim 1 or claim 2, wherein the physical sensor is a button (118, 122, 124, 126, 128), or
 - a rocker switch (200), or
 - a dial (402), or
 - a pressure strip (302, 306), or
 - a moveable bar (612, 814, 852), or
 - an accelerometer.
4. A palmtop computer system including the palmtop computer (100) according to claim 1, and further comprising an input pen (900, 1002).
5. A palmtop computer system as claimed in claim 4, wherein the physical sensor is mounted to the pen (900, 1002).
6. A palmtop computer system as claimed in claim 5, wherein the physical sensor is mounted proximate a writing end of the pen (1002), or wherein the physical sensor is a retractable tip (902) of the pen.

7. A palmtop computer system as claimed in claim 5, wherein the physical sensor is a button (1004) or a dial (1008).

8. A palmtop computer (100) for entering characters using a first input mode and a second input mode, the palmtop computer comprising:

a casing (108);
 a digitizer pad (103) coupled to the casing; and a ridge (502, 512) formed on the digitizer pad to define a first input region (504) associated with the first input mode and a second input region (506) associated with the second input mode.

9. A palmtop computer (100) for entering characters using an input mode comprising:

a casing (108);
 a digitizer pad (103) coupled to the casing; and a border (602) formed around the digitizer pad, the border including a ridge (604, 606, 608, 610) coupled to select the input mode.

10. A palmtop computer (100) as claimed in claim 1, wherein the ridge (604, 606, 608, 610) includes pressure sensitive material and/or the ridge is moveable.

11. A palmtop computer (100) for entering characters comprising:

a casing (108);
 a digitizer pad (103) coupled to the casing and having a textured region (616).

12. A palmtop computer as claimed in claim 11, wherein characters are entered using a first input mode and a second input mode, and

wherein the textured region of the digitizer pad is divided into a first textured region (702) associated with the first input mode and a second textured region (704) associated with the second input mode.

13. A palmtop computer (100) for entering characters using an input mode, the palmtop computer comprising:

a casing (108)
 a digitizer pad (103) coupled to the casing; and an accelerometer coupled to select the input mode.

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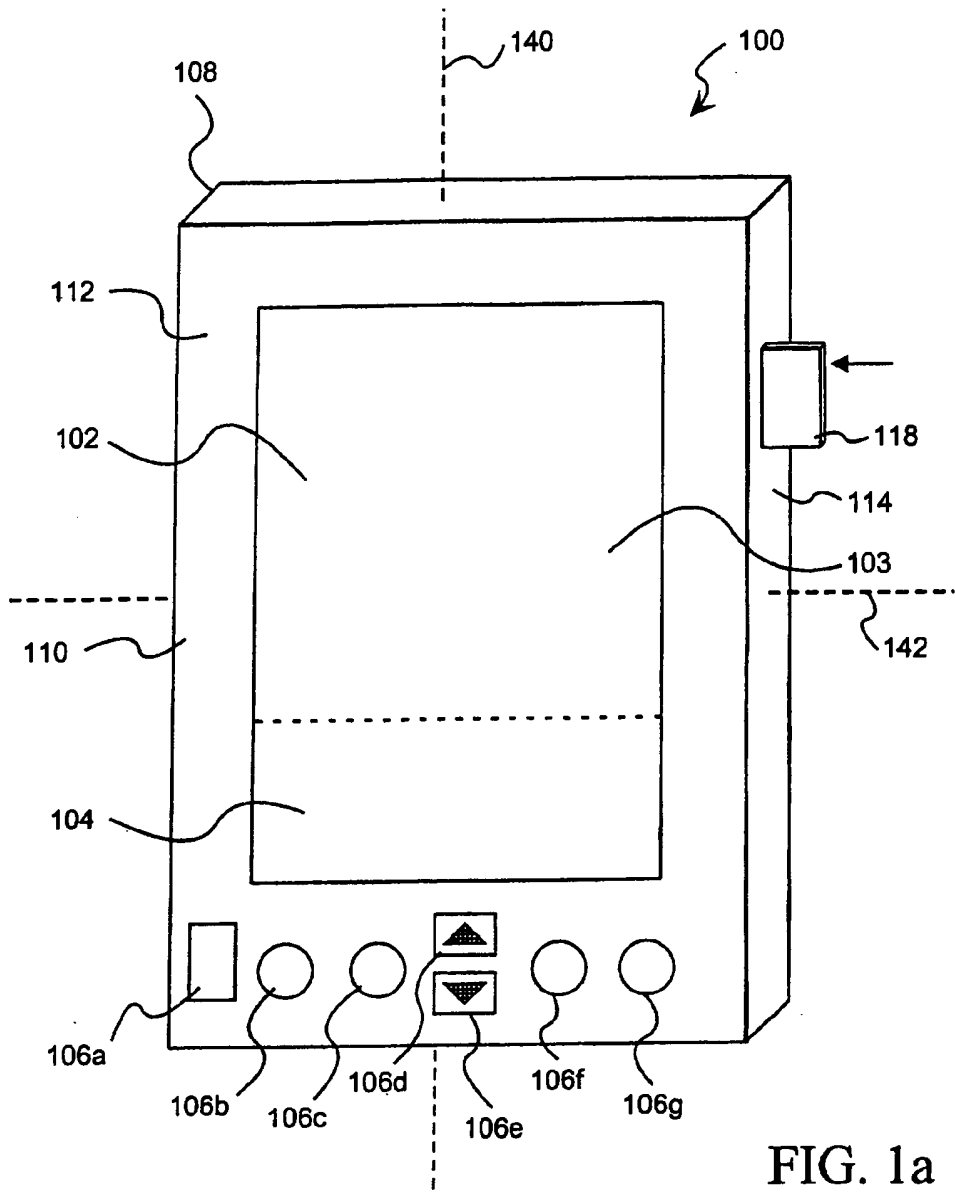


FIG. 1a

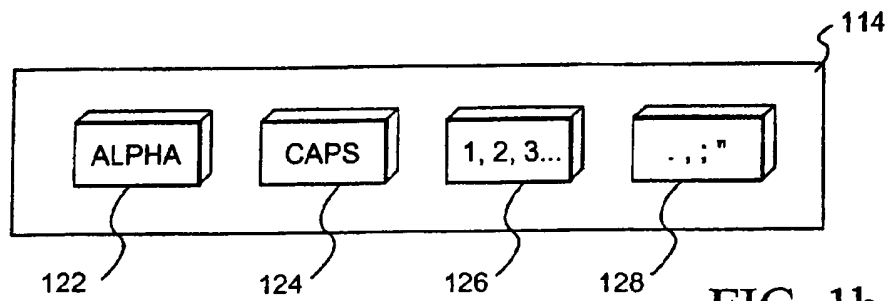


FIG. 1b

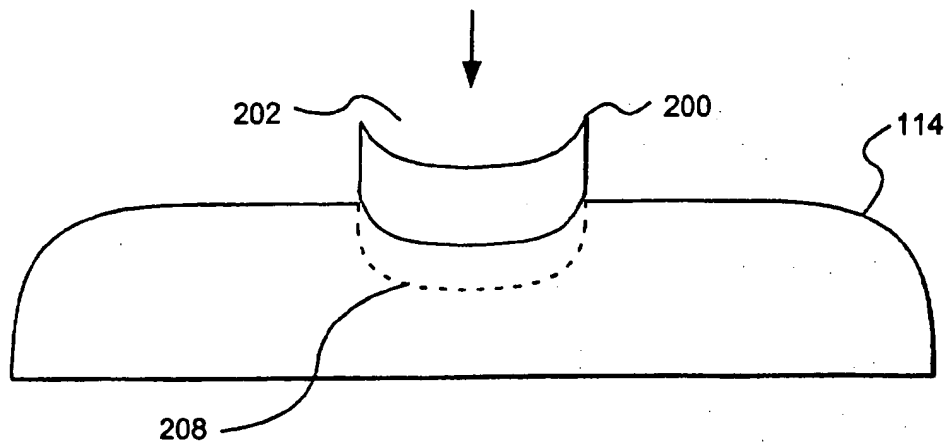


FIG. 2a

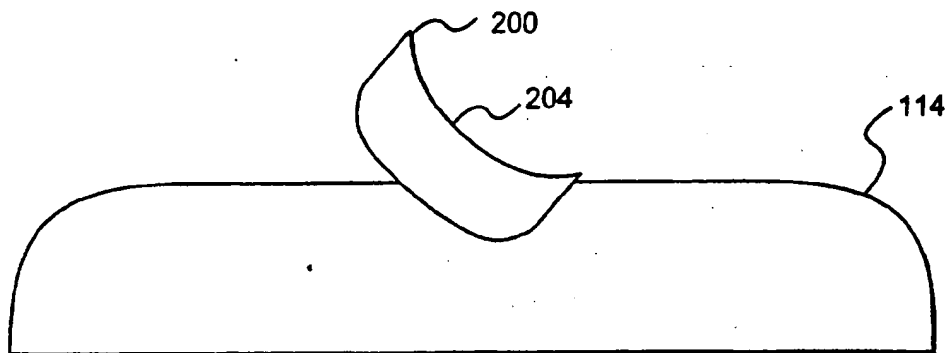


FIG. 2b

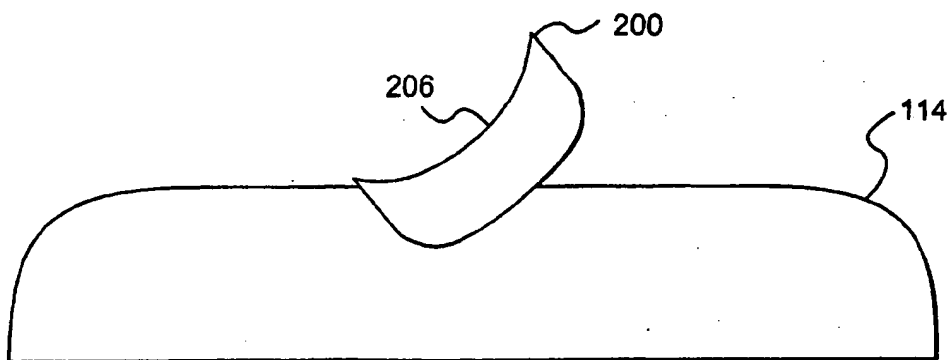


FIG. 2c

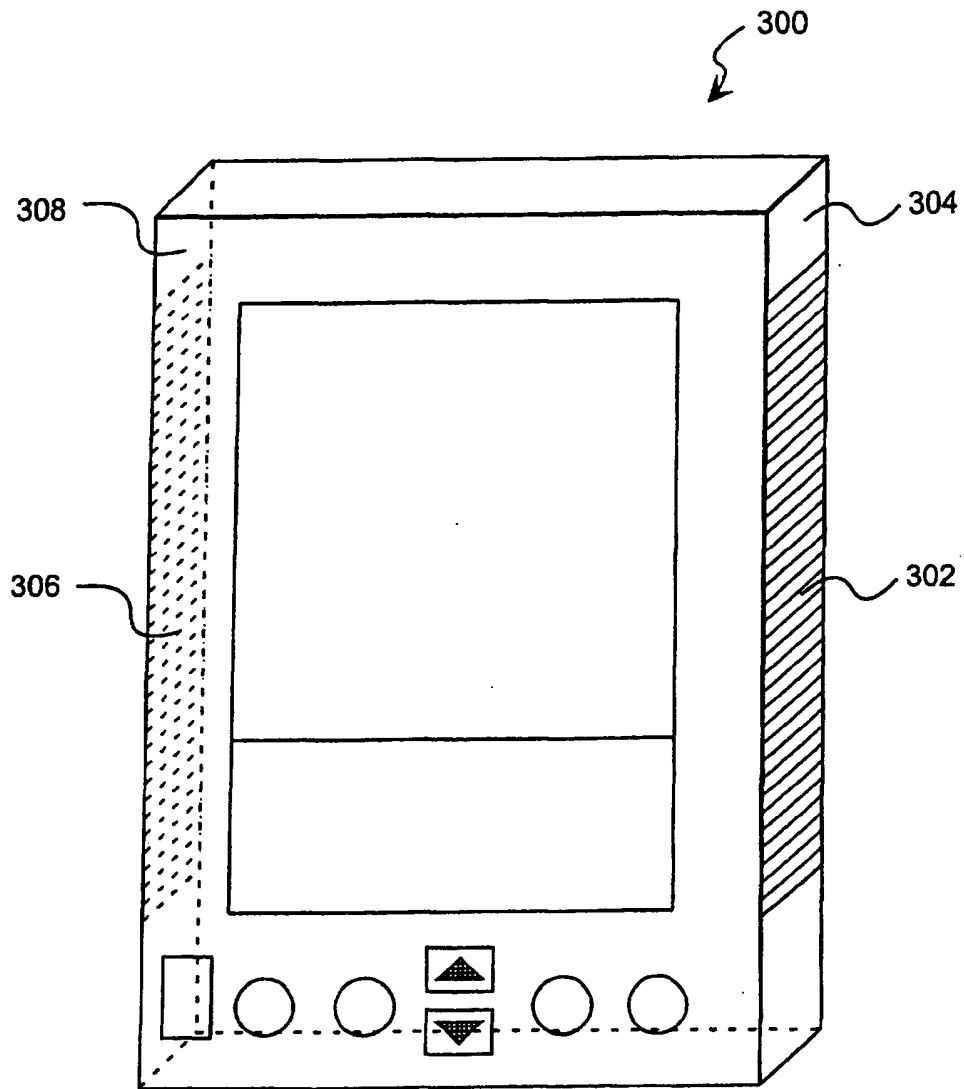


FIG. 3

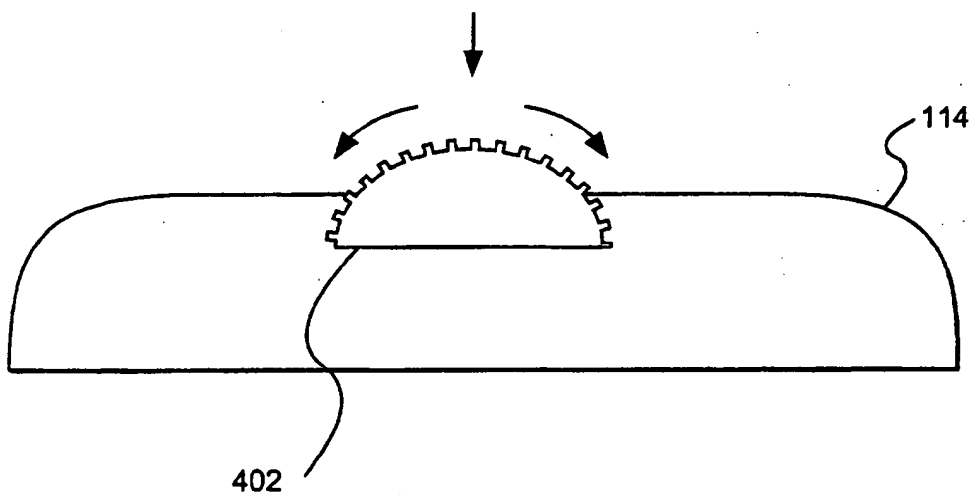


FIG. 4

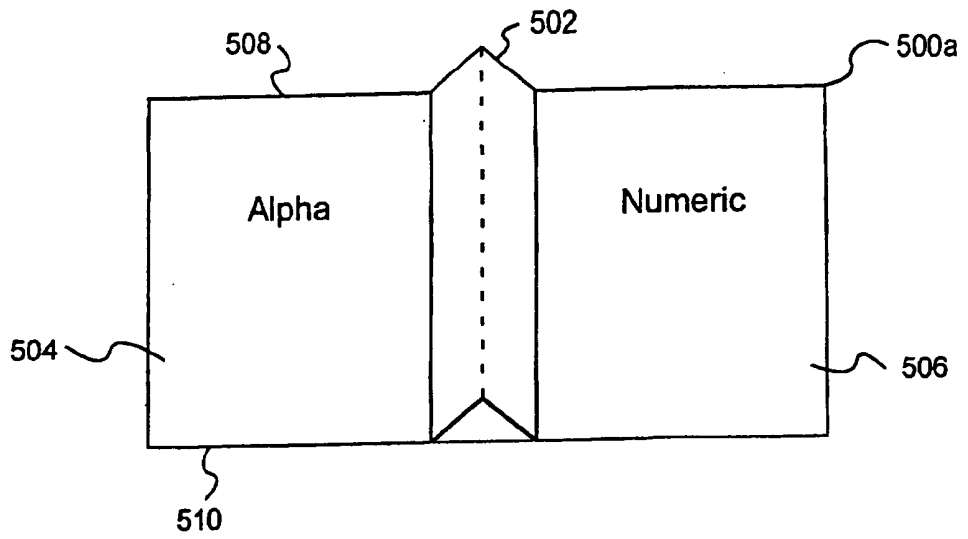


FIG. 5a

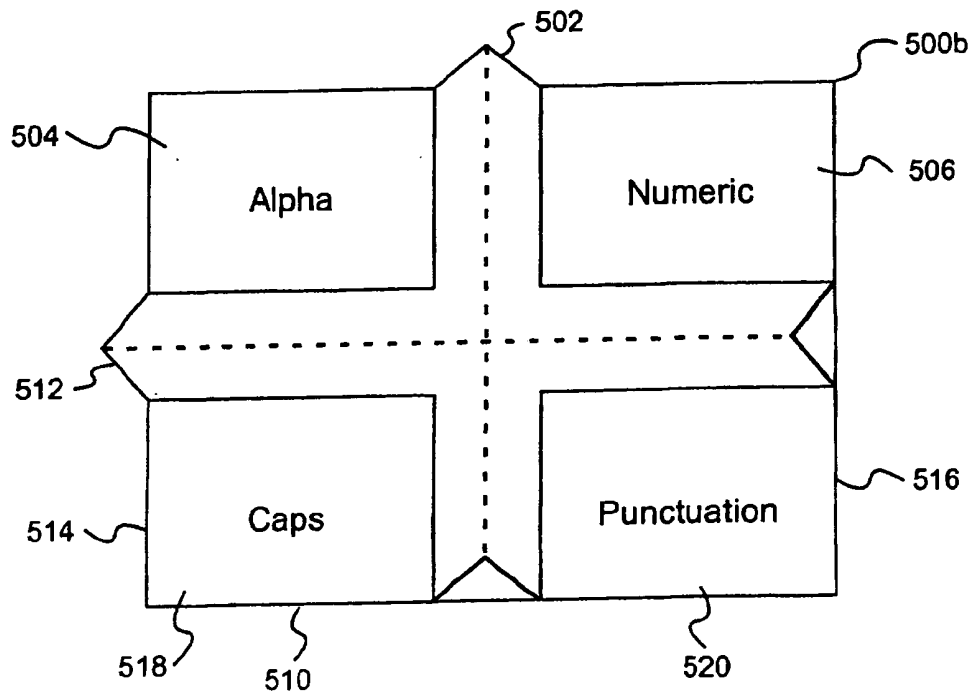


FIG. 5b

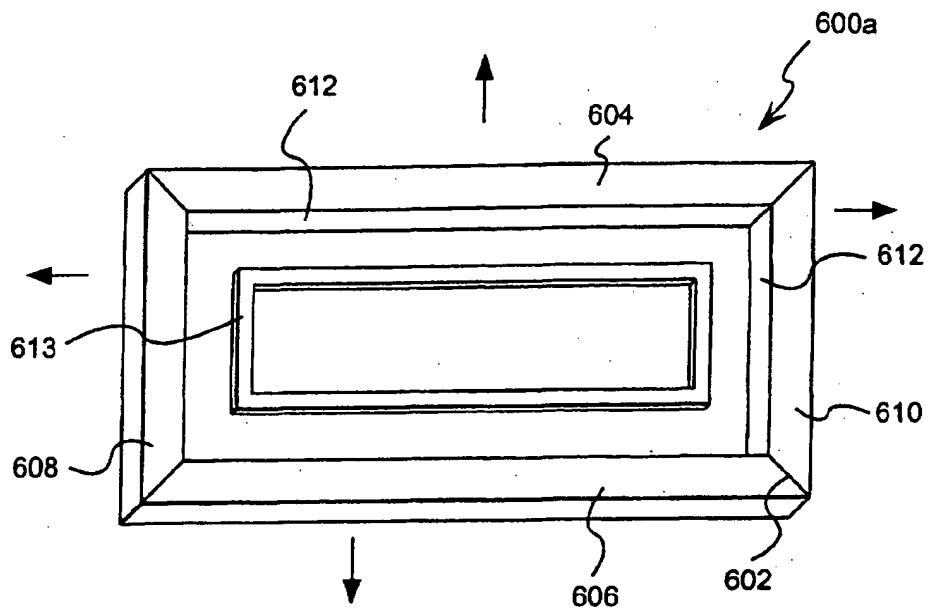


FIG. 6a

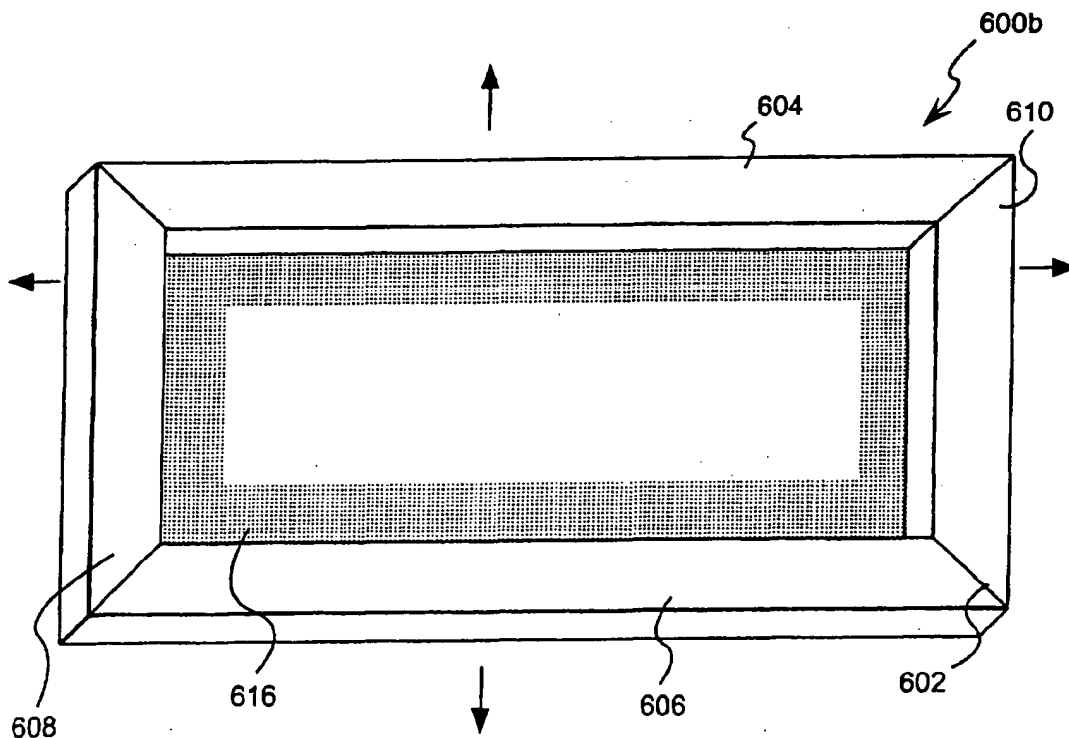


FIG. 6b

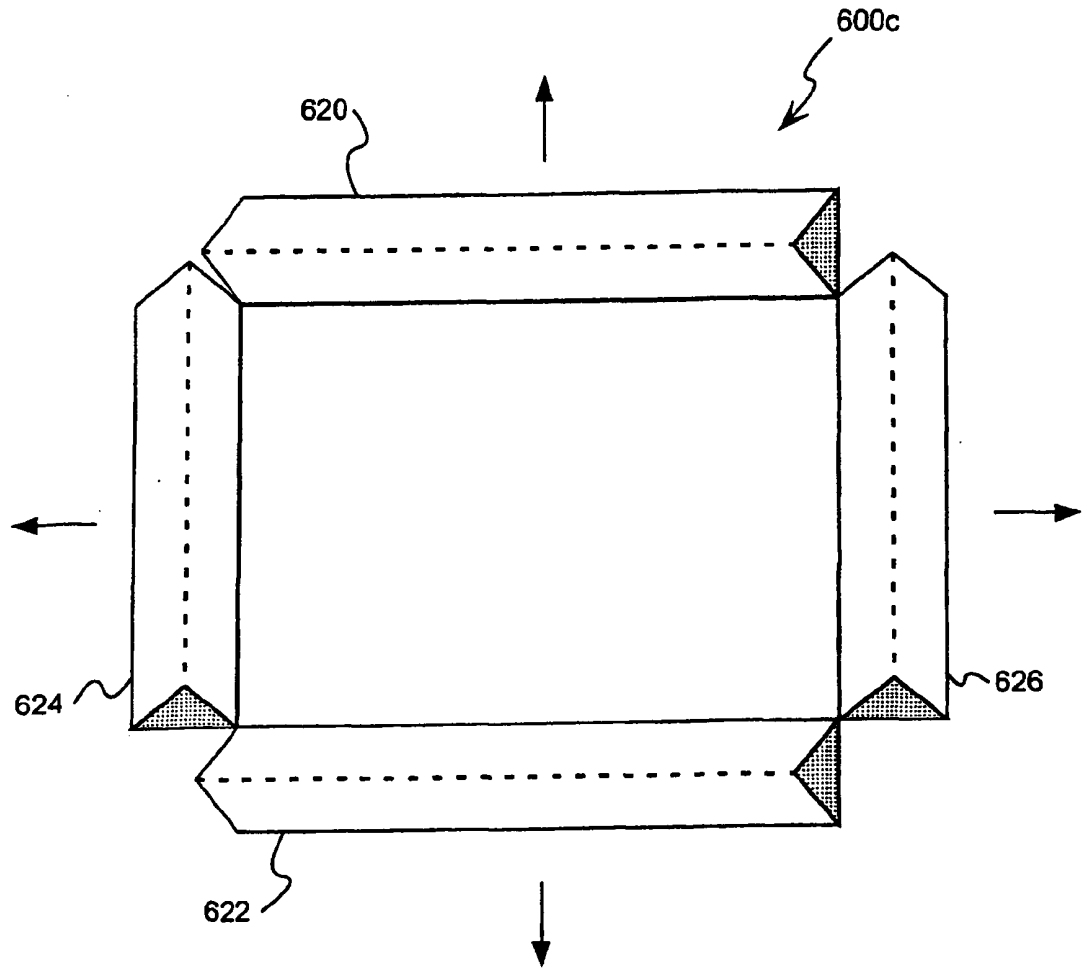


FIG. 6c

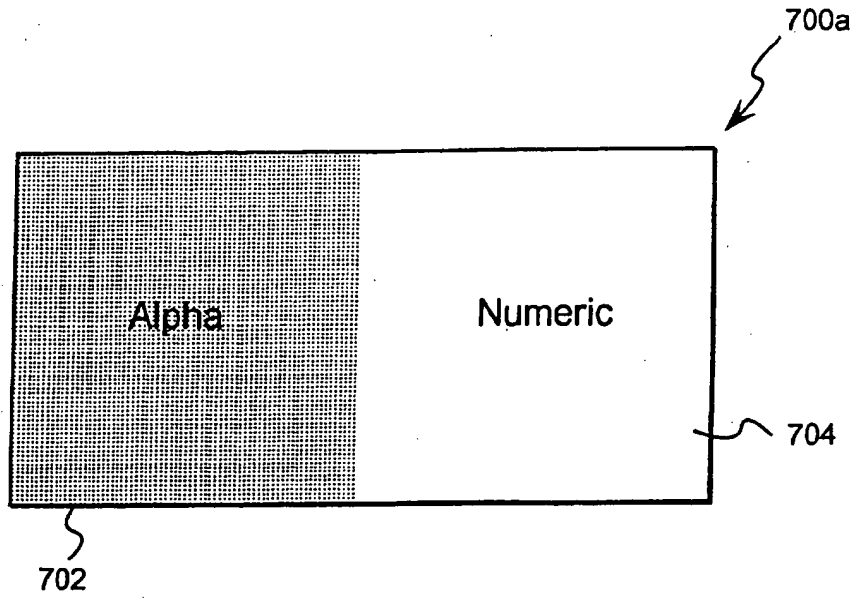


FIG. 7a

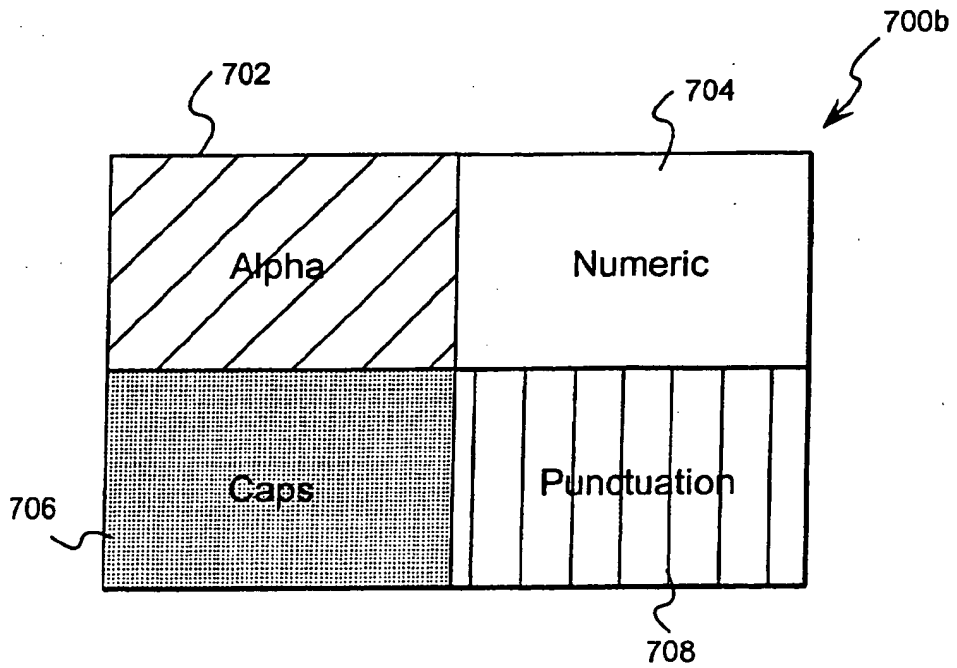


FIG. 7b

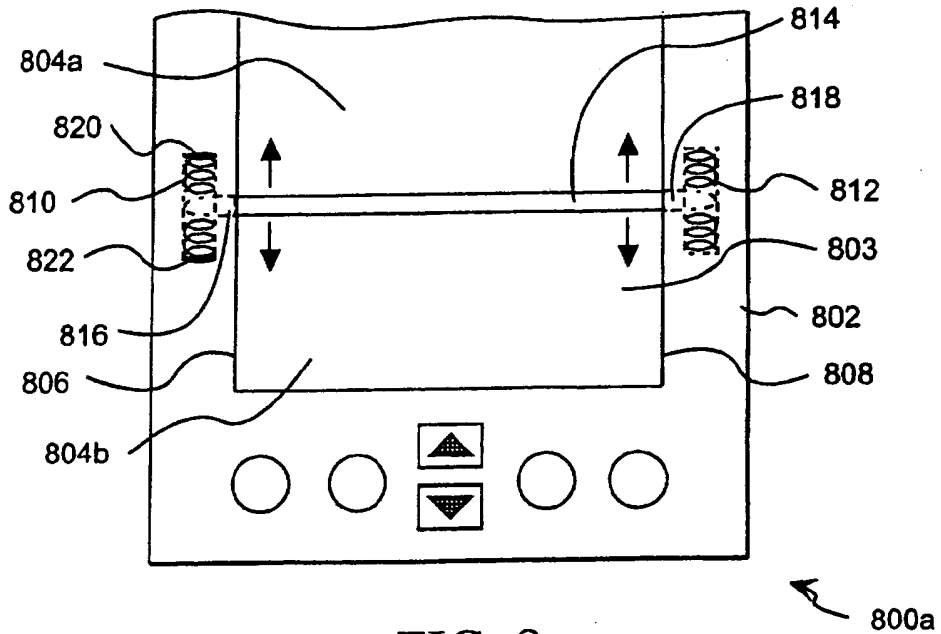


FIG. 8a

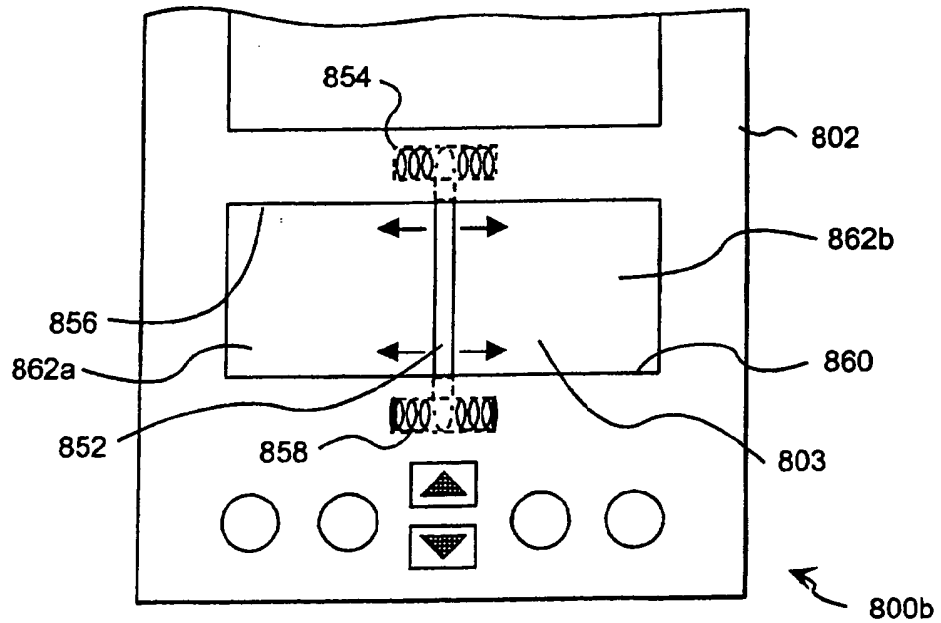


FIG. 8b

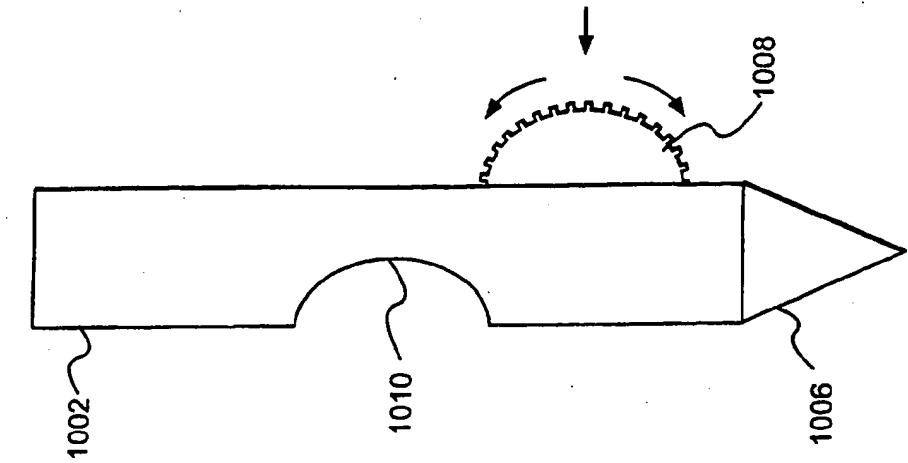


FIG. 10b

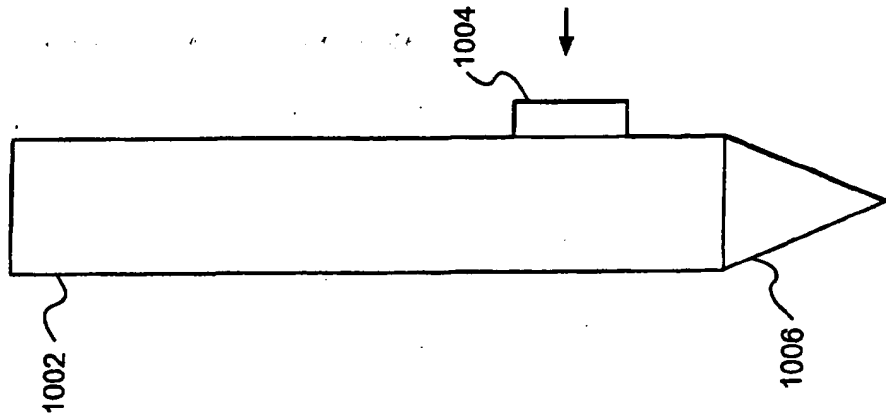


FIG. 10a

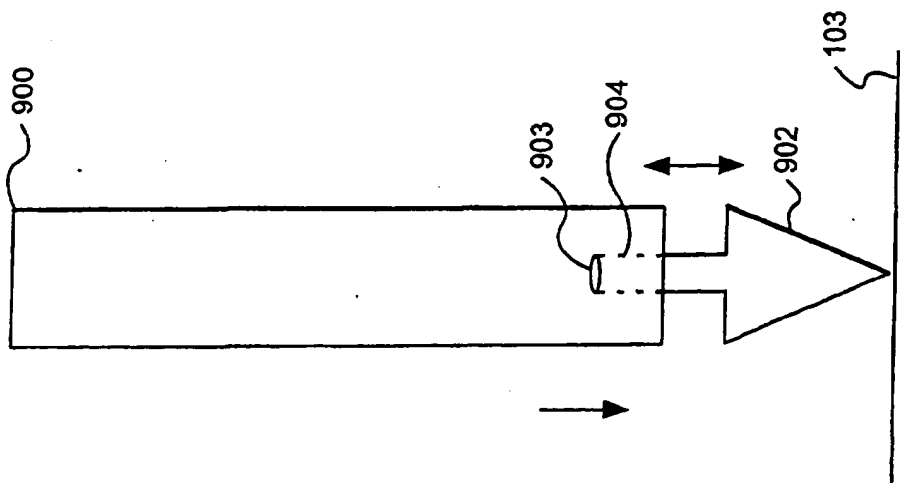


FIG. 9

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(12) **EUROPEAN PATENT APPLICATION**

(88) Date of publication A3:
31.07.2002 Bulletin 2002/31

(51) Int Cl.7: **G06F 1/16, G06K 11/18**

(43) Date of publication A2:
30.05.2001 Bulletin 2001/22

(21) Application number: **00310527.7**

(22) Date of filing: **28.11.2000**

(84) Designated Contracting States:
AT BE CH CY DE DK ES FI FR GB GR IE IT LI LU
MC NL PT SE TR
 Designated Extension States:
AL LT LV MK RO SI

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(54) **Input mode selection on a palmtop computer**

(57) A palmtop computer (100) for entering characters using one or more input modes (such as alpha, numeric, caps, punctuation). In one example, a physical sensor is coupled to select the input mode. The physical sensor may be in the form of a button (118, 122, 124, 126, 128), rocker switch (200), dial (402), pressure strip (302, 306), moveable bar (612, 814, 832), or accelerometer mounted to the device. The physical sensor may also be mounted to a pen (900, 1002). In another example, a ridge (502, 512) is formed on the digitizer pad (103) and positioned to define input regions (504, 506) associated with particular input modes. In another example, a border (602) is formed around the digitizer pad. The border includes a ridge (604, 606, 608, 610) coupled to select the input mode. The digitizer pad may also be textured (616). A first textured region (702) may be associated with one input mode and a second textured region (704) may be associated with another input mode.

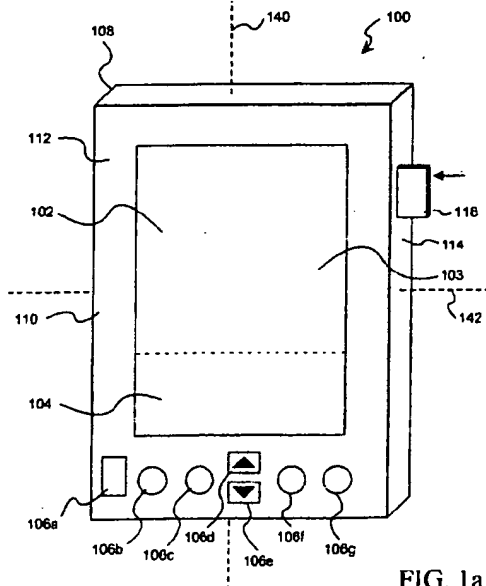


FIG. 1a

EP 1 103 883 A3



European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 00 31 0527

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Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.7)
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The present search report has been drawn up for all claims			
Place of search BERLIN		Date of completion of the search 7 June 2002	Examiner Taylor, P
CATEGORY OF CITED DOCUMENTS		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document	
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EPO FORM 1503 (03.02) (904/01)

ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.

EP 00 31 0527

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Publication number: **0 585 730 A1**

EUROPEAN PATENT APPLICATION

(12) Application number: 93113186.6
 (21) Date of filing: 18.08.93

(51) Int. Cl.⁵: G06F 3/023, G06K 11/18

(30) Priority: 21.08.92 AR 323028
 (43) Date of publication of application: 09.03.94 Bulletin 94/10
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(54) Computer keyboard with dial for entering repetitive data and commands.

(57) A computer keyboard (10) with a dial (30) for entering repetitive commands and data units into a computer system. It is useful for many computer applications, such as programming and file editing, and affords the user an easier, comfortable and straightforward way of replacing repetitive single-key pressing to send bursts of unitary or inverse information to the system. The dial is rotatably mounted on the keyboard frame (12) and has an exposed operating surface (74) which the user may rotate endlessly with just one finger. A rotational transducer (40) senses dial rotation to generate an output signal representing incremental rotation amounts. The keyboard also includes a device (42) for modifying said repeated commands and data units if certain keys (32, 34) are pressed while the dial is being turned.

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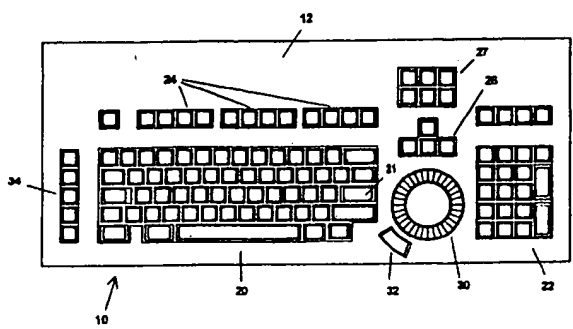


Fig. 1

Field of the Invention

This invention relates to computer input devices, in particular to keyboards. This invention relates to a new computer keyboard comprising additional non-binary means to improve the working condition of a keyboard operator and accelerate some tasks during operation of computer programmes.

A computer keyboard generally comprises a plurality of keys mounted on a substantially horizontal panel, for entering commands and data units (i.e. characters) into a computer or computer display terminal. Each key is mechanically engaged with a binary switch (i.e., on-off switch) configuring a switch array that is periodically scanned by an electronic circuit to sense the key's status and transmit a corresponding code (called scan code) to a computer system, when a change in the switch array status is detected.

Computer keyboards are used in almost any kind of computer application. Compared to other computer peripherals, computer keyboards have not evolved significantly from the first specimen up to the present state of the art, the only changes being limited to varying key layouts and modifications in key shapes and switching mechanisms. At the time of the present invention, we know of no significant keyboard improvements on operational features or functional enhancements.

Computer keyboards generally include: a first group of alphanumeric keys, used for entering textual, numeric and punctuation data, a second group of keys generally called "control keys", used for controlling some programme functions implemented in most of the contemporary programmes (e.g., HOME, END, PAGE UP, DELETE, etc.), a third group comprising general purpose keys, also known as "function keys" (generally labeled F1, F2, F3, etc.) and a fourth group comprising a set of four keys generally called "arrow keys", generally used to select an item from a list, control a cursor's position, etc. In almost all computer keyboards, a special control key generally labeled "ENTER" is also provided, usually used to communicate the computer that a certain data entry or control task is completed.

Background of the Invention

In normal operation of a computer keyboard, communication between operator and machine comprises tasks that may be grouped in two main groups:

1. Data entry tasks, and
2. Control and command tasks.

In operating many contemporary programmes using a computer keyboard, a significant portion of the tasks included in the second group require intensive use of a certain group of keys, generally in a repetitive fashion, in bursts of repeated activation of a single key. This group of keys mainly comprises the arrow keys, and secondly the control and function keys. Moreover, the repetitive bursts generally appear as a sequence of several bursts of repeated activation of keys that have functions inverse to each other (e.g., PAGE UP / PAGE DOWN, ARROW LEFT / ARROW RIGHT, SPACE FORWARD / BACK SPACE, etc.), usually within a successive approximation to a final state.

This phenomenon may be observed in almost any kind of modern computer application, but mainly in highly interactive applications running in personal computers, like programming, text editing, spreadsheet editing, etc. This is primarily because user interfaces had evolved from command line keyword oriented interfaces to more friendly, visual feedback interfaces controlled by a limited group of keys (or alternatively by another kind of computer input device e.g., a mouse).

For example, in former editing applications, a special screen area was assigned to enter programme commands by typing one or more keywords in it. However, contemporary editing applications tend to use a single key to switch a main menu displaying all available command options, and a particular command can be selected by typing the arrow keys repeatedly until a desired option is highlighted. This interface concept has been almost uniformly adopted in the software industry.

On the other hand, when tasks included in the first group are performed, this phenomenon is not as frequent, because the statistical distribution of alphanumeric keystrokes in most applications is substantially constant so that the probability of repeated keystrokes of the same key is far lower.

We have also noted that repeated activation of the same key in a computer keyboard causes an uncomfortable tension in the operator's hands and wrists that frequently causes fatigue in the operator and results in productivity loss. It is believed that this tension excess is due to the lack of movement compensation between fingers and other parts of the hand when performing repetitive typing. This belief is supported by the fact that this tension does not appear when typing a piece of text for instance, which normally has a relatively uniform letter probability distribution function.

A widely used approach for this problem is the auto-repeat method (generally known as "typematic") implemented in almost all computer keyboard application. The auto-repeat method consists in automatically

repeating the scan code corresponding to the key being pressed at a fixed rate, when the key is kept pressed at least for a pre-determined time period.

Although it represents an improvement, significant enough for it to become widely accepted, this method is not all that comfortable and efficient, mainly because the auto-repeat rate is given by a fixed time reference and hence it is not capable of providing speed and precision simultaneously. That is, a high auto-repeat rate sacrifices precision and a low one gives good precision but is slow. This unavoidable speed-precision trade-off leads the operator back to repetitive typing because usually it is the only way to get enough precision in most tasks. Moreover, throughout a certain computer operation session, different auto-repeat speeds are needed depending on the particular task being performed; this is a requirement not satisfied by the auto-repeat method which lacks this flexibility. Still another disadvantage of the auto-repeat method is that the initial period preceding the auto-repetition function produces some uncertainty in the number of repetitions generated. This is because if the delay is too short it may produce undesired keystrokes, and if it is too large, it produces an uncertainty about the instant in which the repetition will begin, reducing the chances of precise control even more.

This accumulation of effects leads average keyboard operators to perform, or at least complete, a lot of operations with repetitive typing, since it appears as mentally less distressing although, in the long run, it strains one physically and psychologically, perhaps unconsciously.

Consequently, there is a need of an improved computer keyboard, capable of performing this kind of operations more efficiently, to improve the work conditions of a computer keyboard operator and enhance productivity.

Disclosure of the Invention

It is a basic object of the present invention to improve the work condition of a computer keyboard operator, replacing vertical up and down finger and hand movements (due to repetitive typing) with a more ergonomic and comfortable movement.

Another object of the present invention is to reduce time spent in some tasks while operating a computer programme with a keyboard.

Another basic object of the present invention is to improve the user interface provided by a computer keyboard, by enhancing its command and data entering capabilities.

Another object of the present invention is to reduce the risk of hand, finger and wrist diseases associated with computer keyboard operation, by providing an improved and more ergonomic way of entering repetitive commands and data.

Another object of the present invention is to provide an improved keyboard having all the features stated above that can be manufactured at a substantially low incremental cost.

Another object of the present invention is to provide a computer keyboard having all the features stated above but substantially maintaining the format and operating characteristics of a conventional keyboard.

According to the invention, the improved keyboard having the features set forth above comprises a conventional keyboard in which the fixed time reference of the auto-repeat function has been replaced by a manually generated timing signal through operation of a dial engaged with a rotation transducer. The dial is rotatably mounted with its rotation axis substantially perpendicular to the keyboard plane, exposing one of its surfaces so as to be engagable by a finger of an operator's hand at a number of radial positions spaced from its centre, so that the sensitivity of the device, i.e., response per finger travel distance, depends on the radial position contacted. In other words, the farther the radial position of finger contact from the centre of the dial, the less sensitive the response to a given amount of finger travel.

A pulsing signal is derived from the output of the rotation transducer representing the angular speed of the dial measured in predetermined incremental angular units, plus an additional binary signal giving the sign of the rotation (i.e., clockwise or counterclockwise). The dial can be rotated endlessly and operated in combination with one or more keys for entering bursts of repeated commands and data units into a computer, the number of repetitions as well as the repetition rate being under tight control of the operator. Furthermore, the dial can be rotated back and forth to switch between two scan codes associated with each key, so that the scan code generated in repetition mode is dependent on the dial rotation direction, enabling fast switching between two different commands associated with a single key (useful for commands having inverse responses to each other).

Auxiliary keys may be used in combination with the dial for performing special functions. A pair of default scan codes can be generated when the dial is rotated without pressing any key, for fast issuing of very frequently used commands.

Brief Description of the Drawings

Figure 1 is a plan view of a personal computer keyboard incorporating a dial and other features according to a preferred embodiment of the invention.

5 Figure 2 is an enlarged perspective view of a portion of the keyboard of figure 1 including the dial.

Figure 3 is a cross-sectional view of the dial according to an embodiment of the invention.

Figure 4 is a time-chart showing binary signal waveforms and phase relationships at the output of the transducer associated with the dial.

10 Figure 5 is a block diagram of the keyboard of the invention, including the dial and associated transducer hardware according to a first embodiment of the invention.

Figure 6 is a flow-chart illustrating a programme routine embodying the operational aspects of the keyboard of the invention.

Figure 7 is a block diagram of the keyboard of the invention, including the dial and associated transducer hardware according to a second embodiment of the invention.

15 Figure 8 is a schematic representation of a possible trajectory of a finger point of contact through a plurality of radial positions.

Figure 9 is a plan view of the keyboard portion of figure 2, representing a particular arrangement according to a preferred embodiment of the invention.

20 Detailed Description of Embodiments

Figure 1 shows a preferred embodiment of a keyboard 10 according to the invention, based on a typical key layout widely used in PC keyboards. In particular, the keyboard 10 includes keyboard supporting frame 12, a main alphanumeric pad 20, a numeric panel 22 located to the right of panel 20, generic function-key panel 24 placed above the main panel 20, arrow key panel 26 and control key panel 27 placed between the main panel 20 and the numeric panel 22.

According to the present invention, the keyboard 10 includes a rotatable dial 30 mounted on the keyboard frame 12 with its rotation axis 29 oriented substantially perpendicular to the plane defined by the key panels, which may freely rotate with relatively little friction. In the preferred embodiment, the keyboard 10 also comprises an auxiliary key 32 for switching a pair of scan codes associated with very frequently used commands, specially shaped to be operated by the thumb of the operator's hand in a way that both dial 30 and key 32 can be simultaneously operated with the thumb and fingers of the same (e.g. right) hand. Also shown in figure 1 is an extra key set comprising auxiliary keys 34 used for switching special scan codes associated with special commands or functions. In the preferred embodiment, this set of keys 34 is placed on the left-hand side of the keyboard 10 so as to be operable by the other (left) hand of an operator.

Figure 2 shows a more detailed view of the dial 30 and the auxiliary keys 32, mounted on the keyboard frame 12 and surrounded by the main key panel 20, the arrow keys panel 26 and the numeric key panel 22, thus configuring an advantageous arrangement as will be explained further on herein. As illustrated in figure 3, the dial 30 is mounted over a stepped opening 31 in the top 13 of the keyboard housing. The opening 31 has a concentric outer step where dial 30 just fits in so as to keep dust from getting inside the keyboard housing 10.

Figure 3 also shows a preferred embodiment of the dial and rotational transducer advantageously using a single piece of material and taking advantage of computer keyboard structures well known in the art. The dial 30 may be manufactured as a knob 50 shaped with an elevated top flat portion 70 and a sloped conical peripheral portion 74 so as to approximately fit in a human palm for easy and reliable manipulation of the dial 30 with any or all fingers of the right hand of the operator. Since the conical portion 74 has been designed to enable precise and slow operation of the dial, it has proven useful to use a rugged surface or a plurality of protruding elements as radial strips or the like. However, for the central portion 70, a polished surface (e.g., acrylic) is preferable, since it allows a good tracking and at the same time provides a smooth and uniform contact surface.

Inside, the dial 30 comprises a shaft 52 posted on the centre of internal surface 54 of the knob part. The shaft 52 is mounted on a bushing 56, fixed to the bottom 62 of keyboard housing 10. The dial mounting preferably includes a circumferential recess 58 in the shaft 56 which receives a resilient latch 59 so that together they hold the dial 30 in place on the keyboard. This mountage has the advantages that, for one, it is easy to insert and remove, enabling nearly instant mounting in the keyboard manufacture and assembly process and, furthermore, features low static friction which gives it just the right resistance so that it can be easily and precisely turned by the operator with hardly any effort.

Going back to the shape of the dial 30, the conical portion 74 folds back at the outer edge and then downwards at a right angle to form a lower cylindrical skirt 57 which is supported above a printed circuit board 66. The bottom edge of the skirt 57 is slotted so as to form a continuous line of rectangular openings all the way round the skirt 57.

5 As is conventional, this circuit board 66 houses the electronics which interface the computer keyboard 10 with a port of the computer system. According to the preferred embodiment of this invention, the circuit board 66 also supports a pair of opto-couplers 68 (only one of which can be seen in figure 3) for sensing dial rotation. More precisely, the opto-couplers 68 are placed on the board 66 relative to the opening 31 so that the cylindrical skirt 56 fits into opto-coupler gaps. Thus, any rotation of the dial 30 results in passage of
10 openings through the opto-coupler gaps. Each of the opto-couplers 68 issue pulse trains contains information regarding direction, rate of turn and incremental angle of turn.

Therefore, the slotted skirt 57 together with opto-couplers 68 form a rotational transducer 40 represented in the block diagram of figure 5. As the dial 30 is rotated, the opto-couplers 68 generate a pair of signals X1-X2 representing signed incremental rotational movement of dial 30. The opto-couplers 68 are
15 mounted on printed circuit board 66, for instance by soldering, at two angularly spaced locations relative to the dial shaft 52 so as to generate synchronous quadrature pulse signals according to a widely known rotation transducer technique displayed in figure 4.

Every quarter-cycle of signals X1-X2 represents an elementary angle DA according to a predetermined resolution. As can be seen in figure 4, the variation of the signal status taken together in each quarter-cycle
20 gives all the motion information. A change in the status of signals X1-X2 at two different points in time defines a transition and provides motion direction information as summarized in the following Table 1.

TABLE 1

25

X1 _n , X2 _n	X1 _{n+1} , X2 _{n+1}	Motion Direction
00	00	0
00	01	-1
00	10	+1
00	11	x
01	00	+1
01	01	0
01	10	x
01	11	-1
10	00	-1
10	01	x
10	10	0
10	11	+1
11	00	x
11	01	+1
11	10	-1
11	11	0

30

35

40

45 In Table 1, the column marked "X1_n, X2_n" represents the signal status prior to detection of the transition and the column marked "X1_{n+1}, X2_{n+1}" represents the status after transition. The third column shows the incremental signed value of the motion detected. Transitions marked with an "x" are not possible in the scheme of figure 5 and may be used as an error signal indicating a transducer malfunction.

Figure 5 shows a block diagram of a preferred embodiment of the electronic circuit onboard the keyboard 10. As shown in figure 5, signals X1-X2 are read by parallel inputs P0 and P1 of logic circuit means 42, which processes the signals to detect the dial rotation according to Table 1 and calculate the angular units rotated according to a predetermined resolution. The logic circuit 42 derives an internal timing signal for each rotation angular unit detected for triggering transmission of the corresponding scan codes when a key is pressed (or the default scan-codes if no key is pressed). The logic circuit 42 derives an
50 additional internal binary signal indicative of the sign of the rotation, for selecting the corresponding scan code from the set of scan codes associated with each key according to the dial rotation direction, as explained further on herein.
55

In the preferred embodiment, the logic circuit 42 is the same means used for scanning key array 44 of keyboard 10, since it only requires the availability of input ports P0 and P1 and some extra programming to

include the transition detection routines and link them to the already available scan code generating means and routines (naturally built into the circuit 42). Circuit 42 can be embodied by means of a microcomputer such as the Motorola 6809 with associated hardware for scanning the key array 44 and transmitting scan codes to the computer system. It will be apparent to those skilled in the art that all accessory elements and means are well known in the industry and are common practice in manufacturing today's computer keyboards. For instance, the key array 44 of figure 5 represents the set of keys of a conventional keyboard, including main alphanumeric panel 20, numeric panel 22, generic function keys panel 24, arrow keys panel 26 and control keys panel 27. Arrays 44 and 34 are cross-scanned by respective lines connected to generic input ports P2 through Pn of circuit means 42.

Figure 6 is a flow diagram of the functions carried out by circuit means 42. The part of the diagram inside the dotted line shows a method similar to that used in a conventional keyboard, the only difference being that in a conventional keyboard, only a single scan code is associated with each key, generated when a key status change is detected. In the keyboard 10 of the invention, however, each key is associated with more than one scan code, the additional scan codes being generated by the dial rotation and depending on the dial rotation direction. The scan code generated when a key is pressed without rotating the dial is called "static scan code", while the additional scan codes defined for the corresponding dial rotation directions are called "dynamic scan codes". Each time a key array 44 status change is detected, circuit means 42 looks up in a table the new scan codes according to the new activation status of key array 44 (keys pressed or released) and fills in a one-dimensional data structure called "scan code vector". When a key is pressed from a released position, circuit means 42 generates the corresponding static scan code. If the key is held in an active position and the dial is rotated, circuit means 42 generates repeatedly the dynamic scan code present in the scan code vector, according to the dial rotation direction and upon detection of each incremental angular unit rotated by the dial.

Table 2 gives an example of a possible scan code assignment table to illustrate this principle.

TABLE 2

Key Label	Static Scan Code	Dynamic Scan Codes	
		(-)	(+)
TAB	21	33	21
SPACE	6B	7D	6B
AUX 1	-	9C	B4

If the keyboard in which the invention is to be practiced is a double code keyboard (i.e., a keyboard that generates a first scan code when a key is pressed and a second scan code when the key is released) as is the case for example of contemporary "PC" keyboards, almost the same scheme may be implemented, the difference being that two scan codes are generated for each dial rotation transducer transition detected, with a suitable delay in between, so as to simulate repeated keystrokes of the same key while maintaining full compatibility with existing applications.

Moreover, Table 2 can be further enhanced to contain not only single scan codes, but a combination of them, so as to simulate repeated keystrokes of a key combination or macro rather than of a single key. For example, "TAB" and "SHIFT + TAB" can be assigned to a certain key of group 34, respectively as the positive and negative dynamic scan codes, so as to use the dial as an option selector in applications that use these key combinations for that purpose.

Although Table 2 has been dimensioned to contain scan code information for each key (i.e., the static scan code and both dynamic scan codes), it may be enhanced to contain additional key-specific information. For example, for some particular keys, a different effective resolution (i.e., the number of dynamic scan codes generated in a complete turn of the dial) may be desirable so as to reduce the dial's sensibility for that particular key. An example of this case is the "PAGE UP" - "PAGE DOWN" function, in which a user needs a certain time period between two successive commands so as to recognize the successive displayed images while browsing a certain file or document. This can be done by providing an additional column in Table 2 containing a number representing a different angular unit value for each key.

If internal skirt 57 is dimensioned to allocate for example 20 slots, a wide range of repetition rates may be easily obtained, from nearly nought (by operating the dial from its periphery) to approximately 200 Hz (by sliding the fingers towards the dial's centre to gain rotational speed). This is illustrated in fig. 8 which sketches a clockwise rotation A1 during a repetition operation. An example of a finger point of contact

trajectory has been represented as curve T in figure 8. As may be seen in fig. 8, to generate an approximately complete turn, just a relatively small amount of finger travel is needed by turning the dial, first sliding the finger from starting point S towards the centre of the dial and then sliding the finger back towards the ending point E at the dial periphery. In this elementary operation performed very frequently while using the dial, since the point of contact evolves through a number of radial positions, from radial position r2 to radial position r1 and then back again to radial position r2, different angular speeds are obtained as the dial rotates a greater or lower number of angular units AU in a given time interval, thereby varying the repetition speed and the perceived effective resolution for a given point of contact travel. The result is that the operator can tightly control a certain repetition operation with both speed and precision at the same time, which in the long run results in a comfortably and efficient operation of the computer.

Moreover, if a wider repetition rate range is wished, the effective resolution may be varied dynamically to produce an acceleration effect. In other words, the function relating the number of rotation transducer transitions detected in a certain time period to the effective repetition timing signal cycles generated in the same time period need not be linear, so that a higher number of transitions detected produces an even higher effective repetition timing signal cycles, widening the effective repetition timing signal range. This can be done for example by dynamically altering the instantaneous angular unit as a function of the rotating speed of dial 30. The processing needed to perform the acceleration effect may be done by circuit means 42, using routines widely known in the art. An additional advantage of implementing the acceleration effect is that it lowers the number of slots of skirt 57 and tolerances requirements in mounting of opto-couplers 68 and dial 30, while still allowing a relatively wide repetition rate range.

In a second embodiment of the invention, the processing means that process the signals generated by the dial rotation transducer and perform the disclosed functions may be inside the computer system, as shown in figure 7. The advantage of this alternative embodiment is that the scan-code table may reside in the computer's memory and hence may be easily configurable for user customization. On the other hand, the disadvantage is that it is not independent of the computer operating system running in the computer and may not guarantee immediate 100% compatibility since modifications need to be introduced at operating system level so as to simulate repeated keystrokes upon dial rotation, in a way that it is transparent to any application programme running in the computer. On the other hand, in the first embodiment, the signals generated by the keyboard 10 when the dial is rotated are always identical to those generated by the effective activation of the physical keys, so that the keyboard of the first embodiment of the invention is fully transparent to any programme running in the computer, even to the operating system itself.

In the preferred embodiment, the horizontal arrow key scan codes are assigned as respective default dynamic scan codes, and the vertical arrow key scan codes are assigned as respective dynamic scan codes of auxiliary key 32. With these assignments and since dial 30 and auxiliary key 32 are simultaneously operable, the combination of both elements behaves in some applications as a two-dimensional, one-dimension-at-a-time cursor control device of an extremely wide speed range and of unlimited trajectory extent due to the operational characteristics of the dial mentioned hereinbefore. For example, when editing a text file in a contemporary word processing application, activation of the right or left arrow keys causes a text cursor to shift from one character position to the next, respectively in a forward or backward direction. At that point, the dial 30 can be used as a right-left cursor control device, capable of traveling without limit and continuously over the text file with significantly little effort and hand movement. Furthermore, if the auxiliary key 32 is pressed, the dial 30 can be used as an up-down cursor control device, shifting the cursor across successive lines of text allowing to reach any part of the text file in the same way.

Moreover, if both dial 30 and auxiliary key 32 are placed on the keyboard panel to the right of the ENTER key 21, as shown in figures 1 and 8, the resulting arrangement inside the dotted line in figure 8 allows a fast, relaxed and efficient programme control in many of contemporary computer applications, since most of them are based on the arrow keys and the ENTER key to control a significant part of the programme flow. For example, in an application based in a pull-down menu structure, the dial may be first used to select a sub-menu by generating the horizontal arrow keys (default dynamic scan codes), and further used to select a certain command within the selected sub-menu by simultaneously pressing auxiliary key 32 to generate the vertical arrow key dynamic scan codes. When the desired command is reached, the ENTER key may be pressed to complete the selection. In this way, the dial 30 combined with auxiliary key 32 and the ENTER key work together as a programme control device, eliminating the need for repeatedly pressing the arrow keys to navigate through the menu tree nodes and branches.

Furthermore, auxiliary keys 34 may be advantageously used to issue pairs of commands frequently used in a repetitive fashion and that produce opposite effects to each other. For example, if the "Page Up" and "Page Down" key scan codes are assigned to one of auxiliary keys 34 as its respective dynamic scan

codes, when said key is pressed while the dial is rotated the dial behaves in many applications as a rotary scrolling device, very useful for browsing for example a long text file or data base file at the computer screen, allowing inspection of the file in a forward or backward direction efficiently and comfortably.

Table 3 is an example of how scan codes may be assigned, thus summarising this disclosure.

5

TABLE 3

Pressed Key	Dynamic Scan Codes	
	Counterclockwise	Clockwise
None (Default)	Left Arrow	Right Arrow
Auxiliary Key 32	Up Arrow	Down Arrow
Aux. Key 34 (1)	Page Up	Page Down
Aux. Key 34 (2)	Space Bar	Delete Character
Aux. Key 34 (3)	Shift + Tab	Tab
Aux. Key 34 (4)	Gen. Inv. Fn.	Gen. Direct Fn.
Alphanumeric Keys	Back Space	Key Static Code

20 As another example, the scan codes of "DELETE" and "SPACE" keys may be assigned to another key in the set 34 as its respective dynamic scan codes, to let entire strings of characters to be rubbed out as the dial is turned in a clockwise direction and otherwise inserting space characters when the dial is rotated in a counter-clockwise direction.

25 While the invention has been illustrated and embodied in a keyboard comprising a dial for entering repetitive data and commands to a computer, it is not intended that it should be restricted to the details given, since various modifications and structural changes may be made without departing in any way from the nature of the present invention. Without further analysis, the foregoing will so fully reveal the gist of the present invention that others can, by applying current knowledge, readily adapt it to various applications without omitting features that, from the standpoint of prior art, fairly constitute essential characteristics of the generic or specific aspects of this invention.

Claims

- 35 1. A computer keyboard (10) for connection to a computer system for entering commands and data units into said computer system; said keyboard including a plurality of keys (20, 22, 24, 26, 27) mounted in a supporting frame (12), scanning means (42) to sense activation of said keys, processing means (42) to generate said commands and said data units on detecting of a status change of said keys and communication means for transmitting said commands and said data units to said computer system; and characterised by comprising a rotatable dial (30) for manually entering sequences of repeated commands and data units to said computer system, said dial being rotatably mounted in said supporting frame and having a centre (70), a rotation axis (29) passing through said centre and an exposed operating surface (74) engagable by at least one finger of an operator at a plurality of radial positions from said centre so that said dial can be rotated without limit by said at least one finger; rotational transducer means (56, 68) for detecting rotation of said dial and generating an output signal indicative of incremental rotation said dial in pre-defined angular units; means (42) for using said output signal to generate said repeated commands and data units for entry into said computer system upon detection of said incremental rotation angular units, means (42) for modifying said repeated commands and data units by activation of said keys while said dial is rotated by said operator.
- 50 2. The keyboard of claim 1, characterised in that said supporting frame is substantially planar; said keyboard including an alphanumeric key panel (20), an arrow key panel (26) and a numeric key panel (22); said dial is mounted with said rotation axis substantially perpendicular to said frame and said dial is located adjacent to at least one of said key panels.
- 55 3. The keyboard of claim 2, characterised in that said dial is substantially circular and has a substantially flat circular elevated central portion (70) for ease of operation so as to reach any of said plurality of radial positions on said dial and obtain different rotation speeds of said dial for equal finger travel rates by contacting said dial at different radial positions.

4. The keyboard of claim 3, characterised in that said dial has a sloped substantially conical peripheral portion (74) ergonomically adapted to a human hand to ease operation of said dial.
5. The keyboard of claim 4, characterised by further comprising a plurality of auxiliary keys (32, 34) for switching frequently used commands or data units, at least one of said auxiliary keys (32) being positioned alongside said dial so as to enable simultaneous operation of said dial and said at least one auxiliary keys with a single hand by said operator.
6. The keyboard of claim 5, characterised in that at least one of said auxiliary keys (32) is located adjacent to a left lower quadrant of said circular dial so as to allow operation of said auxiliary key by a thumb of said hand, said auxiliary key having an approximately circular arc shape, said arc being coaxial to said dial.
7. The keyboard of claim 6, characterised by further comprising a printed circuit board (66) including at least a portion of said rotational transducer means including a pair of opto-couplers (68); and characterised in that said dial is shaped like a knob having: a top portion (70) formed by said flat circular elevated central portion and said substantially conical peripheral portion (74) around said central portion, a lower cylindrical skirt (57) extending downwards from said substantially conical peripheral portion and having a bottom edge spaced from said printed circuit board means and a plurality of slots in said bottom edge, said opto-couplers being positioned on said printed circuit board so that said bottom edge of said lower cylindrical skirt passes through said opto-couplers when said dial is rotated, and a central shaft (52) extending downwards from said central portion, said shaft being engagable rotatably, but axially securable, in a bushing (59) fixed to said supporting frame.
8. The keyboard of claim 7, characterised in that said central shaft has a circumferential recess (58) and said bushing has a resilient latch (59) positioned to engage in said recess when said shaft is inserted in said bushing so as to retain said knob in place and enable said knob to be swiftly fitted into and removed from said supporting frame.
9. A computer system including a computer keyboard (10) for entering commands for controlling a computer programme running in said computer system and entering data units into said computer programme; said keyboard including a plurality of keys (20, 22, 24, 27) mounted on a supporting frame (12), scanning and processing means (42) to sense activation of said keys to generate said commands and said data units in response thereto and communication means (42) for transmitting said commands and said data units to said computer system; and characterised by including an arrangement for improving and speeding up operation of said programme comprising a rotatable dial (30) for manually entering sequences of repeated commands and data units to said computer system, said dial being rotatably mounted on said supporting frame and having a centre, a rotation axis (59) passing through said centre and an exposed operating surface (74) engagable by at least one finger of a hand of an operator at a plurality of radial positions from said centre so that said dial can be rotated without limit by said at least one finger of said hand; transducer means (57, 68) for detecting rotation of said dial and generating an output signal indicative of incremental rotation of said dial in pre-defined angular units; means (42) for using said output signal to generate said repeated commands and said data units for entry into said computer system upon detection of said incremental angular units; a plurality of keys (26) positioned in proximity to said dial so as to allow easy access of said keys by said fingers of said hand; a plurality of auxiliary keys (32, 34) for switching frequently used commands and data units, at least one (32) of said auxiliary keys being positioned alongside said dial so as to allow simultaneous operation of said dial and said at least one auxiliary key by said operator with a same hand; and means (42) for modifying said repeated commands and data units by activation of said keys while said dial is rotated by said operator.

55

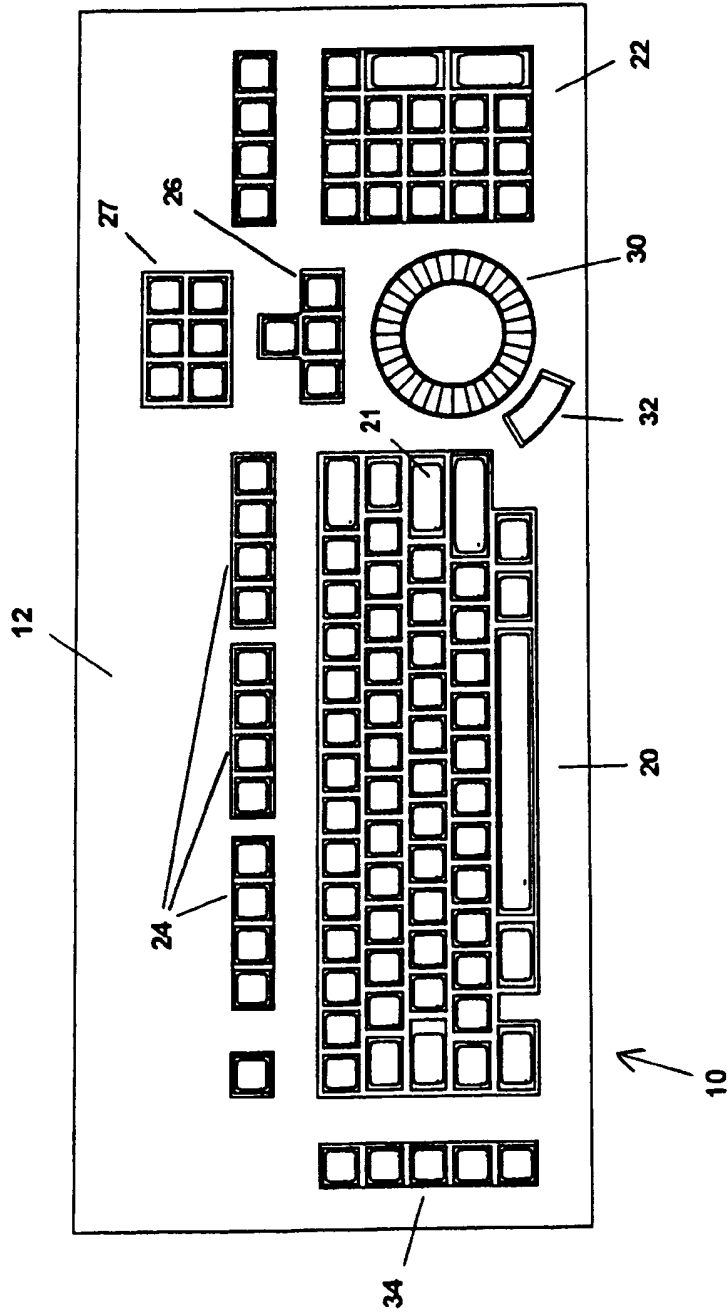


Fig. 1

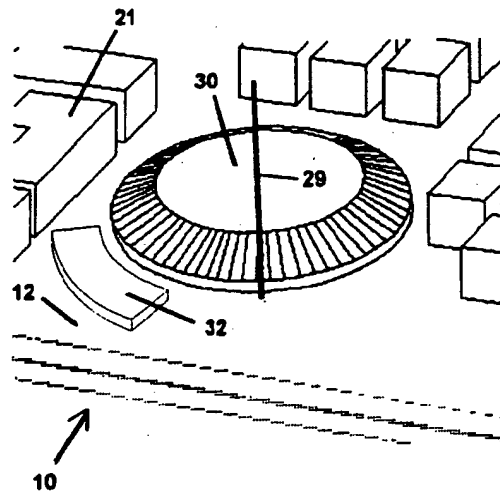


Fig. 2

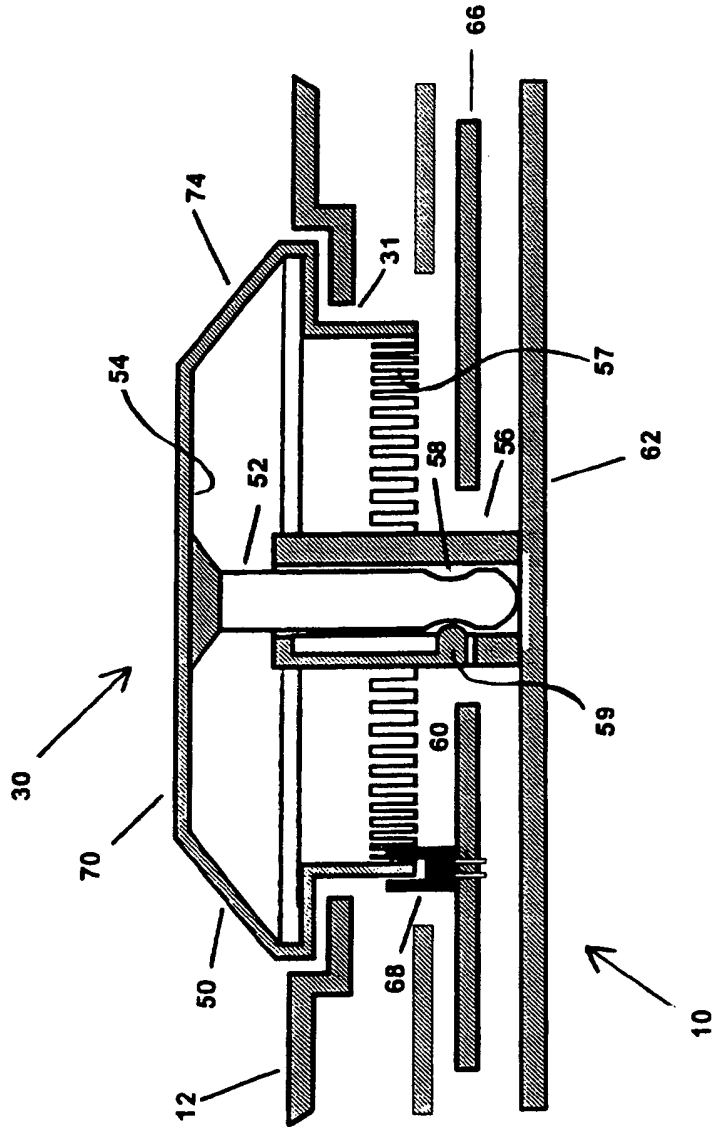


Fig. 3

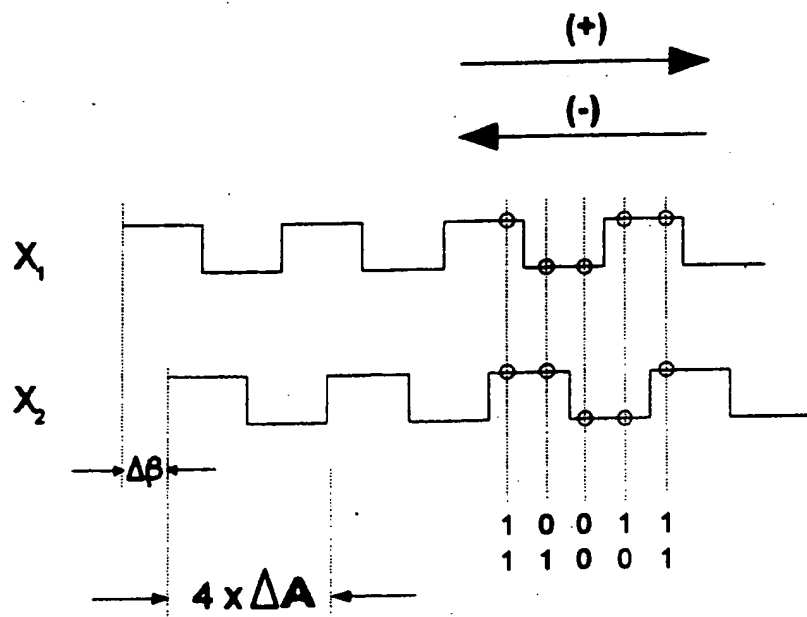


Fig. 4

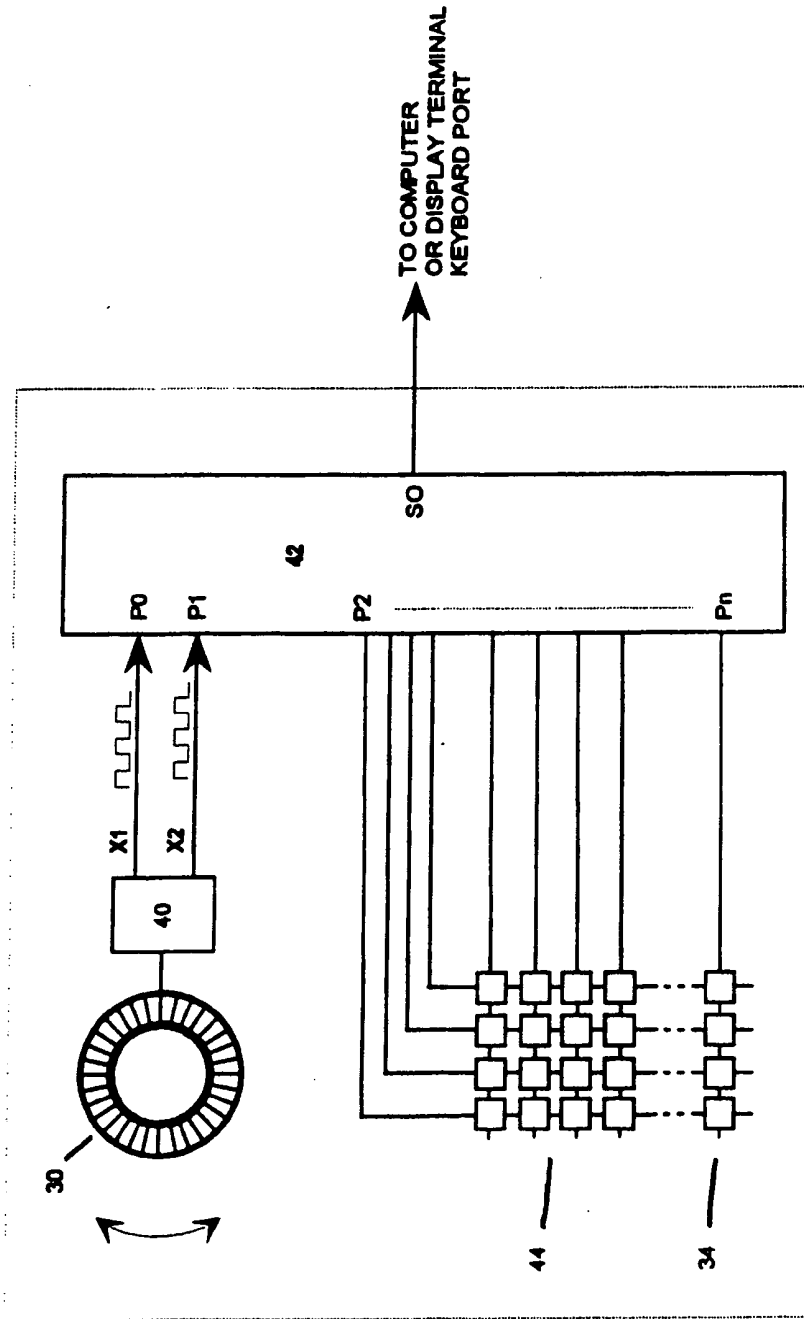


Fig. 5

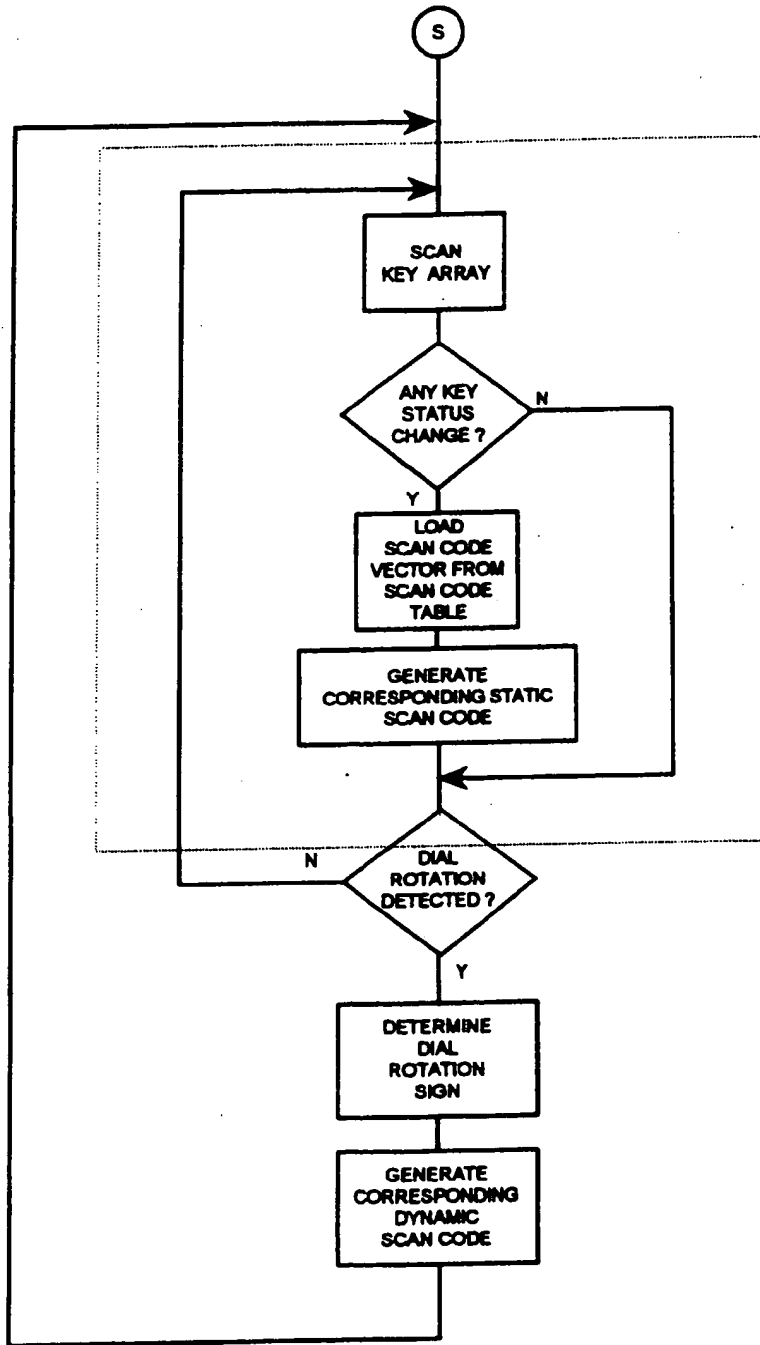
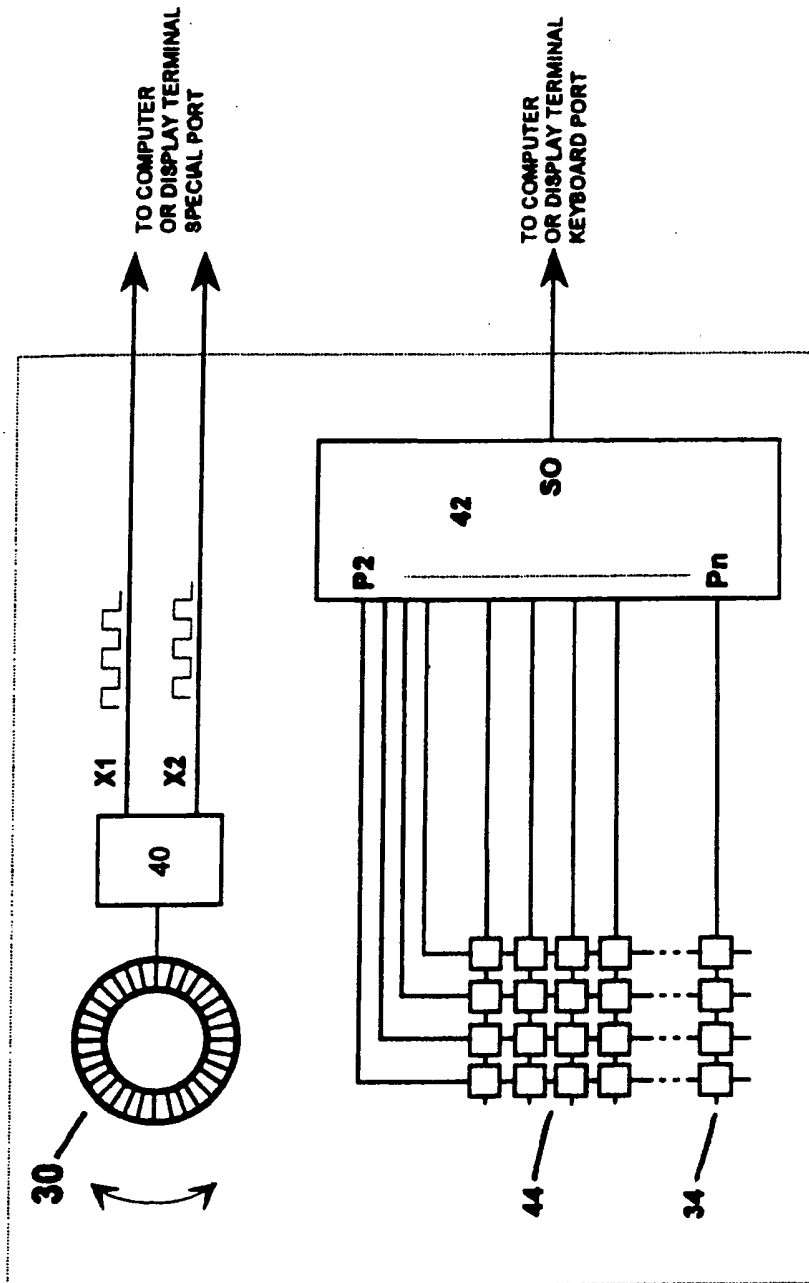


Fig. 6



KEYBOARD

Fig. 7

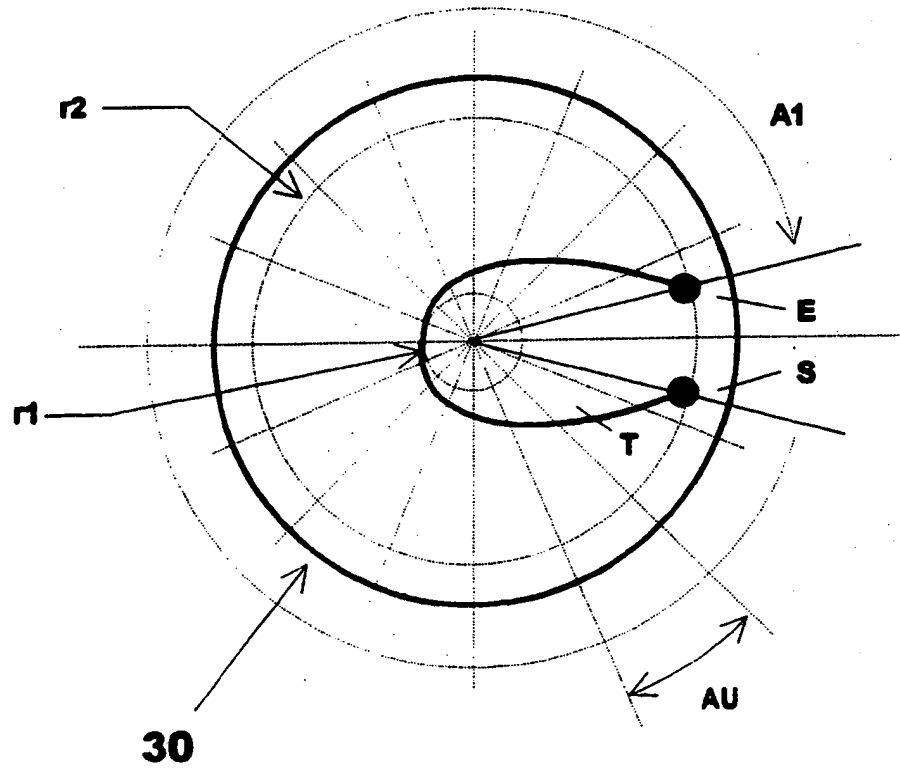


Fig. 8

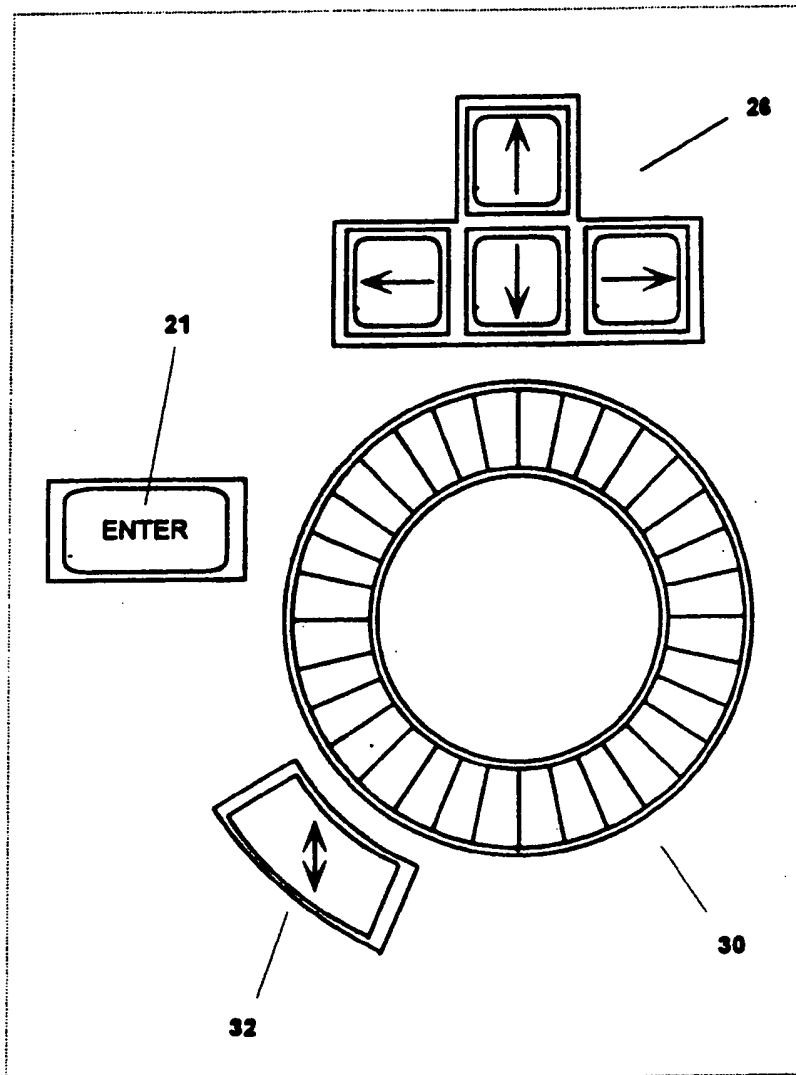


Fig. 9



DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.5)
A	EP-A-0 227 387 (THE OHIO ART COMPANY) * abstract * * page 3, line 34 - line 44; figure 5 * * page 6, line 27 - line 39 * -----	1,9	G06F3/023 G06K11/18
A	EP-A-0 120 683 (TEKTRONIX) * abstract * * page 2, line 13 - page 3, line 11 * * page 9, line 6 - line 16 * -----	1,9	
			TECHNICAL FIELDS SEARCHED (Int.Cl.5)
			G06F G06K
The present search report has been drawn up for all claims			
Place of search		Date of completion of the search	Examiner
THE HAGUE		30 December 1993	Bravo, P
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(19) World Intellectual Property Organization
International Bureau



(43) International Publication Date
22 May 2003 (22.05.2003)

PCT

(10) International Publication Number
WO 03/042805 A1

(51) International Patent Classification: G06F 3/033, G06K 11/18

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(21) International Application Number: PCT/FI02/00889

(22) International Filing Date:
11 November 2002 (11.11.2002)

(25) Filing Language: English

(74) Agent: PATENT AGENCY COMPATENT LTD.; Hämeentie 20, 4th Floor, FIN-00500 Helsinki (FI).

(26) Publication Language: English

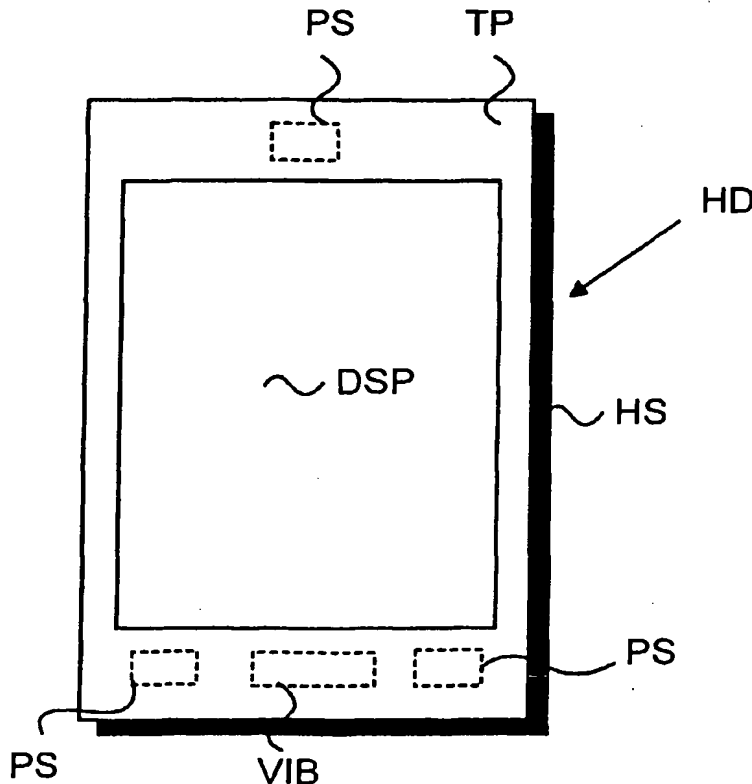
(81) Designated States (national): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, OM, PH, PL, PT, RO, RU, SC, SD, SE, SG, SI, SK, SL, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.

(30) Priority Data:
20012187 12 November 2001 (12.11.2001) FI

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[Continued on next page]

(54) Title: METHOD AND DEVICE FOR GENERATING FEEDBACK



(57) Abstract: The present invention describes a method, a dynamic user interface and an electronic device for generating user detectable multi-functional feedback with a single component in response to a stimulus signal. In the invention, one or more resonating vibrating element(s), e.g. piezo-bender, are attached to a certain component of the device. A conventional electronic device comprises different components for generating a haptic feedback signal, a buzzer signal, a vibratory alert signal or an audio signal. All the above-mentioned feedback signals can be generated with the piezo-clement attached to, e.g. a lens or a housing. This means significant decrement in the space needed and in the power consumption compared to the situation, where the feedback signals are generated with separate components.



WO 03/042805 A1

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(84) **Designated States** (*regional*): ARIPO patent (GH, GM, KI, LS, MW, MZ, SD, SI, SZ, TZ, UG, ZM, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IT, LU, MC, NL, PT, SE, SK, TR), OAPI patent (BF, BJ, CI, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Published:

— with international search report

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

METHOD AND DEVICE FOR GENERATING FEEDBACK

FIELD OF THE INVENTION

The present invention relates to electronic devices. In particular,
5 the present invention relates to a novel and improved method, a dynamic
user interface and an electronic device for generating user detectable multi-
functional feedback.

BACKGROUND OF THE INVENTION

10 In information technology, the user interface (UI) is everything de-
signed into an information device with which a human being may interact,
including display screen, keyboard, mouse, light pen, the appearance of a
desktop, illuminated characters, help messages, and how an application
program or a Web site invites interaction and responds to it. In early com-
15 puters there was very little user interface except for a few buttons at an op-
erator's console. The user interface was largely in the form of punched card
input and report output.

Personal Digital Assistants (PDA) typically comprise a large dis-
play area in proportion to the size of the device. Most PDAs include only a
20 few mechanical buttons in order to provide as large display area as possible.
Therefore, the display area is also used as an input device. The display area
is usually touch-sensitive so that information can be transferred into the de-
vice just by touching the display or using a special tool, e.g. a special pen.

U.S. Patent 5,241,308 (Paragon Systems) describes a touch sen-
25 sitive panel for generating selected ones of any of a plurality of different sig-
nals, each of which is generated by touching a different location on the
panel. The apparatus includes also force sensing means for sensing the
magnitudes of the forces that are applied to each panel member support by
the panel member when the member is touched at a selected location.

30 Touch-sensitive displays have many advantages over conven-
tional information input methods. The display size can be made bigger when
only few mechanical buttons are present. Above all, all the needed buttons
can be generated by program basis in an applicable place. There are, how-
ever, several problems when a touch-sensitive display is used as a primary
35 information input device. When a user uses his/her finger to touch the dis-
play, the problem is that the user does not necessarily receive any haptic

feedback as to whether his/her selection is acceptable or whether the selection is made at all. A traditional keyboard always gives some kind of mechanical response to a press of a button.

The main problem is that there is no solution for electronic devices
5 for generating feedback for various stimulus signals with a single integrated component, the following conditions being fulfilled:

- Cost-effective solution, and
- Minimal power consumption.

U.S. Patent No. 5,245,245 (Motorola) describes an electronic de-
10 vice comprising a piezo-bender. The device is preferably a pager. When a signal is received, an electrical drive circuit electrically coupled to the piezo-bender drives the piezo-bender with a drive signal to generate vibratory motion in the piezo-bender, and a vibratory alert is thus provided. The device
15 comprises also tuning means slidably coupled to the piezo-bender for mechanically tuning the resonance frequency of vibration of the piezo-bender by varying the length of the piezo-bender that can vibrate. It must be noted that the piezo-bender is mechanically tuned so the tuning must be made by a
20 competent technician. It is also difficult to manufacture devices with exactly same (resonance) characteristics because of the mechanical tuning feature. The solution in U.S. Patent No. 5,245,245 is also bound to a certain fixed
25 resonance frequency. U.S. Patent No. 5,245,245 represents a low-profile and reliable vibrator for a selective call receiver. However, the reference publication does not present any connection between user actions and vibratory alert. The solution is not applicable for generating feedback for various
stimulus signals with a single integrated component.

Reference publication WO01/54109 (Immersion) represents a so-
lution of haptic feedback for touchpads and other touch controls. In the publi-
cation, a user uses a touch-input device for entering control instructions. Moreover, at least one actuator is coupled to the touch input device and out-
30 puts a force to provide a haptic sensation to the user contacting the touch surface. In other words, the user receives feedback from the input device itself. The actuator is situated under the touch-sensitive display. The problem is that the solution presented in the reference publication is not applicable for
generating feedback for various stimulus signals with a single integrated
35 component.

The expression "touch-sensitive display" refers preferably to such displays that are being used in current PDAs. These displays, however, have weaknesses. The display is vulnerable to external impacts. The display may also be temperature sensitive, i.e. the use of a device with a touch-sensitive display may be restricted to a certain temperature range.

SUMMARY OF THE INVENTION

The present invention describes a method and an electronic device for generating user detectable multi-functional feedback with a single component in response to a stimulus signal. In the preferred embodiment, the electronic device is a hand-held device comprising at least a housing, electronic circuitry located in said housing, a display, said housing comprising at least a partially transparent lens, the transparent lens area covering at least the display.

The electronic device in the present invention comprises one or more resonating vibrating elements attached to the housing or on the electronic circuitry. In a preferred embodiment, one or more resonating vibrating elements are attached to an area of the lens not covering the display. The lens is not necessarily a touch-sensitive display as represented in the background of the invention section. Instead, the lens may be more like a panel where the lens itself is not touch-sensitive. When the resonating element(s) are attached to the lens, the feedback is transmitted to the user of the electronic hand-held device effectively through the lens. With the resonating vibrating elements, the feedback is produced to the user in response to the stimulus signal. The resonating vibrating element is preferably a piezoelectric bender.

The touch-sensitive feature is achieved with special detecting means. In a preferred embodiment, the detecting means refer to one or more force sensors attached to the lens. In one embodiment, the electronic device comprises at least force sensors with which the location of a touch on the display can be determined.

In the present invention, an electrical drive circuit is electrically coupled to the resonating vibrating element(s) for electrically driving the resonating vibrating element(s) with a drive signal. The drive signal is constituted based on the stimulus signal. The stimulus signal is preferably a user-actuated signal, a radio signal received with a radio receiver of said elec-

tronic device or an electronic device induced signal. It is also possible that one or more different stimulus signals are detected at the same time. When the drive signal is supplied in the resonating vibrating elements, preferable one or more of the following feedback signals are generated: a haptic feedback signal, a vibratory alert signal, an audio signal or a buzzer signal.

5 The present invention describes also a dynamic user interface for generating user detectable multi-functional feedback with a single component in response to a stimulus signal in a device, the user interface comprising at least a housing and electronic circuitry located in the housing. The dynamic user interface further comprises means for detecting the stimulus signal, one or more resonating vibrating elements attached to the housing or on the electronic circuitry, and an electrical drive circuit electrically coupled to the resonating vibrating element(s) for electrically driving the resonating vibrating element(s) with a drive signal, the drive signal being constituted based on the stimulus signal.

10 The present invention has several advantages over the prior-art solutions. In the present invention, the resonating vibrating element(s) may be used in several different functions. In the prior-art solutions, each function requires a dedicated component in the implementation. This is a clear advantage.

15 The present invention represents a solution where the power consumption is low. This is a very important feature in electronic hand-held devices. In the prior-art solutions, each feedback signal (a haptic feedback signal, a vibratory alert signal, an audio signal or a buzzer signal) is generated with a dedicated component. In the present invention, all the aforementioned feedback signals are generated with a single component, and therefore, there is only one power-consuming component. This enables easier minimisation of the power consumption.

20 The present invention describes also a solution where it is not necessary to use conventional touch-sensitive displays. Electronic hand-held devices can be made much more durable because it is not necessary to use any elastic membranes or touch-sensitive displays. Instead, a rigid transparent lens covers the actual display device.

25 The solution represented in the present invention is simple. Further, the present invention is not prone to manufacturing differences because the feedback can be adjusted easily.

The present invention has still further advantages. Because the solution uses only single component to generate feedback, this means significant space saving in the Printed Circuit Board (PCB). The number of components needed on the PCB is thus reduced. The solution represented in the present invention is also a low-cost solution because of the savings in the components.

BRIEF DESCRIPTION OF THE DRAWINGS

The accompanying drawings, which are included to provide a further understanding of the invention and constitute a part of this specification, illustrate embodiments of the invention and together with the description help to explain the principles of the invention. In the drawings:

- Fig 1** is a simplified block diagram of an electronic hand-held device, according to the present invention,
- Fig 2** is a top plan view of an electronic hand-held device, according to the present invention,
- Fig 3** is a graph illustrating the resonance frequency, according to the present invention, and
- Fig 4** is a side view of a parallel type mass-loaded piezo-bender, according to the preferred embodiment of the present invention.

DETAILED DESCRIPTION OF THE INVENTION

Reference will now be made in detail to the embodiments of the present invention, examples of which are illustrated in the accompanying drawings.

Figure 1 is an electrical block diagram of an electronic hand-held device, e.g. a Personal Digital Assistant (PDA) or a mobile phone. Figure 1 does not comprise all the elements required in the electronic hand-held device but only the relevant elements required in the present invention. The electronic hand-held device comprises a central processing unit CPU for controlling the electronic hand-held device. A memory MEM is associated with the CPU to store relevant software applications and other relevant information. The electronic hand-held device comprises at least a partially transparent lens TP, the transparent lens area covering at least the display.

Also the term touch panel can be used when referring to the lens. The actual display DSP is located under the transparent lens TP area.

The lens TP is also used as a primary input device. User actions are detected with means IM for detecting stimulus signals. Means IM for detecting in one embodiment refers preferably to force sensors PS attached directly or indirectly to the lens TP. With three force sensors any location (a touch) on the lens TP area can be recognised and a relevant procedure started. Means IM for detecting stimulus signals together with the lens TP and the display DSP may refer to a conventional touch-sensitive display. In general, means IM for detecting stimulus signals may refer to several different physical or software components with which the stimulus signal(s) can be detected.

Figure 1 also comprises a drive circuit DC and vibrating element(s) VIB. The drive circuit (DC) is electrically coupled to said resonating vibrating element(s) (VIB) and electrically drives the resonating vibrating element(s) (VIB) with a drive signal, the drive signal being constituted based on the stimulus signal. A vibrating element is preferably a piezo-electric element attached directly to the lens TP. The CPU controls the drive circuit DC which itself supplies a drive signal to the vibrating element(s) VIB. The piezo-electric element is attached to the lens TP, e.g. by gluing, welding, screwing etc.

The CPU comprises means DM for determining the source of the stimulus signal, means TM for determining the resonance frequency by producing a bursted frequency sweep, means LM for detecting the vibration level with said force sensors PS, and means OM for feeding the obtained frequency to the resonating vibrating element(s) VIB. The above mentioned means are preferably implemented with the CPU and/or relevant software application(s).

The drive circuit DC in one embodiment comprises several components. It can comprise, e.g. an analog to digital converter (A/D), a digital signal processor, a digital to analog converter (D/A) and an amplifier. When, e.g. a radio signal is received with the radio receiver RF, the radio signal is input to a digital signal processor. The digital signal processor processes the radio signal and inputs the signal to the D/A-converter. The analog signal is then amplified with the amplifier and finally the amplified signal is input to the piezo-bender. Because the piezo-bender is attached to the lens TP, the

whole system acts like an audio speaker and is able to produce an audio signal.

In one embodiment of Figure 1, the vibrating element, e.g. a piezo-bender, is used as means IM for detecting the user stimulus signal. Therefore, both detecting the user stimulus signal and generating a feedback signal is produced by an integrated component.

In one embodiment, the piezo-bender is also used in measuring acceleration. Preferably there is an external mass attached to the piezo-bender. When a hand-held device comprising a mass attached piezo-bender is moved along the z-axis, the z-axis being essentially perpendicular to the x/y-plane of the display of the hand-held device, the piezo-bender measures force changes (acceleration) resulting from the inertia. Several functions can be linked to the measurement. One example is that the zooming factor of the material on the display of the hand-held device depends on the measured acceleration information. The zooming example is described in more detail in the patent application WO0127735 (Myorigo).

If the electronic hand-held device is a mobile phone and/or a radio, the device comprises also a radio receiver RF part for sending and receiving radio frequency signals.

Figure 2 is a top plan view of an electronic hand-held device HD. The device is preferable a Personal Digital Assistant (PDA) or a mobile phone. Figure 2 is a simplified example of an electronic hand-held device so the device may comprise also other features or functional buttons. The electronic hand-held HD device comprises a housing HS. The housing HS comprises at least a partially transparent lens TP covering the actual display DSP.

In a preferred embodiment, the lens/touch panel TP itself is not touch-sensitive. The force sensors PS are directly or indirectly attached to the lens TP. In Figure 2 there are three force sensors PS attached to the lens TP. The force sensors PS are in a preferred embodiment attached to the housing HS as in a triangular form. The force sensors PS can be attached in any other appropriate way.

With three or more force sensors PS it is possible to accurately calculate and determine a place where the lens TP is touched. With the above-mentioned arrangement, the lens TP itself does not have to contain any touch-sensitive membrane or any other touch-sensitive features. In-

stead, a touch is detected with the force sensors PS. The force sensors can sense a user input also outside the transparent lens area. Therefore, certain areas of the housing HS or non-transparent areas of the lens TP can also be used as a part of the user interface.

5 Figure 2 comprises also a resonating vibrating element VIB. The resonating vibrating element VIB is attached to an area of the lens TP not covering the display DSP. The lens TP is preferably impervious outside the display DSP area. The vibrating element VIB is preferably a piezo-electric element and is of unimorph, bimorph or multilayer structure. The multilayer
10 structure is the preferred solution because of the low input voltage required. The piezo-bender is preferably formed of three parts: an upper part, a lower part and a metal element between those parts. The metal element significantly strengthens the overall structure. The drive circuit DC of Figure 1 applies the desired drive signal to the resonating vibrating element VIB, thus
15 causing the vibrating element VIB to vibrate/resonate at a certain frequency.

In one embodiment of Figure 2, the resonating vibrating elements are used to provide multiple feedback signals. The resonating vibrating element is preferably a piezo-bender of unimorph, bimorph or multilayer structure. The stimulus signal can originate from different sources. The stimulus
20 signal can be a user-actuated signal, e.g. a touch on the lens. It can also be a radio frequency signal received with the radio receiver of the electronic device. This is the case when the electronic device is, e.g. a mobile phone. Alternatively, the stimulus signal can be an electronic device induced signal, e.g. operating system originated signal. Therefore, each stimulus signal may
25 cause a different feedback signal.

When the piezo-bender is used to response to, e.g. a touch on the lens, a pulsed or continuous haptic feedback signal occurs. The haptic feedback signal is typically a short signal, e.g. 200-300 Hz of frequency and, e.g. 5-100 ms of duration, or a continuous signal. This signal is typically a plain or
30 modulated resonance frequency of the piezo-bender. However, the feedback signal does not have to be restricted only to the haptic feedback. With a piezo-bender, practically any required frequency bandwidth can be produced. The feedback signal can additionally be a buzzer signal, a vibratory alert signal or an audio signal. This means that a piezo-bender attached to
35 the lens of the electronic hand-held device can act as a speaker. Producing of an audio signal may require that the audio bandwidth is flattened by digital

signal processing in order to reduce the effect of the cantilever resonance frequencies. Certain criteria must be satisfied when generating audio signals. Especially in the buzzer feature, the sound pressure level (in Pascals) has to be adequate. The frequency band has to be broad enough. Also the harmonic multifold frequencies of the resonance frequency can be made use of when generating the feedback signal.

A conventional electronic device comprises different components for generating a haptic feedback signal, a buzzer signal, a vibratory alert signal or an audio signal. A buzzer signal is generated with a buzzer, an audio signal is generated, e.g. with a speaker, a vibratory alert signal is generated, e.g. with an electromagnetic motor and a haptic feedback signal, e.g. with a DC motor, a solenoid, moving magnet actuator etc. All the above-mentioned feedback signals can be generated with the piezo-element in the present invention. This means significant decrement in the power consumption compared to the situation, where the feedback signals are generated with separate components.

Figure 1 and 2 represents only one embodiment of the dynamic user interface described in the present invention. The dynamic user interface is not restricted to any special devices. The dynamic user interface is able to generate user detectable multi-functional feedback with a single component in response to a stimulus signal. The stimulus signal can be a user actuated signal, a radio signal received with a radio receiver or a device induced signal. The user interface comprises at least a housing and electronic circuitry located in the housing. The shape of the housing is not restricted. With means for detecting the stimulus signal a stimulus signal source is defined. One or more resonating vibrating elements is attached to the housing or on the electronic circuitry, e.g. a PCB board located in the housing. An electrical drive circuit electrically coupled to the resonating vibrating element(s) electrically drives the resonating vibrating element(s) with a drive signal, the drive signal being constituted based on the stimulus signal.

The resonating vibrating element is preferably a piezo-bender of unimorph, bimorph or multilayer structure. It is very crucial to define the type of the stimulus signal, because the feedback signal generated by the piezo-bender solely depends on the stimulus signal. The feedback signal is a haptic feedback signal, a vibratory alert signal, an audio signal or a buzzer signal. It is very important to carefully define the attachment point of the piezo-

bender to the housing or to the electronic circuitry. The piezo-bender component itself does not produce all the needed feedback signals but attached to the housing or to the electronic circuitry it is able to produce multi-functional feedback.

5 There are numerous devices where the dynamic user interface described can be used. The devices include, e.g. joysticks, keyboards, e-books, or practically any device, where multi-functional feedback can be used.

10 Figure 3 shows the acceleration and the current-frequency response of an exemplary electronic hand-held device. The upper graph represents the acceleration factor of the lens as a function of frequency. The bigger the acceleration value, the stronger the feedback to the user. The lower graph represents the current as a function of frequency. In a preferred embodiment of Figure 3, an external mass is attached to the vibrating element. The use of an external mass increases the force obtained at the clamp
15 point of the piezo-bender and also improves the low-frequency audio bandwidth. The reason why the frequency area for a haptic feedback is quite low, e.g. 200-300 Hz, is that normally a human being is not so sensitive to higher frequencies, e.g. with a hand. The peak current value is slightly higher in the
20 resonance than in the immediate surroundings of the resonance frequency. The acceleration and the current values in Figure 3 are not necessarily real values but merely exemplary values.

 The resonance frequency can be made use of yet another way. In the manufacturing phase, the lens or the overall housing may be manufactured
25 in such a way that one of the resonance frequencies of the lens or of the housing is in the same frequency range as that of the vibrating element. Therefore, the overall effect of the haptic feedback is more efficient.

 It may occur that the resonance frequency must be individually
30 sought. The electronic hand-held device comprises a feature where the optimal frequency may be determined. This is done by determining the resonance frequency by producing a bursted frequency sweep. The force sensors can be made use of in another situation. The responses of the vibrating
 element(s) (haptic feedback) can be detected with the force sensors. With the force sensors it is possible to determine the individual resonance frequency.
35 When the measurement is made, the drive circuit is set to feed the obtained frequency to the vibrating element(s).

The feedback parameters can also be individually tuned for each person using it. The main parameters that the user can control are, for example:

- 5
- amplitude
 - the time period of the vibration
 - the vibration frequency.

10 Figure 4 is a side view of a parallel type mass-loaded piezo-bender, according to the preferred embodiment of the present invention. Here, the metal beam 42 is placed between the piezo-ceramic layers 41 and 43. The metal beam 42 extends beyond the piezo-ceramic layers 41 and 43 and has a mass 44 mechanically coupled to the other end of the metal beam 42. The mass 44 may be spot welded to the metal beam 42, and provides a vibratable body at one end of the cantilever structure. The other end of the piezo-bender is clamped to the lens or housing 45. When an electrical driving signal is applied, for example, across the opposing surfaces of the piezo layers, the tip of the piezo-bender begins to deflect. The deflections at the resonance of the piezo-bender are significantly greater than without the mass because of the extension of the metal beam 42 beyond the piezo-ceramic layers 41 and 43 and because of the mass 44 at the end of the beam 42. The vibrating mass 44' and vibrating bender tend to impart greater impulses to the lens or housing 45 through each vibration cycle. In the present invention, the resonating vibrating elements are made use of in several different functions. In the prior-art solutions, each function requires a dedicated component in the implementation. Therefore, valuable space saving in electronic hand-held devices is accomplished, and above all, the power consumption is minimized. This is a very important feature in electronic hand-held devices.

25 The present invention describes also a solution using only single component to generate feedback. This means significant space saving in the Printed Circuit Board (PCB). The number of components needed on the PCB is reduced. The solution represented in the present invention is also a low-cost solution because of the savings in the components.

30 The present invention describes a solution where feedback can be adjusted electrically. Adjusting the drive signal a desired feedback can be achieved. The adjustment can be set manually by the user or automatically by the device itself. The present invention describes also a dynamic user

35

interface and an integrated low-cost and low power solution for producing multi-functional feedback.

5 It must be noted that the piezo-bender component itself is not necessarily able to generate all the feedback signals (a haptic feedback signal, a buzzer signal, a vibratory alert signal or an audio signal) described in the present invention. However, the situation is different when the piezo-bender is attached, e.g. to a lens, a certain part of a housing, or a PCB board. Together with the component on which the piezo-bender is attached, it is possible to generate multi-functional feedback as described in the present invention.

10

It is obvious to a person skilled in the art that with the advancement of technology, the basic idea of the invention may be implemented in various ways. The invention and its embodiments are thus not limited to the examples described above, instead they may vary within the scope of the claims.

15

CLAIMS

1. An electronic device for generating user detectable multi-functional feedback with a single component in response to a stimulus signal, said electronic device (HD) comprising at least a housing (HS) and electronic circuitry located in said housing (HS),

5 c h a r a c t e r i s e d in that said electronic device further comprises:

 means (IM) for detecting said stimulus signal;

 at least one resonating vibrating element (VIB) attached to said
10 housing (HS) or on said electronic circuitry, the resonating vibrating element having the ability to produce at least two feedback signals selected from a group consisting of a haptical feedback signal, a vibratory alert signal, an audio signal, and a buzzer signal; and

 an electrical drive circuit (DC) electrically coupled to said resonating vibrating element(s) (VIB) for electrically driving said resonating vibrating element(s) (VIB) with a drive signal, said drive signal being constituted based
15 on said stimulus signal.

2. The electronic device according to claim 1, c h a r a c t e r -
i s e d in that the electronic device comprises a display (DSP) and a partially transparent lens (TP), the transparent lens area covering at least said
20 display (DSP), said resonating vibrating element(s) (VIB) being attached to an area of said lens (TP) not covering said display (DSP).

3. The electronic device according to claim 1 or 2, c h a r a c -
t e r i s e d in that said stimulus signal is one or more of the following signals:
25

 a user actuated signal;

 a radio signal received with a radio receiver (RF) of said electronic device; and

 an electronic device induced signal.

4. The electronic device according to any of the claims 1, 2 or 3,
c h a r a c t e r i s e d in that said feedback comprises one or more of the following signals:

 a haptic feedback signal;

 a vibratory alert signal;

35 an audio signal; and

 a buzzer signal.

5. The electronic device according to any of the claims 1, 2, 3 or 4, c h a r a c t e r i s e d in that the means (IM) for detecting said stimulus signal comprises one or more sensors (PS) for detecting user input.

6. The electronic device according to any of the claims 1, 2, 3, 4
5 or 5, c h a r a c t e r i s e d in that the electronic device comprises means (DM) for determining the source of said stimulus signal.

7. The electronic device according to any of the claims 1, 2, 3, 4, 5
or 6, c h a r a c t e r i s e d in that the electronic device comprises:
means (TM) for determining the resonance frequency by produc-
10 ing a bursted frequency sweep;
means (LM) for detecting the vibration level with said sensor(s)
(PS); and
means (OM) for feeding the obtained frequency to said resonating
vibrating element(s) (VIB).

8. The electronic device according to any of the claims 1, 2, 3, 4,
15 5, 6 or 7, c h a r a c t e r i s e d in that said resonating vibrating element
(VIB) is used as an acceleration sensor.

9. The electronic device according to any of the claims 1, 2, 3, 4,
5, 6, 7 or 8, c h a r a c t e r i s e d in that said resonating vibrating ele-
20 ment (VIB) is a piezo-bender of a unimorph, bimorph or multilayer structure.

10. The electronic device according to claim 9, c h a r a c -
t e r i s e d in that the electronic device comprises an external mass at-
tached to said piezo-bender.

11. The electronic device according to claim 1 or 2, c h a r a c -
25 t e r i s e d in that said housing (HS) and/or said lens (TP) is manufac-
tured so that at least one of its resonating frequencies is within the same fre-
quency range as the frequency range of said resonating vibrating element(s)
(VIB).

12. The electronic device according to any of the claims 1, 2, 3, 4,
30 5, 6, 7, 8, 9, 10 or 11, c h a r a c t e r i s e d in that the electronic device
is a hand-held electronic device.

13. A method for generating user detectable multi-functional feed-
back with a single component in response to an stimulus signal with an elec-
tronic device, said electronic device comprising at least a housing and elec-
35 tronic circuitry located in said housing,

characterised in that said electronic device comprises at least one resonating vibrating element (VIB) attached to said housing or on said electronic circuitry, the resonating vibrating element producing at least two feedback signals selected from a group consisting of a haptical
5 feedback signal, a vibratory alert signal, an audio signal, and a buzzer signal;

the method further comprising the steps of:

detecting said stimulus signal; and

electrically driving said resonating vibrating element(s) with a drive signal with an electrical drive circuit electrically coupled to said resonating
10 vibrating element(s), said drive signal being constituted based on said stimulus signal.

14. The method according to claim 13, characterised in that the electronic device comprises a display and a partially transparent lens, the transparent lens area covering at least said display, said resonating
15 vibrating element(s) being attached to an area of said lens not covering said display.

15. The method according to claim 13 or 14, characterised in that said stimulus signal comprises one or more of the following
20 signals:

a user actuated signal;
a radio signal received with a radio receiver of said electronic device; and

an electronic device induced signal.

16. The method according to any of the claims 13, 14 or 15, characterised in that said feedback comprises one or more of
25 the following signals:

a haptic feedback signal;
a vibratory alert signal;
an audio signal; and
30 a buzzer signal.

17. The method according to any of the claims 13, 14, 15 or 16, characterised in that detecting user input with one or more sensors.

18. The method according to any of the claims 13, 14, 15, 16 or
35 17, characterised in that the method comprises the step of:
determining the source of said stimulus signal.

19. The method according to any of the claims 13, 14, 15, 16, 17 or 18, c h a r a c t e r i s e d in that the method comprises the steps of:
determining the resonance frequency by producing a bursted frequency sweep;

5 detecting the vibration level with said sensor(s); and
feeding the obtained frequency to said resonating vibrating element(s).

20. The method according to any of the claims 13, 14, 15, 16, 17, 18 or 19, c h a r a c t e r i s e d in that using said resonating vibrating element as an acceleration sensor.

21. The method according to any of the claims 13, 14, 15, 16, 17, 18, 19 or 20, c h a r a c t e r i s e d in that said resonating vibrating element is a piezo-bender of a unimorph, bimorph or multilayer structure.

22. The method according to claim 21, c h a r a c t e r i s e d in that the method comprises the step of:
attaching an external mass to said piezo-bender.

23. The method according to any of the claims 13, 17, 21 or 22, c h a r a c t e r i s e d in that detecting said stimulus signal with said piezo-bender.

24. The method according to claim 12 or 13, c h a r a c t e r i s e d in that the method comprises the step of:
manufacturing said housing and/or said lens so that at least one of its resonance frequencies is within the same frequency range as the frequency range of said resonating vibrating element(s).

25. The method according to any of the claims 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23 or 24, c h a r a c t e r i s e d in that the electronic device is a hand-held electronic device.

26. A dynamic user interface for generating user detectable multifunctional feedback with a single component in response to a stimulus signal in a device, said user interface comprising at least a housing (HS) and electronic circuitry located in said housing (HS),

30 c h a r a c t e r i s e d in that said dynamic user interface further comprises:

35 means (IM) for detecting said stimulus signal;
at least one resonating vibrating element (VIB) attached to said housing (HS) or on said electronic circuitry; the resonating vibrating element

having the ability to produce at least two feedback signals selected from a group consisting of a haptical feedback signal, a vibratory alert signal, an audio signal, and a buzzer signal; and

an electrical drive circuit (DC) electrically coupled to said resonating vibrating element(s) (VIB) for electrically driving said resonating vibrating element(s) (VIB) with a drive signal, said drive signal being constituted based on said stimulus signal.

27. The dynamic user interface according to claim 26, characterized in that the device comprises a display (DSP) and a partially transparent lens (TP), the transparent lens area covering at least said display (DSP), said resonating vibrating element(s) (VIB) being attached to an area of said lens (TP) not covering said display (DSP).

28. The dynamic user interface according to claim 26 or 27, characterized in that said stimulus signal is one or more of the following signals:

- a user actuated signal;
- a radio signal received with a radio receiver (RF); and
- a device induced signal.

29. The dynamic user interface according to any of the claims 26, 27 or 28, characterized in that said feedback comprises one or more of the following signals:

- a haptic feedback signal;
- a vibratory alert signal;
- an audio signal; and
- a buzzer signal.

30. The dynamic user interface according to any of the claims 26, 27, 28 or 29, characterized in that the means (IM) for detecting said stimulus signal comprises one or more sensors (PS) for detecting user input.

31. The dynamic user interface according to any of the claims 26, 27, 28, 29 or 30, characterized in that the dynamic user interface comprises means (DM) for determining the source of said stimulus signal.

32. The dynamic user interface according to any of the claims 26, 27, 28, 29, 30 or 31, characterized in that the dynamic user interface comprises:

means (TM) for determining the resonance frequency by producing a bursted frequency sweep;

means (LM) for detecting the vibration level with said sensor(s) (PS); and

5 means (OM) for feeding the obtained frequency to said resonating vibrating element(s) (VIB).

33. The dynamic user interface according to any of the claims 26, 27, 28, 29, 30, 31 or 32, characterised in that said resonating vibrating element (VIB) is used as an acceleration sensor.

10 34. The dynamic user interface according to any of the claims 26, 27, 28, 29, 30, 31, 32 or 33, characterised in that said resonating vibrating element (VIB) is a piezo-bender of a unimorph, bimorph or multilayer structure.

15 35. The dynamic user interface according to claim 34, characterised in that the dynamic user interface comprises an external mass attached to said piezo-bender.

20 36. The dynamic user interface according to claim 26 or 27, characterised in that said housing (HS) and/or lens (TP) is manufactured so that at least one of its resonating frequencies is within the same frequency range as the frequency range of said resonating vibrating element(s) (VIB).

37. The dynamic user interface according to any of the claims 26, 27, 28, 29, 30, 31, 32, 33, 34, 35 or 36, characterised in that the device is a hand-held electronic device.

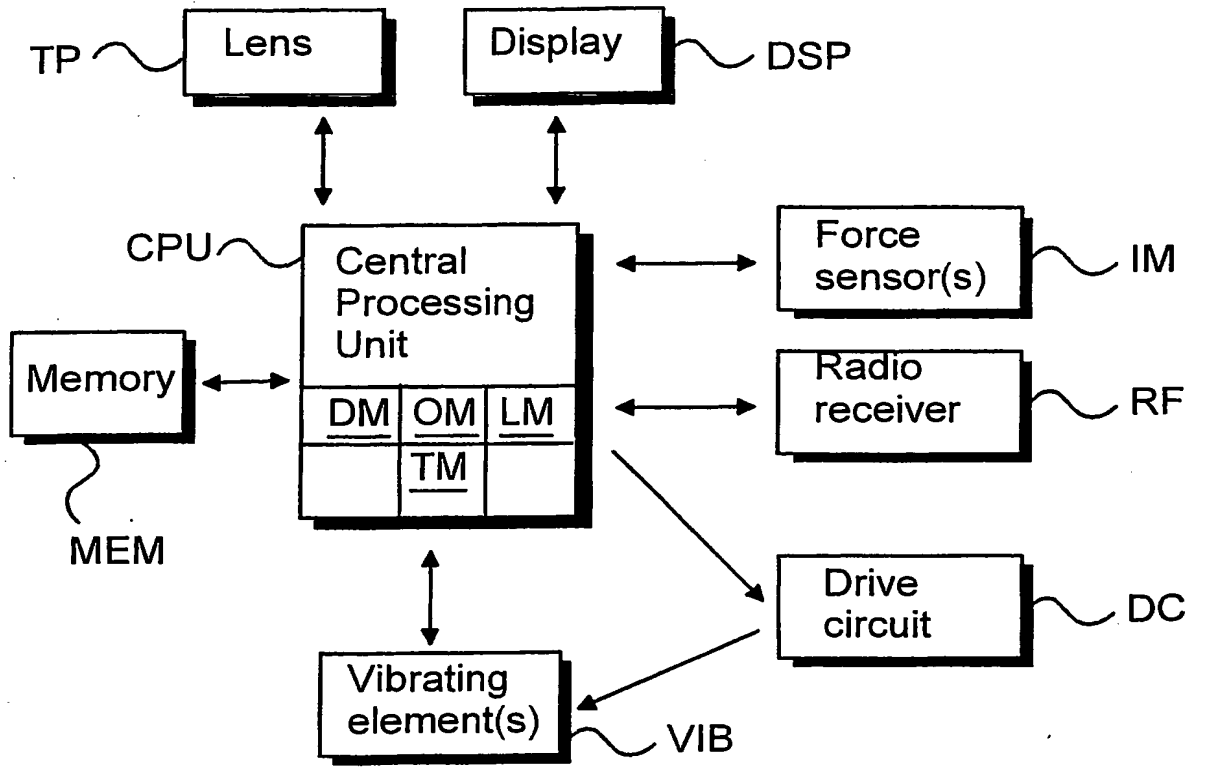


Fig. 1

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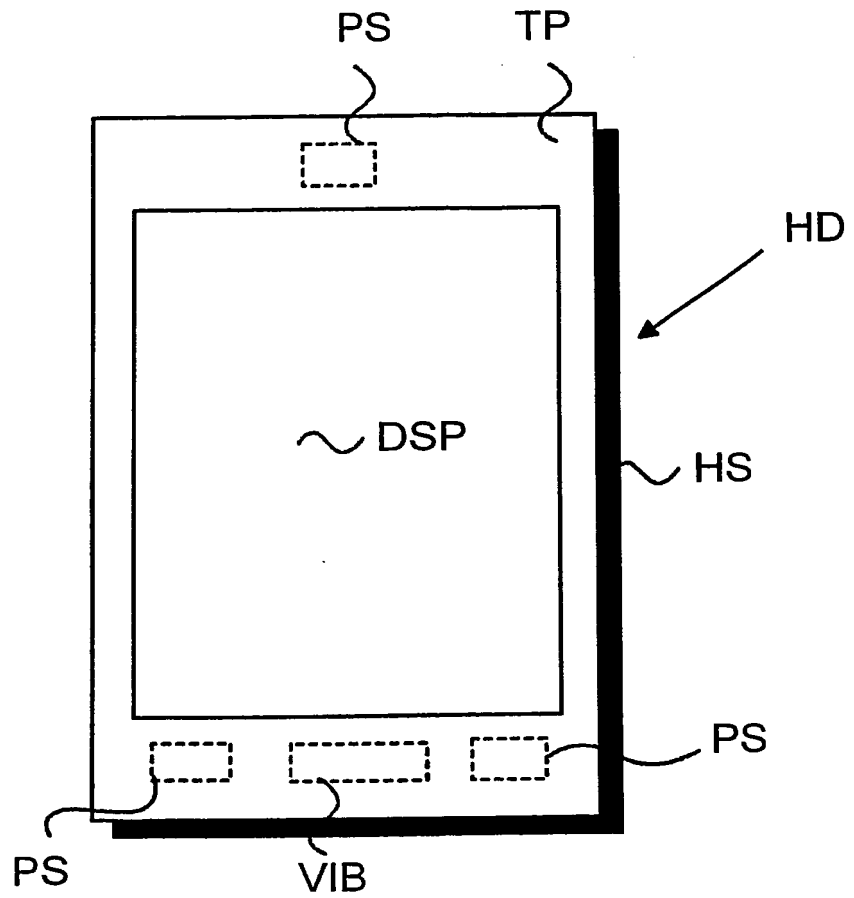


Fig. 2

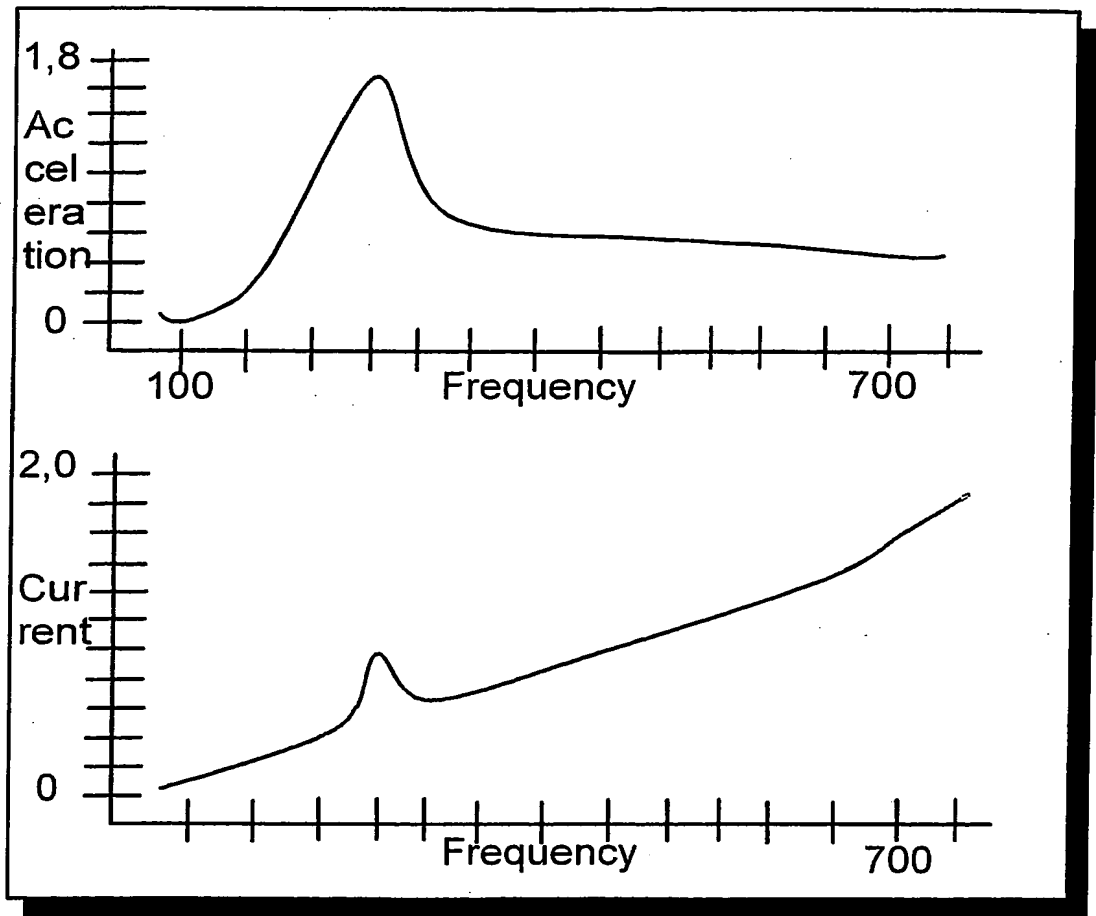


Fig. 3

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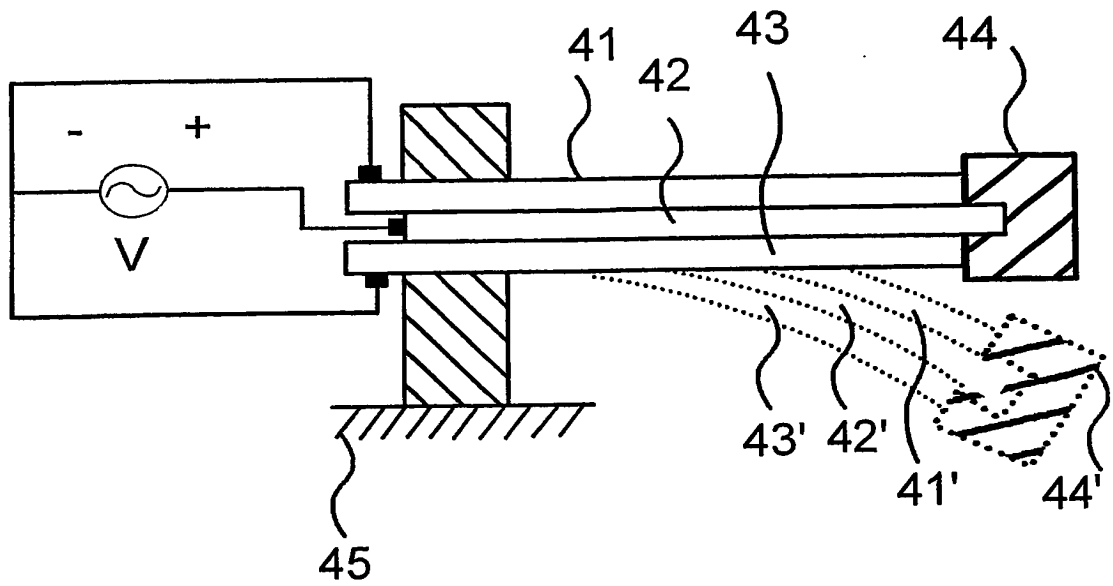


Fig. 4

INTERNATIONAL SEARCH REPORT

International application No.

PCT/FI 02/00889

A. CLASSIFICATION OF SUBJECT MATTER

IPC7: G06F 3/033, G06K 11/18

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC7: G06F, G06K

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

SE,DK,FI,NO classes as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EPO-INTERNAL, WPI DATA, PAJ

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 9200559 A1 (HEWLETT-PACKARD CO), 9 January 1992 (09.01.92), page 6, line 1 - line 26, claims 1,4, 13, abstract --	1-6,11-18, 24-31,36-37
X	US 4885565 A (EMBACH, J.T.), 5 December 1989 (05.12.89), column 1, line 20 - line 45, claim 1, abstract --	1-6,11-18, 24-31,36-37
X	WO 0152029 A2 (SONY COMPUTER ENTERTAINMENT INC), 19 July 2001 (19.07.01), page 2, line 1 - page 3, line 25, abstract --	1-6,11-18, 24-31,36-37

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Date of the actual completion of the international search

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13-02-2003

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INTERNATIONAL SEARCH REPORT

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C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	DE 4323863 A1 (ANDROMEDA GESELLSCHAFT FÜR COMPUTER- UND ROBOTER PRODUKTE MBH), 19 January 1995 (19.01.95), column 1, line 1 - line 56, claims 1-2, abstract --	1-6, 11-18, 24-31, 36-37
P,X	US 2002033795 A1 (SHAHOIAN, E.J. ET AL), 21 March 2002 (21.03.02), [0007] - [0014] -- -----	1-6, 11-18, 24-31, 36-37

INTERNATIONAL SEARCH REPORT
 Information on patent family members

30/12/02

International application No.
 PCT/FI 02/00889

Patent document cited in search report			Publication date	Patent family member(s)		Publication date
WO	9200559	A1	09/01/92	GB	9014130 D	00/00/00
US	4885565	A	05/12/89	NONE		
WO	0152029	A2	19/07/01	EP	1247152 A	09/10/02
DE	4323863	A1	19/01/95	NONE		
US	2002033795	A1	21/03/02	WO	02073587 A	19/09/02
				AU	2954301 A	31/07/01
				US	6429846 B	06/08/02
				US	2001035854 A	01/11/01
				WO	0154109 A	26/07/01

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ART UNIT: 2629 PAPER NUMBER:
DATE MAILED: 11/01/2006

Table with 5 columns: APPLICATION NO., FILING DATE, FIRST NAMED INVENTOR, ATTORNEY DOCKET NO., CONFIRMATION NO.
Row 1: 11/249,009, 10/11/2005, Beth Marcus, 19146-005001, 9446
TITLE OF INVENTION: HUMAN INTERFACE INPUT ACCELERATION SYSTEM

Table with 7 columns: APPLN. TYPE, SMALL ENTITY, ISSUE FEE DUE, PUBLICATION FEE DUE, PREV. PAID ISSUE FEE, TOTAL FEE(S) DUE, DATE DUE
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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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11/249,009 10/11/2005 Beth Marcus 19146-005001 9446

TITLE OF INVENTION: HUMAN INTERFACE INPUT ACCELERATION SYSTEM

APPLN. TYPE	SMALL ENTITY	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
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nonprovisional YES \$700 \$300 \$0 \$1000 02/01/2007

EXAMINER	ART UNIT	CLASS-SUBCLASS
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OSORIO, RICARDO 2629 345-156000

1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363).
 Change of correspondence address (or Change of Correspondence Address form PTO/SB/122) attached.
 "Fee Address" indication (or "Fee Address" Indication form PTO/SB/47; Rev 03-02 or more recent) attached. Use of a Customer Number is required.

2. For printing on the patent front page, list
 (1) the names of up to 3 registered patent attorneys or agents OR, alternatively, 1 _____
 (2) the name of a single firm (having as a member a registered attorney or agent) and the names of up to 2 registered patent attorneys or agents. If no name is listed, no name will be printed. 2 _____
 3 _____

3. ASSIGNEE NAME AND RESIDENCE DATA TO BE PRINTED ON THE PATENT (print or type)

PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. If an assignee is identified below, the document has been filed for recordation as set forth in 37 CFR 3.11. Completion of this form is NOT a substitute for filing an assignment.

(A) NAME OF ASSIGNEE (B) RESIDENCE: (CITY and STATE OR COUNTRY)

Please check the appropriate assignee category or categories (will not be printed on the patent): Individual Corporation or other private group entity Government

4a. The following fee(s) are submitted:

- Issue Fee
- Publication Fee (No small entity discount permitted)
- Advance Order - # of Copies _____

4b. Payment of Fee(s): (Please first reapply any previously paid issue fee shown above)

- A check is enclosed.
- Payment by credit card. Form PTO-2038 is attached.
- The Director is hereby authorized to charge the required fee(s), any deficiency, or credit any overpayment, to Deposit Account Number _____ (enclose an extra copy of this form).

5. Change in Entity Status (from status indicated above)

- a. Applicant claims SMALL ENTITY status. See 37 CFR 1.27.
- b. Applicant is no longer claiming SMALL ENTITY status. See 37 CFR 1.27(g)(2).

NOTE: The Issue Fee and Publication Fee (if required) will not be accepted from anyone other than the applicant; a registered attorney or agent; or the assignee or other party in interest as shown by the records of the United States Patent and Trademark Office.

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This collection of information is required by 37 CFR 1.311. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, Virginia 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, Virginia 22313-1450.

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Table with 5 columns: APPLICATION NO., FILING DATE, FIRST NAMED INVENTOR, ATTORNEY DOCKET NO., CONFIRMATION NO.
11/249,009 10/11/2005 Beth Marcus 19146-005001 9446

20985 7590 11/01/2006
FISH & RICHARDSON, PC
P.O. BOX 1022
MINNEAPOLIS, MN 55440-1022

EXAMINER

OSORIO, RICARDO

ART UNIT PAPER NUMBER

2629

DATE MAILED: 11/01/2006

Determination of Patent Term Adjustment under 35 U.S.C. 154 (b)

(application filed on or after May 29, 2000)

The Patent Term Adjustment to date is 0 day(s). If the issue fee is paid on the date that is three months after the mailing date of this notice and the patent issues on the Tuesday before the date that is 28 weeks (six and a half months) after the mailing date of this notice, the Patent Term Adjustment will be 0 day(s).

If a Continued Prosecution Application (CPA) was filed in the above-identified application, the filing date that determines Patent Term Adjustment is the filing date of the most recent CPA.

Applicant will be able to obtain more detailed information by accessing the Patent Application Information Retrieval (PAIR) WEB site (http://pair.uspto.gov).

Any questions regarding the Patent Term Extension or Adjustment determination should be directed to the Office of Patent Legal Administration at (571)-272-7702. Questions relating to issue and publication fee payments should be directed to the Customer Service Center of the Office of Patent Publication at 1-(888)-786-0101 or (571)-272-4200.

Notice of Allowability

Application No.	Applicant(s)	
11/249,009	MARCUS ET AL	
Examiner	Art Unit	
RICARDO L. OSORIO	2629	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

- 1. This communication is responsive to 8/17/2006.
- 2. The allowed claim(s) is/are 1-38.
- 3. Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 - a) All b) Some* c) None of the:
 - 1. Certified copies of the priority documents have been received.
 - 2. Certified copies of the priority documents have been received in Application No. _____.
 - 3. Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

* Certified copies not received: _____.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.
THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

- 4. A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.
- 5. CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
 - (a) including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
 - 1) hereto or 2) to Paper No./Mail Date _____.
 - (b) including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.

Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).
- 6. DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

- 1. Notice of References Cited (PTO-892)
- 2. Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3. Information Disclosure Statements (PTO/SB/08), Paper No./Mail Date _____
- 4. Examiner's Comment Regarding Requirement for Deposit of Biological Material
- 5. Notice of Informal Patent Application
- 6. Interview Summary (PTO-413), Paper No./Mail Date _____
- 7. Examiner's Amendment/Comment
- 8. Examiner's Statement of Reasons for Allowance
- 9. Other _____

DETAILED ACTION

1. After considering arguments traversing the restriction requirement in REMARKS filed 8/17/2006, examiner is persuaded by the arguments and is now withdrawing the restriction requirement, and claims 1-38 will be examined together.

Allowable Subject Matter

2. Claims 1-38 are allowed.

3. The following is an examiner's statement of reasons for allowance: Claims 1-38 are allowable since certain key features of the claimed invention are not taught or fairly suggested by the prior art. In claims 1 and 27, "an input controller communicatively coupled to the input assembly and the communication channel, the input controller being configured to generate an input signal upon actuation of at least one of the plurality of input elements and being further configured to relay the input signal to the communication channel for transmission to the hand-held host device to control execution of the one or more functions of the software application mapped to the actuated input element". In claim 16, "connecting the input assembly to the communication channel using an input controller configured to generate an input signal upon actuation of at least one of the plurality of input elements and being further configured to relay the input signal to the communication channel for transmission to the hand-held host device to control execution of the one or more functions of the software application mapped to the actuated input element". The closest prior art Patil et al. (6,489,976) discloses activating an input or accelerator key corresponding to a symbol displayed in the pop-up portion associated with an option icon for that option, however singularly or in combination fails to anticipate or render the above underlined limitations obvious.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Ricardo L. Osorio whose telephone number is 571-272-7676. The examiner can normally be reached on Monday through Thursday from 7:00 A.M. to 5:30

Art Unit: 2629

P.M. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Bipin Shalwala whose telephone number is 571-272-7681.

Any response to this action should be mailed to:

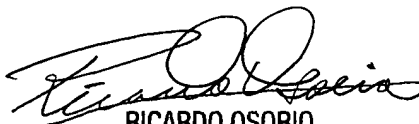
Commissioner of Patents and Trademarks

Washington, D.C. 20231

or faxed to: 571-273-8300 (for Technology Center 2600 only)

Hand-delivered responses should be brought to the Customer Service Window at the Randolph Building, 401, Dulany Street, Alexandria, VA 22314.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).


RICARDO OSORIO
PRIMARY EXAMINER
Technology Division: 2629

RLO
October 28, 2006

Notice of References Cited	Application/Control No. 11/249,009	Applicant(s)/Patent Under Reexamination MARCUS ET AL.	
	Examiner RICARDO L. OSORIO	Art Unit 2629	Page 1 of 1

U.S. PATENT DOCUMENTS

*	Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	Classification
*	A US-6,489,976	12-2002	Patil et al.	715/827
*	B US-6,461,238	10-2002	Rehkemper et al.	463/6
*	C US-6,094,197	07-2000	Buxton et al.	715/863
*	D US-5,943,054	08-1999	Hirano et al.	715/827
*	E US-5,287,514	02-1994	Gram, Raymond D.	715/826
*	F US-5,825,362	10-1998	Retter, Dale	715/854
*	G US-2002/0023265	02-2002	Metcalfe, Darrell J.	725/74
*	H US-2003/0095288	05-2003	Hung et al.	358/296
	I US-			
	J US-			
	K US-			
	L US-			
	M US-			

FOREIGN PATENT DOCUMENTS

*	Document Number Country Code-Number-Kind Code	Date MM-YYYY	Country	Name	Classification
	N				
	O				
	P				
	Q				
	R				
	S				
	T				

NON-PATENT DOCUMENTS

*	Include as applicable: Author, Title Date, Publisher, Edition or Volume, Pertinent Pages)
U	
V	
W	
X	

*A copy of this reference is not being furnished with this Office action. (See MPEP § 707.05(a).)
Dates in MM-YYYY format are publication dates. Classifications may be US or foreign.



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Bib Data Sheet

CONFIRMATION NO. 9446

SERIAL NUMBER 11/249,009	FILING OR 371(c) DATE 10/11/2005 RULE	CLASS 345	GROUP ART UNIT 2629	ATTORNEY DOCKET NO. 19146-005001
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APPLICANTS

Beth Marcus, Bedford, MA;
 Elaine Chen, Arlington, MA;
 Rob Podoloff, Framingham, MA;
 Lorraine Wheeler, Billerica, MA;

** CONTINUING DATA ***** *No RLO*

** FOREIGN APPLICATIONS ***** *No RLO*

IF REQUIRED, FOREIGN FILING LICENSE GRANTED ** SMALL ENTITY **
 ** 11/02/2005

Foreign Priority claimed <input type="checkbox"/> yes <input checked="" type="checkbox"/> no	STATE OR COUNTRY MA	SHEETS DRAWING 13	TOTAL CLAIMS 38	INDEPENDENT CLAIMS 3
35 USC 119 (a-d) conditions met <input type="checkbox"/> yes <input checked="" type="checkbox"/> no <input type="checkbox"/> Met after Allowance				
Verified and Acknowledged <i>[Signature]</i> Examiner's Signature	<i>RLO</i> Initials			


ADDRESS


20985

TITLE

Human interface input acceleration system

FILING FEE RECEIVED 1015	FEES: Authority has been given in Paper No. _____ to charge/credit DEPOSIT ACCOUNT No. _____ for following:	<input type="checkbox"/> All Fees
		<input type="checkbox"/> 1.16 Fees (Filing)
		<input type="checkbox"/> 1.17 Fees (Processing Ext. of time)
		<input type="checkbox"/> 1.18 Fees (Issue)
		<input type="checkbox"/> Other _____
		<input type="checkbox"/> Credit

Issue Classification 	Application/Control No. 11/249,009	Applicant(s)/Patent under Reexamination MARCUS ET AL.
	Examiner RICARDO L. OSORIO	Art Unit 2629

ISSUE CLASSIFICATION									
ORIGINAL					INTERNATIONAL CLASSIFICATION				
CLASS		SUBCLASS			CLAIMED			NON-CLAIMED	
345		156			6	09	6	5100	
CROSS REFERENCES									/
CLASS	SUBCLASS (ONE SUBCLASS PER BLOCK)								/
345	169								/
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(Assistant Examiner) (Date)					 RICARDO OSORIO PRIMARY EXAMINER (Primary Examiner) (Date) 10/30/06			Total Claims Allowed: 38	
(Legal Instruments Examiner) (Date)								O.G. Print Claim(s) 1	O.G. Print Fig. 4

<input type="checkbox"/> Claims renumbered in the same order as presented by applicant		<input type="checkbox"/> CPA		<input type="checkbox"/> T.D.		<input type="checkbox"/> R.1.47		
Final	Original	Final	Original	Final	Original	Final	Original	
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3	7	35	37	67	97	127	157	187
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14	10		40	70	100	130	160	190
15	11		41	71	101	131	161	191
5	12		42	72	102	132	162	192
6	13		43	73	103	133	163	193
7	14		44	74	104	134	164	194
8	15		45	75	105	135	165	195
16	16		46	76	106	136	166	196
17	17		47	77	107	137	167	197
18	18		48	78	108	138	168	198
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24	26		56	86	116	146	176	206
27	27		57	87	117	147	177	207
28	28		58	88	118	148	178	208
29	29		59	89	119	149	179	209
30	30		60	90	120	150	180	210

11/249,009

EAST Search History

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L1	0	11/249,001	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2006/10/30 02:35
L2	0	(input adj acceleration adj system).ti.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2006/10/30 02:36
L3	261	(human adj interface).ti.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2006/10/30 02:36
L4	0	3 and input adj accelerat\$4	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2006/10/30 02:40
L5	2267	input adj accelerat\$4	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2006/10/30 02:41
L6	729	input adj accelerator	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2006/10/30 02:41
L7	7	6 and (handheld or hand-held)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2006/10/30 02:42
L8	11	("4914732" "5287514" "5825362" "5943054" "5969718" "6094197" "6094529" "6141011" "6236987" "6313851" "6344865").PN. OR ("6489976").URPN.	US-PGPUB; USPAT; USOCR	OR	ON	2006/10/30 02:53

EAST Search History

L9	157969	((handheld or hend-held or portable or palm adj top) adj computer or pda or (cell\$5 adj \$4phone))	US-PGPUB; USPAT; USOCR	OR	ON	2006/10/30 02:57
L10	1917	9 and (hand-held or handheld) near3 control\$4	US-PGPUB; USPAT; USOCR	OR	ON	2006/10/30 02:58
L11	43	10 and input adj controller	US-PGPUB; USPAT; USOCR	OR	ON	2006/10/30 02:58
L12	9	11 and interfac\$4 near3 (handheld or hand-held)	US-PGPUB; USPAT; USOCR	OR	ON	2006/10/30 02:59
L13	8	11 and communicat\$4 near3 (handheld or hand-held)	US-PGPUB; USPAT; USOCR	OR	ON	2006/10/30 02:59
L14	16	12 13	US-PGPUB; USPAT; USOCR	OR	ON	2006/10/30 02:59
L15	16	12 or 13	US-PGPUB; USPAT; USOCR	OR	ON	2006/10/30 03:00
L16	0	15 and (sav\$4 or minimiz\$4 or limit\$4 or control\$4) near3 actuation	US-PGPUB; USPAT; USOCR	OR	ON	2006/10/30 03:00
L17	16	15 and (sav\$4 or minimiz\$4 or limit\$4 or control\$4) near3 (actuation or selection or input\$4)	US-PGPUB; USPAT; USOCR	OR	ON	2006/10/30 03:01
L18	7	17 and accelerat\$4	US-PGPUB; USPAT; USOCR	OR	ON	2006/10/30 03:03
L19	9	17 not 18	US-PGPUB; USPAT; USOCR	OR	ON	2006/10/30 03:06
L20	0	(input adj accelerator and hand-held adj host adj device and communication adj channel and input and assembly and input adj controller and software adj application).clm.	US-PGPUB; USPAT; USOCR	OR	ON	2006/10/30 03:07

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Attorney's Docket No.: 19146-005001

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AUG 17 2006

Applicant : Beth Marcus, et al	Art Unit : 2629
Serial No. : 11/249,009	Examiner : Ricardo Osorio
Filed : October 11, 2005	Conf. No. : 9446
Title : HUMAN INTERFACE INPUT ACCELERATION SYSTEM	

Mail Stop Amendment
 Commissioner for Patents
 P.O. Box 1450
 Alexandria, VA 22313-1450

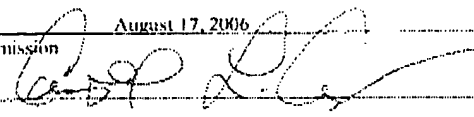
RESPONSE TO RESTRICTION REQUIREMENT

In response to the Office Action mailed July 17, 2006, Applicants elect, with traverse, the invention of Group 2 drawn to the embodiment of species 2 of Fig. 2.

CERTIFICATE OF TRANSMISSION BY FACSIMILE

I hereby certify that this correspondence is being transmitted by facsimile to the Patent and Trademark Office on the date indicated below.

 Date of Transmission August 17, 2006

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 Typed or Printed Name of Person Signing Certificate Carroll Allmon

AUG 17 2006

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Attorney's Docket No.: 19146-005001

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Number of pages including this page **4**

Applicant : Beth Marcus, et al
Serial No. : 11/249,009
Filed : October 11, 2005

Art Unit : 2629
Examiner : Ricardo Osorio

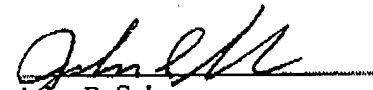
Title : Human Interface Input Acceleration System

Mail Stop Amendment
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

A Response to Restriction Requirement dated **August 17, 2006**, is attached.

Respectfully submitted,

Date: August 17, 2006


John P. Schnurer
Reg. No. 52,196

Fish & Richardson P.C.
PTO Customer No. 20985
12390 El Camino Real
San Diego, California 92130
Telephone: (858) 678-5070
Fax: (858) 678-5099

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Serial No. : 11/249,009
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Page : 2 of 3

Attorney's Docket No.: 19146-005001

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The Office Action identified the following allegedly patentably distinct species: Fig. 1 directed to species 1; Fig. 2 directed to species 2; Figs. 5a-5d directed to species 3; Figs. 6 directed to species 4, and Figs. 7a-7d directed to species 5. See Office Action at page 2 ¶ 1. Claims 1-38 are generic to all species.

Applicants respectfully request reconsideration of the restriction requirement pursuant to 37 C.F.R. § 1.143 and that the requirement be withdrawn since the Office Action does not clearly articulate the reasons for holding that the alleged distinct species are present.

The Office Action alleges that Figures 1, 2, 5a-5d, 6, 7a-7d comprise five patentably distinct species. The Examiner has the burden to concisely state, "[t]he particular reasons relied on ... for holding that the inventions as claimed are independent or distinct." See M.P.E.P. § 808.01. However, the Office Action does not state any such reasons, but instead apparently bases the restriction solely on the cited Figures. See Office Action at pg. 2, ¶ 1. As such, Applicants respectfully request that the Examiner concisely state the particular reasons for holding the inventions independent and distinct.

Nonetheless, each of the figures cited in the Office Action depicts an input accelerator device with an input assembly that can include a front input assembly, a rear input assembly, and a side input assembly. See Specification at ¶¶ 0045 - 46. Fig. 1 depicts "a high-level block diagram of a hand-held input accelerator device 100 upon which the human interface and input system and associated input techniques described herein may be implemented for controlling software applications stored and running on a hand-held host device 117." See *id.* at ¶ 0036. Fig. 2 is a depiction of an input accelerator device that includes "optional hardware components." Figs. 3 and 4 further illustrate the interface and input system 114 present in both Figs. 1 and 2 to depict an input controller 316, a front input assembly, a rear assembly, and a side assembly. See *id.* at ¶¶ 0045-46. Figs 5a-5d, 6, and 7a-7d depict some of the possible combinations of various input elements that may be disposed on the front, rear, and side assemblies. See *id.* at ¶¶ 0062-67. For example, the specification describes that "the input elements ... of the front input assembly 526, the side input elements ... of the side input assembly 519, and the back input elements ... of the rear input assembly 528 in this implementation and any other implementations may be analog and/or digital buttons, keys,

Applicant : Beth Marcus, et al
Serial No. : 11/249,009
Filed : October 11, 2005
Page : 3 of 3

Attorney's Docket No.: 19146-005001

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rockers (which may be a one or more position buttons or an analog joystick-type button), sliders, dials or touch pads used in combination with pressure sensors (such as force sensitive resistors, piezoelectric resistive sensors, and capacitive sensors), positional sensors (such as rotary encoders, linear potentiometers and the like), miniature analog thumb joysticks or other sensors or a combination of them." *See id.* at 0062. Thus, Figs. 1-4 describe the internal hardware components of an accelerator device and Figs 5a-5d, 6, and 7a-7d, are only illustrative of the above mentioned variations in the input elements disposed on the front, rear, and side assemblies of an input acceleration device. For at least these reasons, the election/restriction of species requirement is improper and should be withdrawn.

Upon the allowance of generic claims 1-38, Applicants reserve the right to consideration of claims to additional species which depend from or otherwise require all the limitations of an allowable generic claim as provided by 37 CFR 1.141.

Please apply any charges or credits to Deposit Account No. 06-1050.

Respectfully submitted,

Date: August 17, 2006



John P. Schnurer
Reg. No. 52,196

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12390 El Camino Real
San Diego, California 92130
Telephone: (858) 678-5070
Facsimile: (858) 678-5099

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PATENT APPLICATION FEE DETERMINATION RECORD

Substitute for Form PTO-875

Application or Docket Number

11249009

APPLICATION AS FILED - PART I

(Column 1) (Column 2)

SMALL ENTITY

OR

OTHER THAN SMALL ENTITY

FOR	NUMBER FILED	NUMBER EXTRA
BASIC FEE (37 CFR 1.18(a), (b), or (c))		
SEARCH FEE (37 CFR 1.18(k), (l), or (m))		
EXAMINATION FEE (37 CFR 1.18(o), (p), or (q))		
TOTAL CLAIMS (37 CFR 1.18(i))	38 minus 20 =	18
INDEPENDENT CLAIMS (37 CFR 1.18(h))	3 minus 3 =	
APPLICATION SIZE FEE (37 CFR 1.18(e))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is \$250 (\$125 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR	
MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))		

RATE (\$)	FEE (\$)
	150
	250
	100
X\$ 25=	450
X\$100=	
TOTAL	950

RATE (\$)	FEE (\$)
X\$50=	
X\$200=	
N/A	
TOTAL	

* If the difference in column 1 is less than zero, enter "0" in column 2.

APPLICATION AS AMENDED - PART II

(Column 1) (Column 2) (Column 3)

SMALL ENTITY

OR

OTHER THAN SMALL ENTITY

08/17/06

AMENDMENT A	CLAIMS REMAINING AFTER AMENDMENT	HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA
Total (37 CFR 1.16(i))	38	38	0
Independent (37 CFR 1.16(h))	3	3	0
Application Size Fee (37 CFR 1.18(s))			
FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))			

RATE (\$)	ADDITIONAL FEE (\$)
X\$ 25 =	0
X\$100 =	0
TOTAL ADD'T FEE	0

RATE (\$)	ADDITIONAL FEE (\$)
X =	
X =	
N/A	
TOTAL ADD'T FEE	

(Column 1) (Column 2) (Column 3)

SMALL ENTITY

OR

OTHER THAN SMALL ENTITY

AMENDMENT B	CLAIMS REMAINING AFTER AMENDMENT	HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA
Total (37 CFR 1.16(i))			
Independent (37 CFR 1.16(h))			
Application Size Fee (37 CFR 1.18(s))			
FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))			

RATE (\$)	ADDITIONAL FEE (\$)
X =	
X =	
N/A	
TOTAL ADD'T FEE	

RATE (\$)	ADDITIONAL FEE (\$)
X =	
X =	
N/A	
TOTAL ADD'T FEE	

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.

** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".

*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".

The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1.

This collection of information is required by 37 CFR 1.16. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1460, Alexandria, VA 22313-1460.

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
11/249,009	10/11/2005	Beth Marcus	19146-005001	9446

20985 7590 07/17/2006
FISH & RICHARDSON, PC
P.O. BOX 1022
MINNEAPOLIS, MN 55440-1022

EXAMINER

OSORIO, RICARDO

ART UNIT PAPER NUMBER

2629

DATE MAILED: 07/17/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

DETAILED ACTION

Election/Restrictions

1. This application contains claims directed to the following patentably distinct species: Fig. 1 is directed to species # 1, Fig. 2 is directed to species # 2, Figs 5a-d are directed to species # 3, Fig. 6 is directed to species # 4, and Figs. 7a-d are directed to species # 5.

Applicant is required under 35 U.S.C. 121 to elect a single disclosed species for prosecution on the merits to which the claims shall be restricted if no generic claim is finally held to be allowable. Currently, there are no generic claims.

Applicant is advised that a reply to this requirement must include an identification of the species that is elected consonant with this requirement, and a listing of all claims readable thereon, including any claims subsequently added. An argument that a claim is allowable or that all claims are generic is considered nonresponsive unless accompanied by an election.

Upon the allowance of a generic claim, applicant will be entitled to consideration of claims to additional species which depend from or otherwise require all the limitations of an allowable generic claim as provided by 37 CFR 1.141. If claims are added after the election, applicant must indicate which are readable upon the elected species. MPEP § 809.02(a).

2. Applicant is advised that the reply to this requirement to be complete must include (i) an election of a species or invention to be examined even though the requirement be traversed (37 CFR 1.143) and (ii) identification of the claims encompassing the elected invention.

The election of an invention or species may be made with or without traverse. To reserve a right to petition, the election must be made with traverse. If the reply does not distinctly and

Art Unit: 2629

specifically point out supposed errors in the restriction requirement, the election shall be treated as an election without traverse.

Should applicant traverse on the ground that the inventions or species are not patentably distinct, applicant should submit evidence or identify such evidence now of record showing the inventions or species to be obvious variants or clearly admit on the record that this is the case. In either instance, if the examiner finds one of the inventions unpatentable over the prior art, the evidence or admission may be used in a rejection under 35 U.S.C.103(a) of the other invention.

3. Applicant is reminded that upon the cancellation of claims to a non-elected invention, the inventorship must be amended in compliance with 37 CFR 1.48(b) if one or more of the currently named inventors is no longer an inventor of at least one claim remaining in the application. Any amendment of inventorship must be accompanied by a request under 37 CFR 1.48(b) and by the fee required under 37 CFR 1.17(i).

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Ricardo L. Osorio whose telephone number is 571-272-7676. The examiner can normally be reached on Monday through Thursday from 7:00 A.M. to 5:30 P.M. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Bipin Shalwala whose telephone number is 571-272-7681.

Any response to this action should be mailed to:

Commissioner of Patents and Trademarks

Washington, D.C. 20231

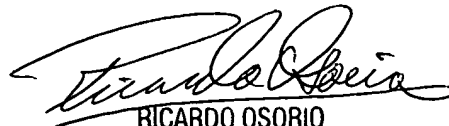
or faxed to: 571-273-8300 (for Technology Center 2600 only)

Hand-delivered responses should be brought to the Customer Service Window at the Randolph Building, 401, Dulany Street, Alexandria, VA 22314.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be

Art Unit: 2629

obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



RICARDO OSORIO
PRIMARY EXAMINER
Technology Division: 2629

RLO
July 13, 2006

Index of Claims



Application/Control No.

11/249,009

Examiner

RICARDO L. OSORIO

Applicant(s)/Patent under Reexamination

MARCUS ET AL.

Art Unit

2629

√	Rejected
=	Allowed

—	(Through numeral) Cancelled
÷	Restricted

N	Non-Elected
I	Interference

A	Appeal
O	Objected

Claim		Date	
Final	Original		
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No. 7/13/08
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APPLICATION NUMBER	FILING OR 371 (c) DATE	FIRST NAMED APPLICANT	ATTORNEY DOCKET NUMBER
11/249,009	10/11/2005	Beth Marcus	19146-005001

CONFIRMATION NO. 9446
FORMALITIES LETTER

20985
FISH & RICHARDSON, PC
P.O. BOX 1022
MINNEAPOLIS, MN 55440-1022

Date Mailed: 11/03/2005

NOTICE TO FILE MISSING PARTS OF NONPROVISIONAL APPLICATION

01/04/2006 RFEKADU1 00000042 11249009

FILED UNDER 37 CFR 1.53(b)

01 FC:2011	150.00 OP
02 FC:2111	250.00 OP
03 FC:2311	100.00 OP
04 FC:2051	65.00 OP
05 FC:2202	450.00 OP

Filing Date Granted

Items Required To Avoid Abandonment:

An application number and filing date have been accorded to this application. The item(s) indicated below, however, are missing. Applicant is given **TWO MONTHS** from the date of this Notice within which to file all required items and pay any fees required below to avoid abandonment. Extensions of time may be obtained by filing a petition accompanied by the extension fee under the provisions of 37 CFR 1.136(a).

- The statutory basic filing fee is missing.
Applicant must submit \$ 150 to complete the basic filing fee for a small entity.
- The oath or declaration is missing. *A properly signed oath or declaration in compliance with 37 CFR 1.63, identifying the application by the above Application Number and Filing Date, is required.*
Note: If a petition under 37 CFR 1.47 is being filed, an oath or declaration in compliance with 37 CFR 1.63 signed by all available joint inventors, or if no inventor is available by a party with sufficient proprietary interest, is required.

The application is informal since it does not comply with the regulations for the reason(s) indicated below.

The required item(s) identified below must be timely submitted to avoid abandonment:

- Replacement drawings in compliance with 37 CFR 1.84 and 37 CFR 1.121(d) are required. The drawings submitted are not acceptable because:
 - The drawings submitted to the Office are not electronically reproducible. Drawing sheets must be submitted on paper, which is flexible, strong, white, smooth, non-shiny, and durable (see 37 CFR 1.84(e)). See Figure(s) 5a, 5c, 6, 7a-7c.

Applicant is cautioned that correction of the above items may cause the specification and drawings page count to exceed 100 pages. If the specification and drawings exceed 100 pages, applicant will need to submit the required application size fee.

The applicant needs to satisfy supplemental fees problems indicated below.

01/04/2006 RFEKADU1-00000042-11249009

~~01 FC:2011~~
~~02 FC:2111~~

~~150.00 OP~~
~~250.00 OP~~

100.00 OP

~~03 FC:2311~~

65.00 OP

The required item(s) identified below must be timely submitted to avoid abandonment:

- Additional claim fees of **\$450** as a small entity, including any required multiple dependent claim fee, are required. Applicant must submit the additional claim fees or cancel the additional claims for which fees are due.
- To avoid abandonment, a surcharge (for late submission of filing fee, search fee, examination fee or oath or declaration) as set forth in 37 CFR 1.16(f) of \$65 for a small entity in compliance with 37 CFR 1.27, must be submitted with the missing items identified in this letter.

SUMMARY OF FEES DUE:

Total additional fee(s) required for this application is **\$1015** for a Small Entity


- **\$150** Statutory basic filing fee.
- **\$65** Surcharge.

- The application search fee has not been paid. Applicant must submit **\$250** to complete the search fee.
- The application examination fee has not been paid. Applicant must submit **\$100** to complete the examination fee for a small entity in compliance with 37 CFR 1.27

- Total additional claim fee(s) for this application is **\$450**
 - **\$450** for **18** total claims over 20.

Replies should be mailed to: Mail Stop Missing Parts
Commissioner for Patents
P.O. Box 1450
Alexandria VA 22313-1450

*A copy of this notice **MUST** be returned with the reply.*


Office of Initial Patent Examination (571) 272-4000, or 1-800-PTO-9199, or 1-800-972-6382
PART 2 - COPY TO BE RETURNED WITH RESPONSE



IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant : Beth Marcus, et al Art Unit : 2819
Serial No. : 11/249,009 Examiner : Unknown
Filed : October 11, 2005
Title : HUMAN INTERFACE INPUT ACCELERATION SYSTEM

MAIL STOP MISSING PARTS

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

RESPONSE TO NOTICE TO FILE MISSING PARTS OF APPLICATION

In response to the Notice to File Missing Parts of Application under 37 CFR §1.53(b) mailed November 3, 2005 (copy enclosed), applicant claims small entity status (see 37 CFR 1.27) and submits herewith the following:

- Payment of the basic filing fee of \$150;
Payment of the search fee of \$250;
Payment of the examination fee of \$100;
Payment of the additional/multiple dependent claims fees of \$450;
Payment of the surcharge of \$65 for late filing of the basic filing fee and/or declaration;
A Combined Declaration and Power of Attorney in compliance with 37 CFR §1.63;
Replacement drawings (13 sheets) that comply with the size requirements and that are clear and in permanent ink. The replacements contain the same material as the drawings on deposit;

CERTIFICATE OF MAILING BY FIRST CLASS MAIL

I hereby certify under 37 CFR §1.8(a) that this correspondence is being deposited with the United States Postal Service as first class mail with sufficient postage on the date indicated below and is addressed to the Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

Date of Deposit: December 29, 2005
Signature: [Handwritten Signature]

Carroll Allman
Typed or Printed Name of Person Signing Certificate

Applicant : Beth Marcus, et al
Serial No. : 11/249,009
Filed : October 11, 2005
Page : 2 of 2

Attorney's Docket No.: 19146-005001

A check in the total amount of \$1015 is attached;

It is understood that this perfects the application and no additional papers or filing fees are required. Please apply any other charges or credits to Deposit Account No. 06-1050.

Respectfully submitted,

Date: December 29, 2005



John P. Schnurer
Reg. No. 52,196

Fish & Richardson P.C.
PTO Customer No. 20985
12390 El Camino Real
San Diego, California 92130
Telephone: (858) 678-5070
Facsimile: (858) 678-5099

10582891.doc



COMBINED DECLARATION AND POWER OF ATTORNEY

As a below named inventor, I hereby declare that:

My residence, post office address and citizenship are as stated below next to my name.

I believe I am an original, first and joint inventor of the subject matter which is claimed and for which a patent is sought on the invention entitled HUMAN INTERFACE INPUT ACCELERATION SYSTEM, the specification of which:

[X] was filed on October 11, 2005 as Application Serial No. 11/249,009 .

I hereby state that I have reviewed and understand the contents of the above-identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose all information I know to be material to patentability in accordance with Title 37, Code of Federal Regulations, §1.56.

I hereby appoint the following attorneys and/or agents to prosecute this application and to transact all business in the Patent and Trademark Office connected therewith:

John C. Phillips, Reg. No. 35,322
Scott C. Harris, Reg. No. 32,030
David L. Feigenbaum, Reg. No. 30,378
Bing Ai, Reg. No. 43,312

William Hunter, Reg. No. 47,671
John Hayden, Reg. No. 37,640
John P. Schnurer, Reg. No. 52,196
J. Robin Rohlicek, Reg. No. 43,349

Direct all telephone calls to JOHN C. PHILLIPS at telephone number (858) 678-5070.

Direct all correspondence to the following:

20985
PTO Customer Number

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patents issued thereon.

Full Name of Inventor: BETH MARCUS

Inventor's Signature: Beth Marcus Date: 12/7/05
Residence Address: P.O. Box 882
Bedford, MA 01730
Citizenship: USA
Post Office Address: Bedford, MA 01730

Combined Declaration and Power of Attorney

Page 2 of 2 Pages

Full Name of Inventor: ELAINE CHEN

Inventor's Signature: Elaine Chen

Date: Dec 9, 2005

Residence Address: 118 Thorndike Street
Arlington, MA 02474

Citizenship: USA

Post Office Address: Arlington, MA 02474

Full Name of Inventor: ROB PODOLOFF

Inventor's Signature: Rob Podoloff

Date: 12/9/05

Residence Address: ~~2 Donovan Drive~~ 20 Gaslight Lane
~~Bedford, MA 01730~~ Framingham, MA 01702

Citizenship: USA

Post Office Address: Bedford, MA 01730

Full Name of Inventor: LORRAINE WHEELER

Inventor's Signature: Lorraine S. Wheeler

Date: 09 Dec 2005

Residence Address: 105 Dudley Rd
Billerica, MA 01821

Citizenship: USA

Post Office Address: Billerica, MA 01821

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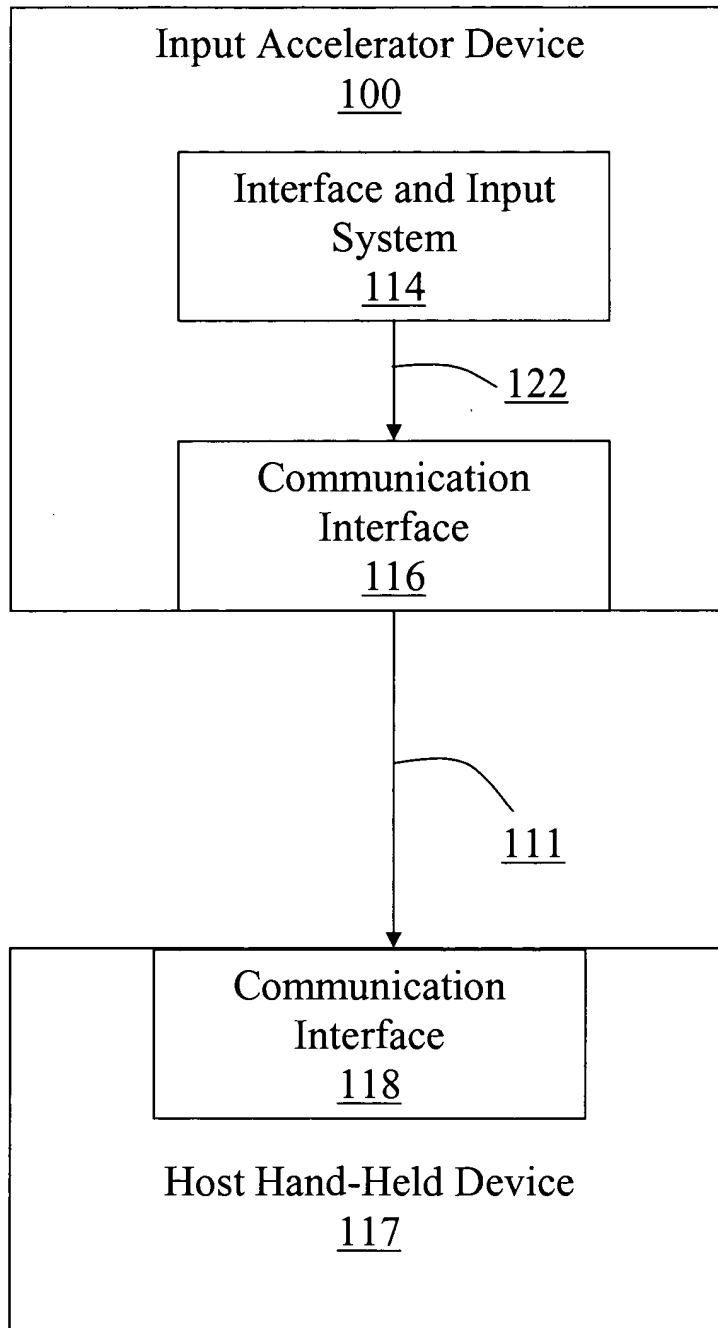
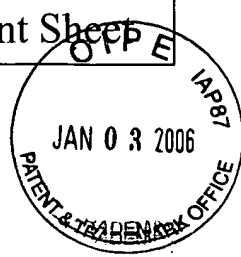


FIG. 1

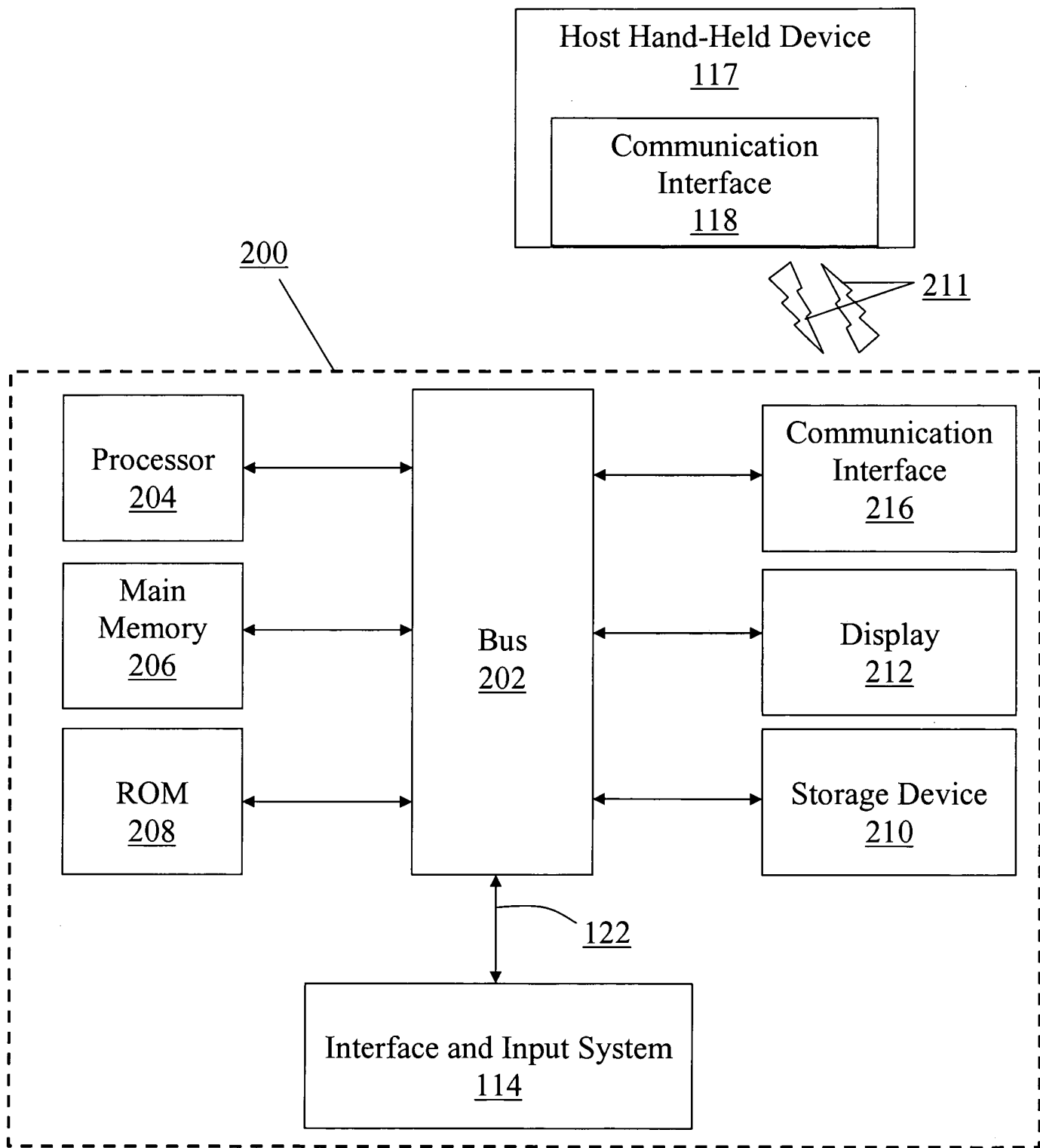


FIG. 2

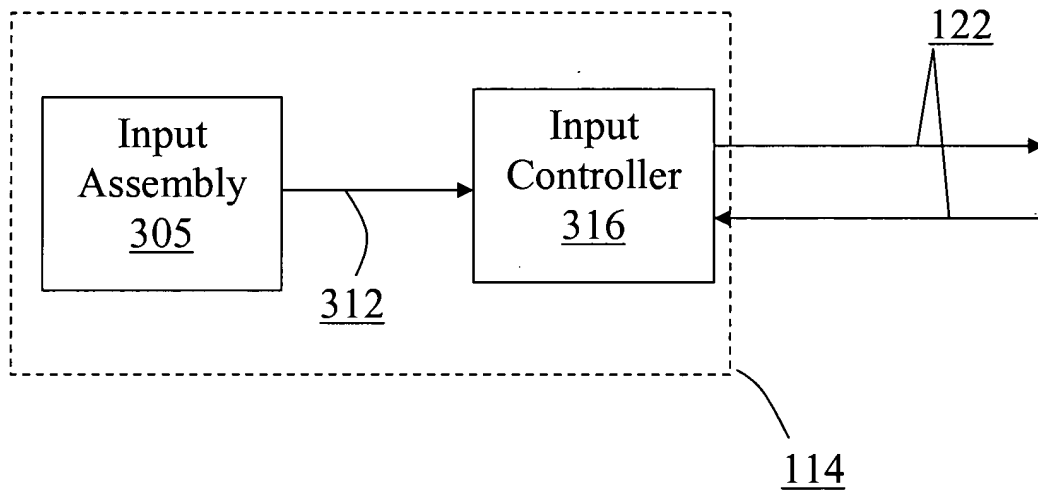


FIG. 3

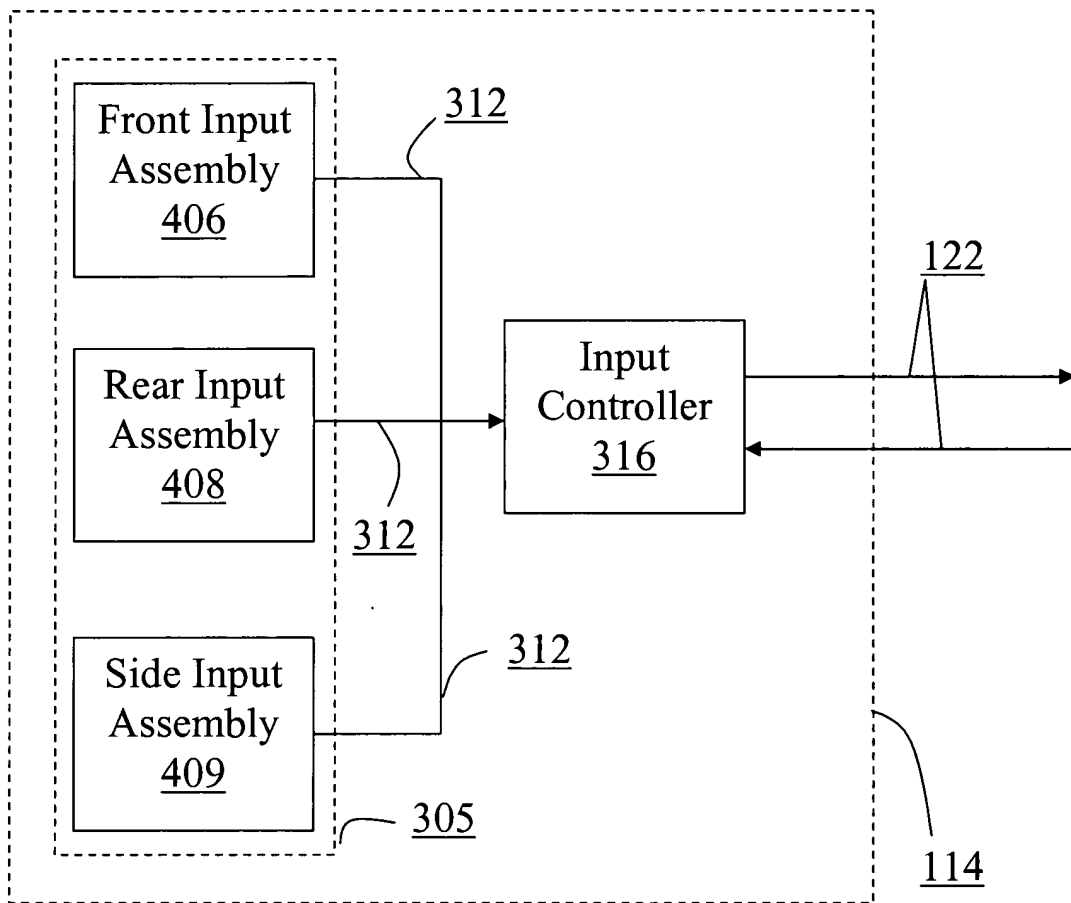


FIG. 4

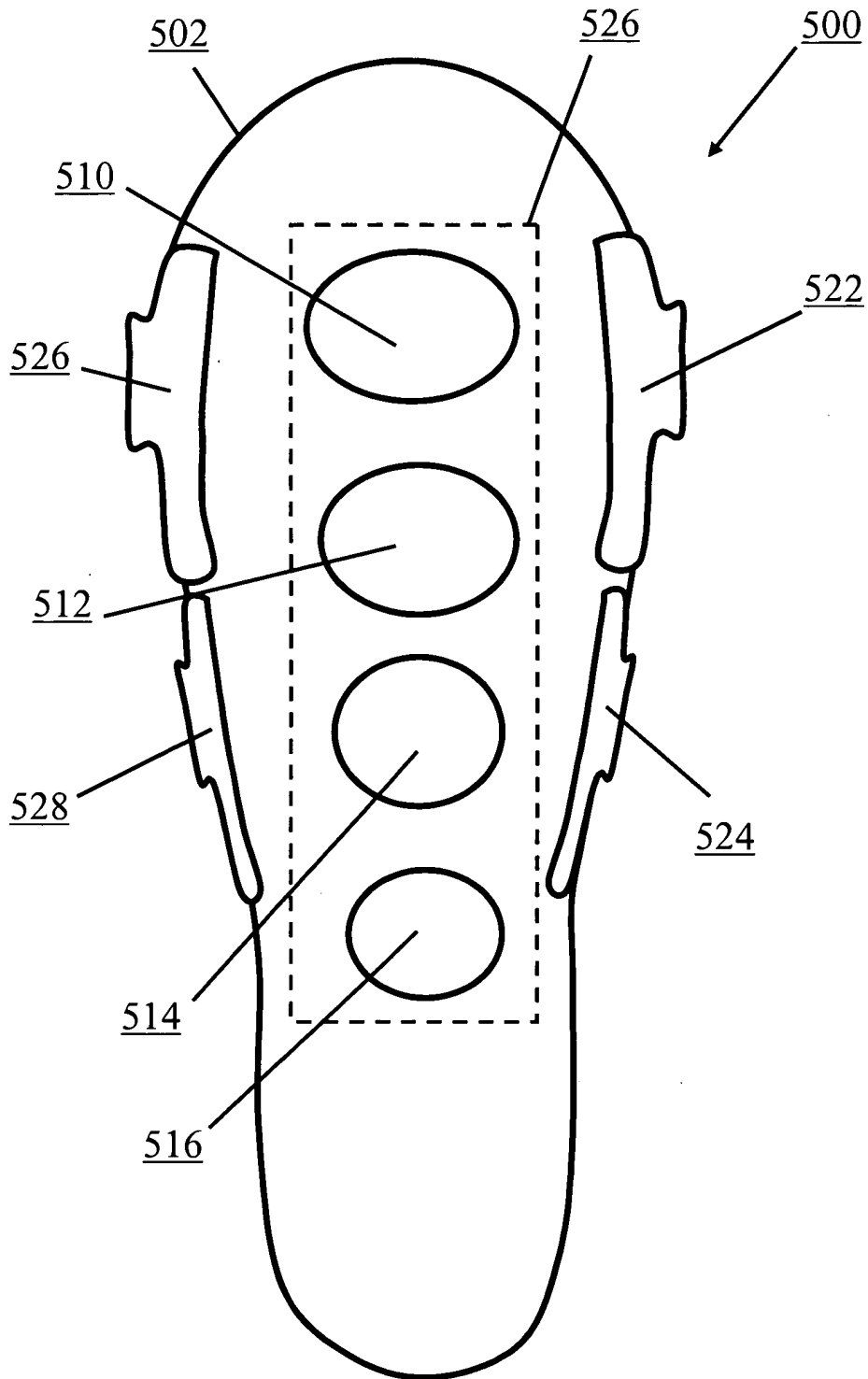


FIG. 5a

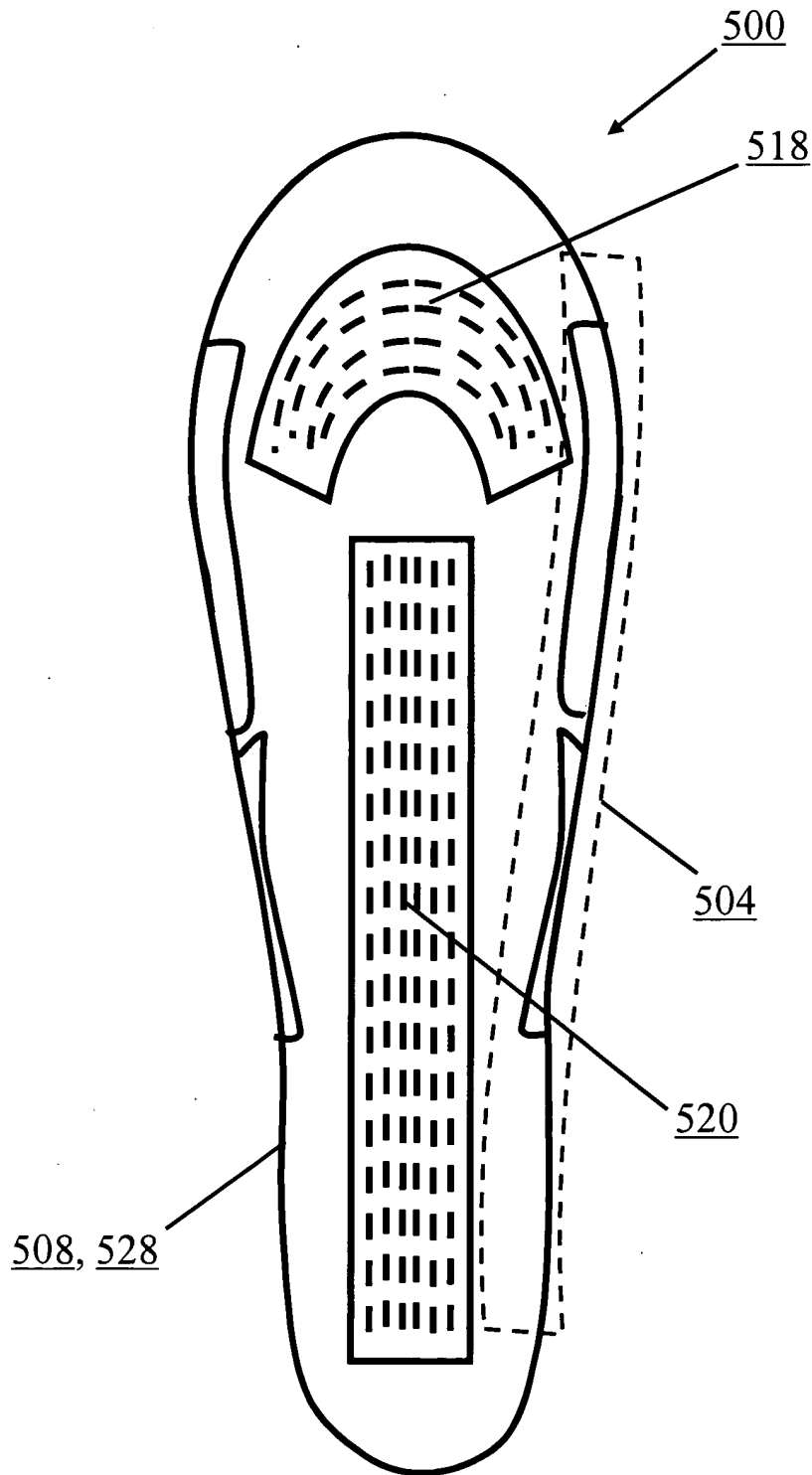


FIG. 5b

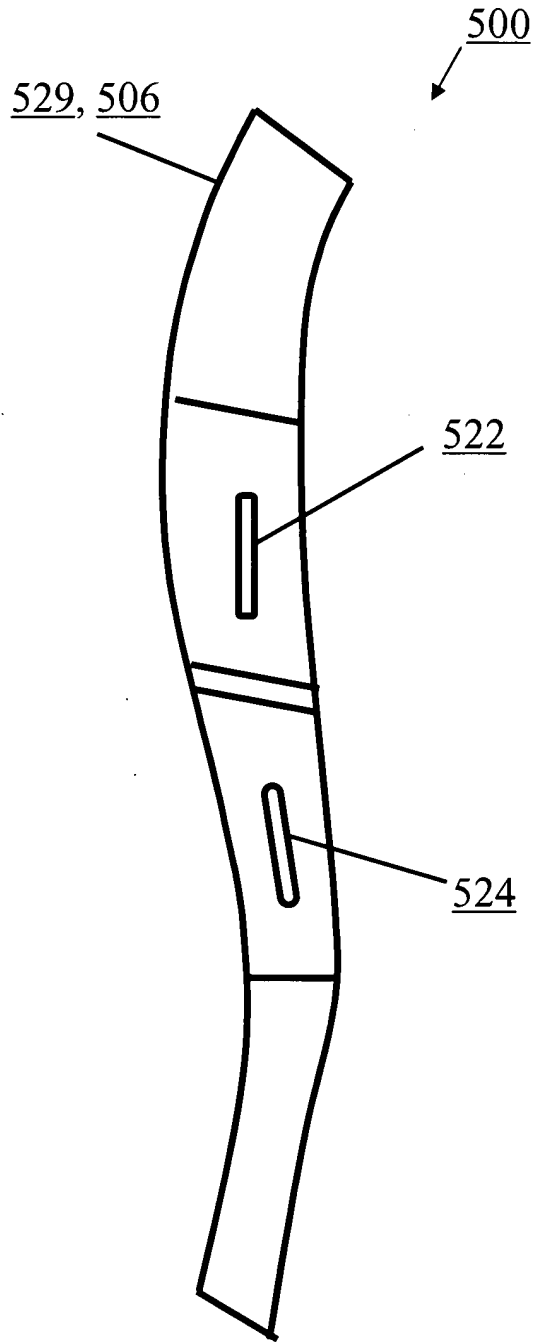


FIG. 5c

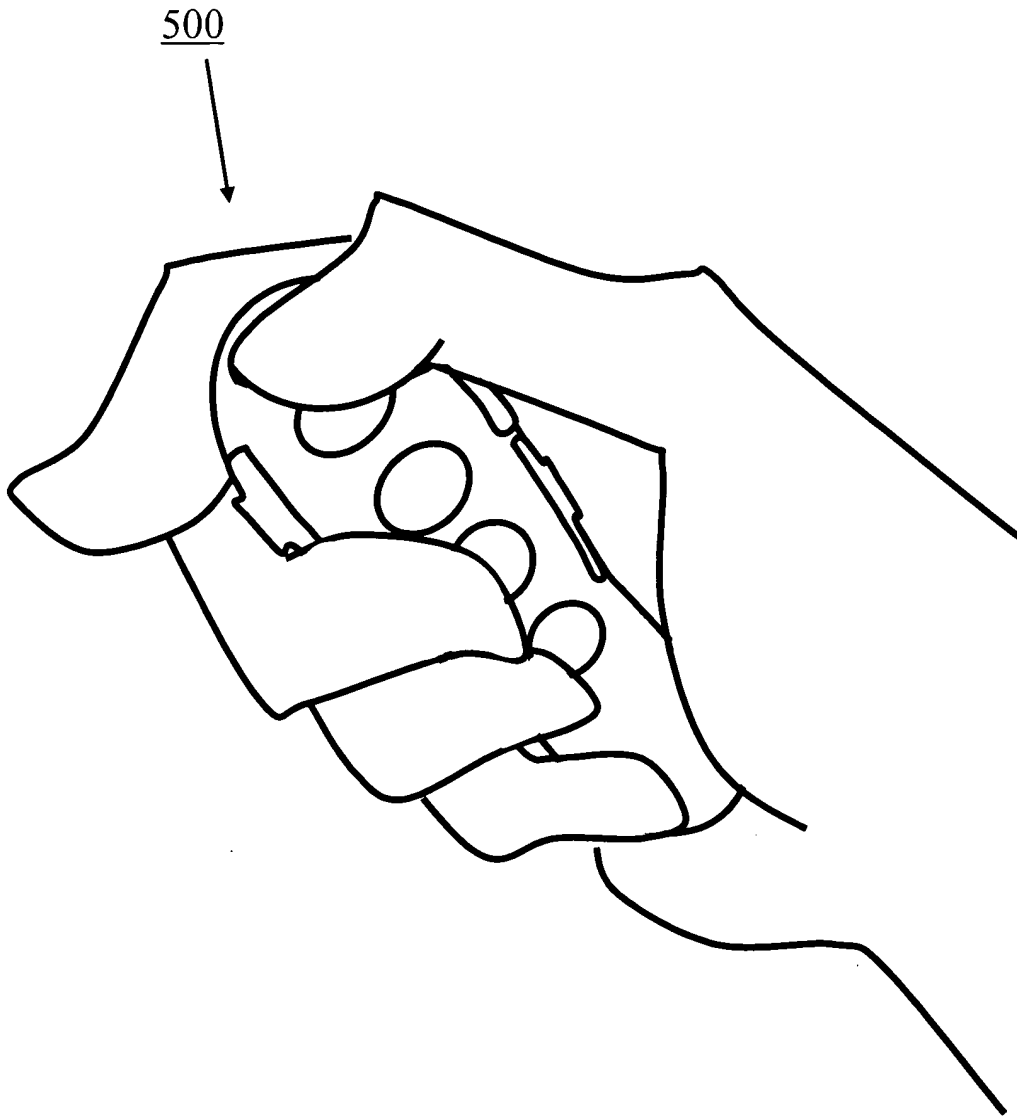


FIG. 5d

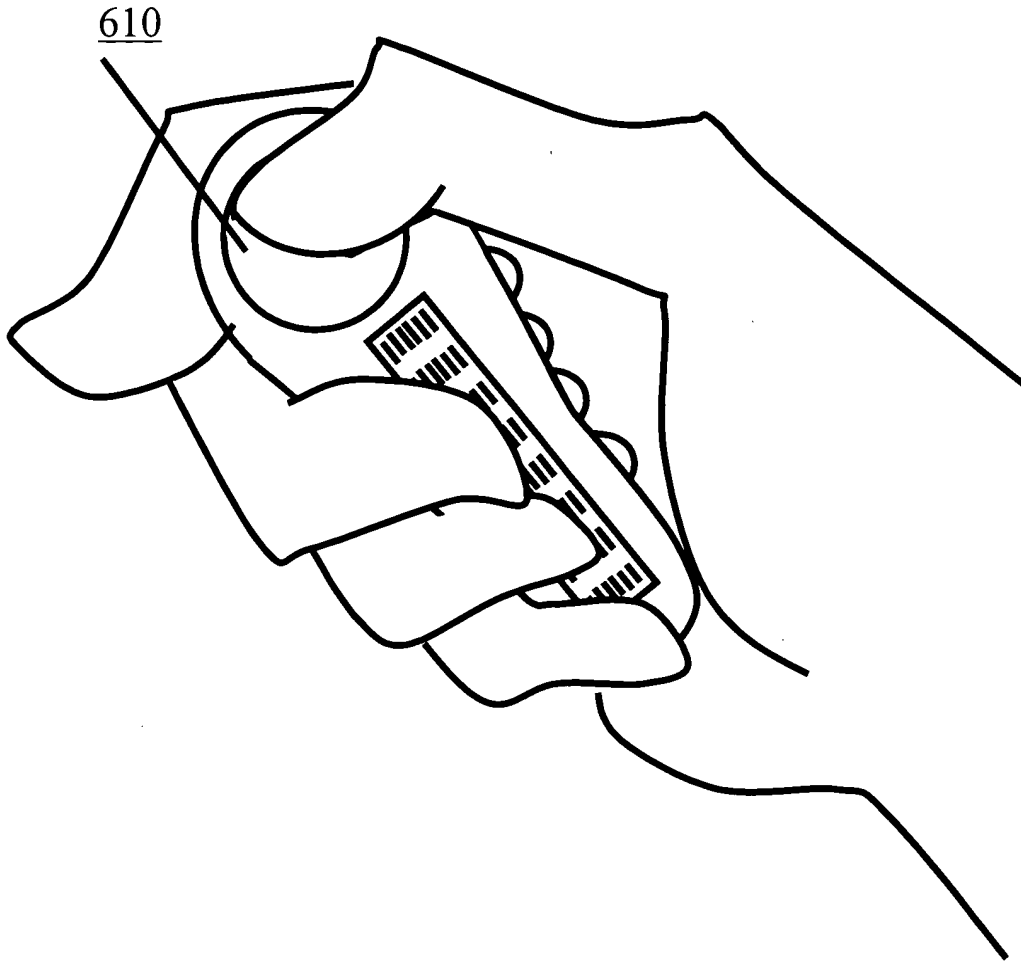


FIG. 6

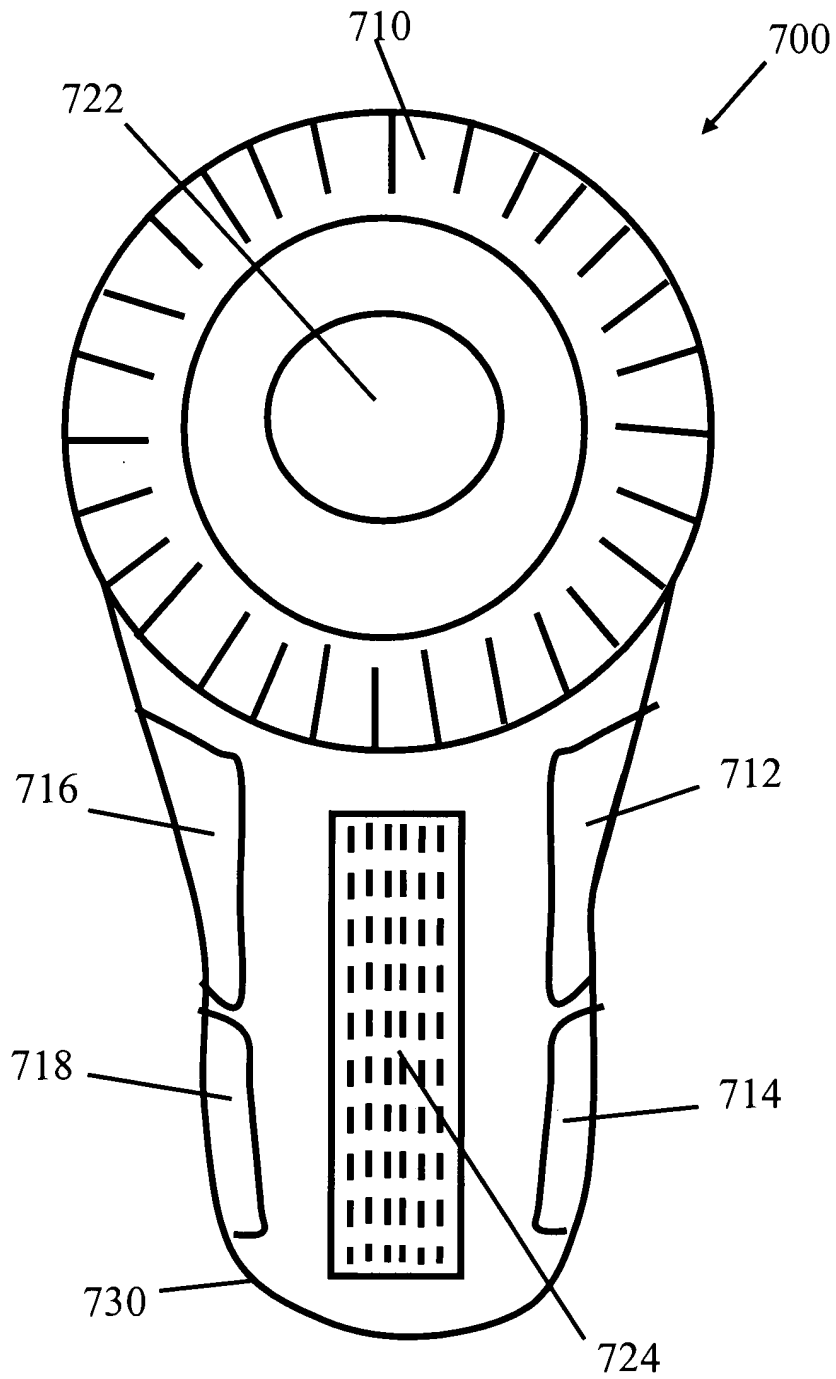


FIG. 7a

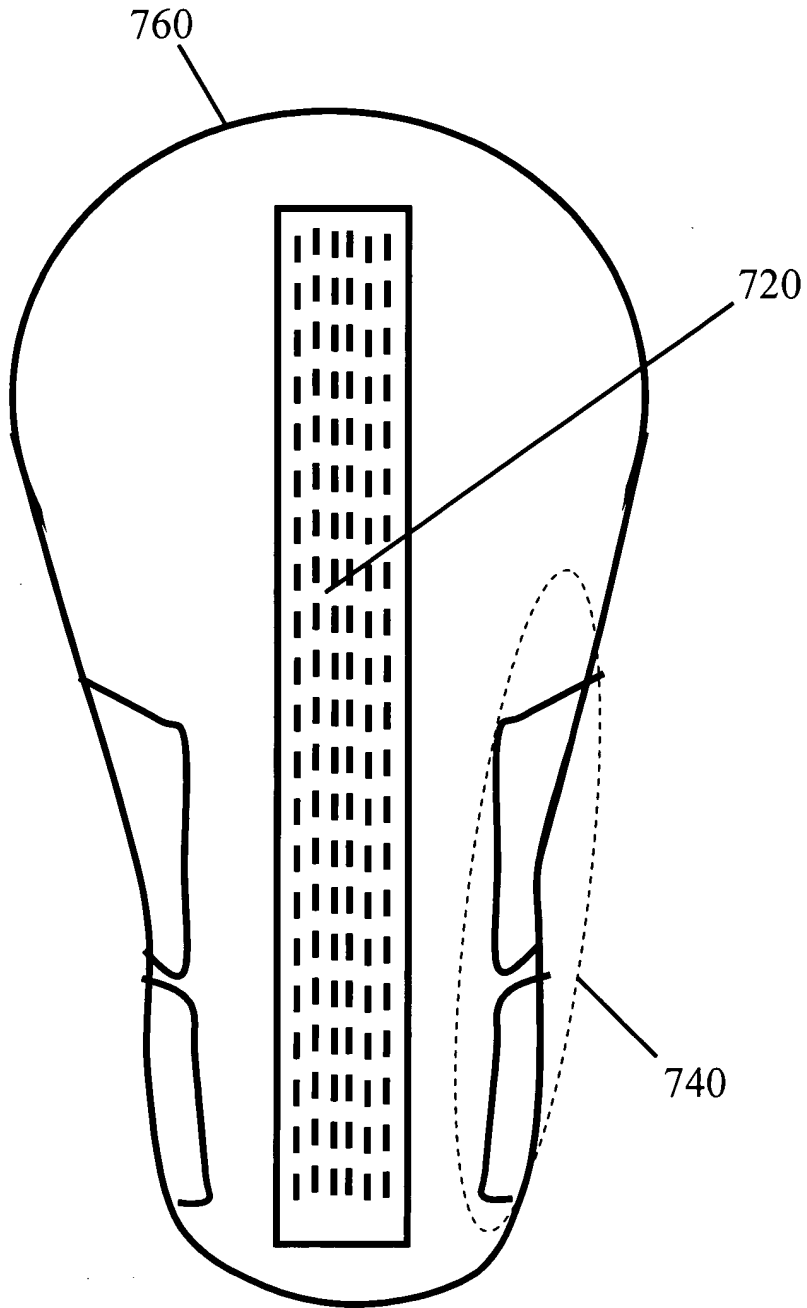


FIG. 7b

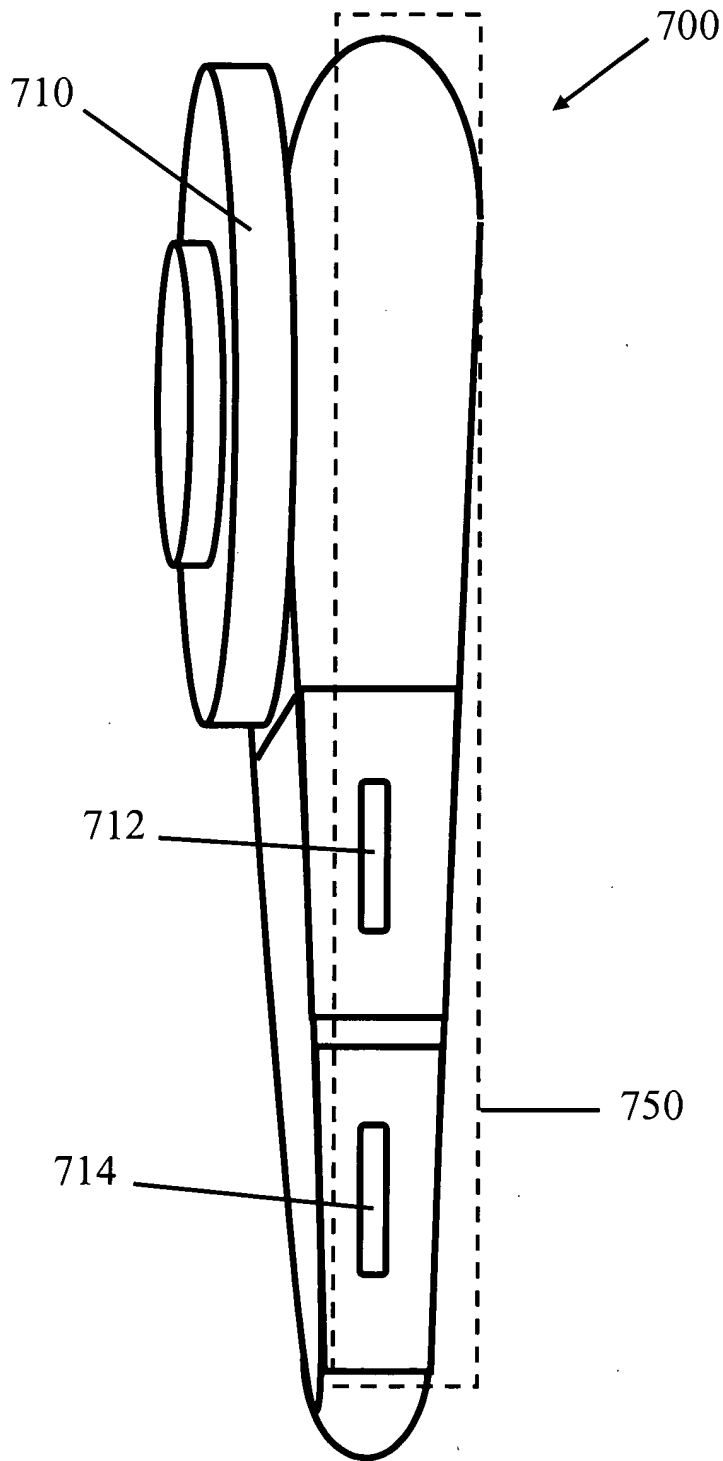


FIG. 7c

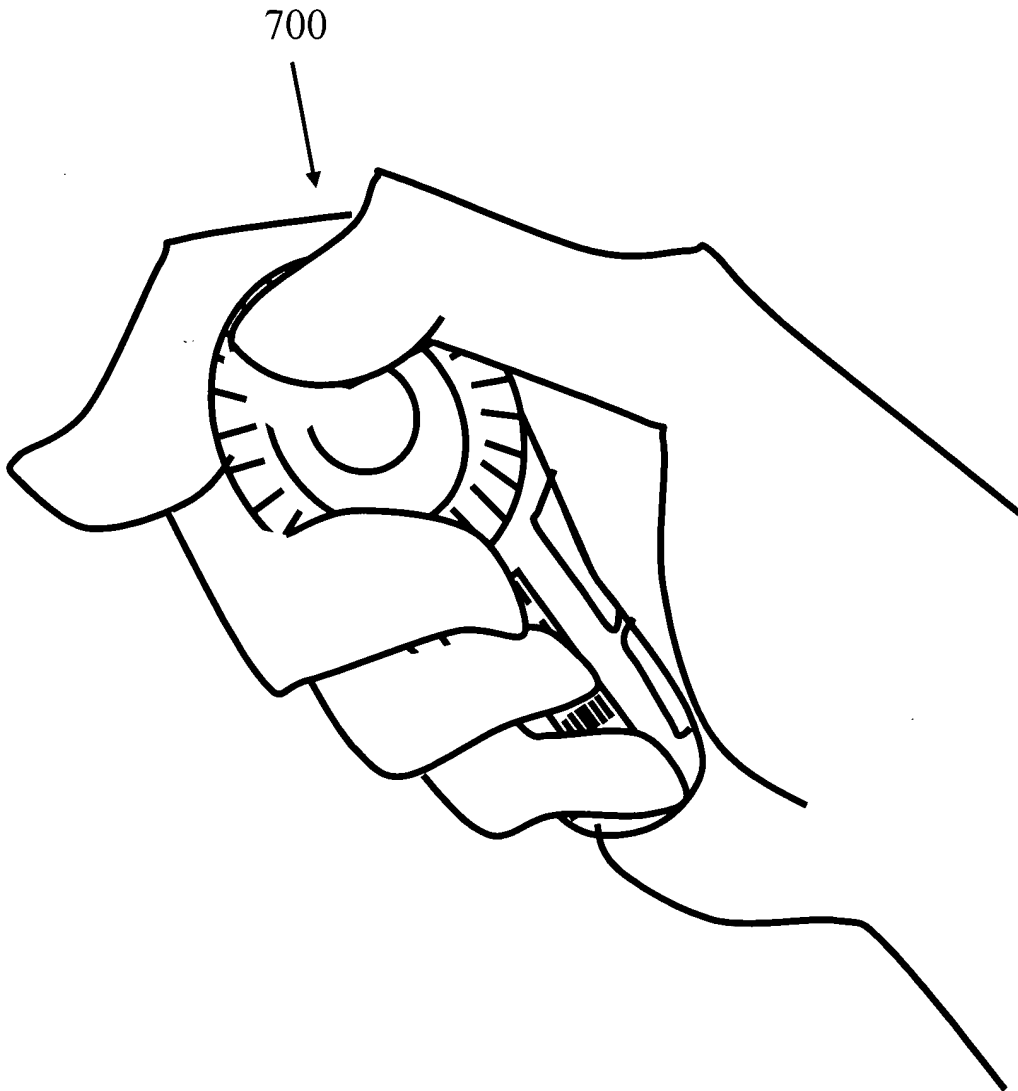


FIG. 7d



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NUMBER	FILING OR 371 (c) DATE	FIRST NAMED APPLICANT	ATTORNEY DOCKET NUMBER
11/249,009	10/11/2005	Beth Marcus	19146-005001

CONFIRMATION NO. 9446
FORMALITIES
LETTER

20985
FISH & RICHARDSON, PC
P.O. BOX 1022
MINNEAPOLIS, MN 55440-1022

Date Mailed: 11/03/2005

NOTICE TO FILE MISSING PARTS OF NONPROVISIONAL APPLICATION

FILED UNDER 37 CFR 1.53(b)

Filing Date Granted

Items Required To Avoid Abandonment:

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Applicant must submit \$ 150 to complete the basic filing fee for a small entity.
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 - The drawings submitted to the Office are not electronically reproducible. Drawing sheets must be submitted on paper, which is flexible, strong, white, smooth, non-shiny, and durable (see 37 CFR 1.84(e)). See Figure(s) 5a, 5c, 6, 7a-7c.

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The required item(s) identified below must be timely submitted to avoid abandonment:

- Additional claim fees of **\$450** as a small entity, including any required multiple dependent claim fee, are required. Applicant must submit the additional claim fees or cancel the additional claims for which fees are due.
- To avoid abandonment, a surcharge (for late submission of filing fee, search fee, examination fee or oath or declaration) as set forth in 37 CFR 1.16(f) of \$65 for a small entity in compliance with 37 CFR 1.27, must be submitted with the missing items identified in this letter.

SUMMARY OF FEES DUE:

Total additional fee(s) required for this application is **\$1015** for a Small Entity

- **\$150** Statutory basic filing fee.
- **\$65** Surcharge.

- The application search fee has not been paid. Applicant must submit **\$250** to complete the search fee.
- The application examination fee has not been paid. Applicant must submit **\$100** to complete the examination fee for a small entity in compliance with 37 CFR 1.27

- Total additional claim fee(s) for this application is **\$450**
 - **\$450** for **18** total claims over 20.

Replies should be mailed to: Mail Stop Missing Parts
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October 11, 2005

Attorney Docket No.: 19146-005001

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Presented for filing is a new original patent application of:

Applicant: BETH MARCUS, ELAINE CHEN, ROB PODOLOFF AND
LORRAINE WHEELER

Title: HUMAN INTERFACE INPUT ACCELERATION SYSTEM

Enclosed are the following papers, including those required to receive a filing date
under 37 C.F.R. § 1.53(b):

	<u>Pages</u>
Specification	31
Claims	10
Abstract	1
Declaration	[To be Filed at a Later Date]
Drawing(s)	13

Enclosures:

— Postcard.

This application is entitled to small entity status. Under 37 C.F.R. §1.53(f), no filing
fee is being paid at this time.

If this application is found to be incomplete, or if a telephone conference would
otherwise be helpful, please call the undersigned at (858) 678-5070.

Kindly acknowledge receipt of this application by returning the enclosed postcard.

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Frederick P. Fish
1855-1930

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Page 2

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Respectfully submitted,

A handwritten signature in black ink, appearing to read 'John P. Schnurer', with a long horizontal flourish extending to the right.

John P. Schnurer

Reg. No. 52,196

Enclosures

JPS/sxg

10559921.doc

APPLICATION
FOR
UNITED STATES LETTERS PATENT

TITLE: HUMAN INTERFACE INPUT ACCELERATION SYSTEM
APPLICANT: BETH MARCUS, ELAINE CHEN, ROB PODOLOFF AND
LORRAINE WHEELER

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Human Interface Input Acceleration System

[0001] This application is related to co-pending U.S. Patent Application Serial No. 10/699,555, filed on October 31, 2003 and co-pending U.S. Patent Application Serial No. 11/221,412, filed on September 6, 2005.

BACKGROUND

[0002] The following description relates to hand-held input acceleration devices for interfacing with electronic devices, such as cellular phones, personal digital assistants (“PDAs”), pocket personal computers, smart phones, hand-held game devices, bar code readers, MP3 players and other similar input devices having a keypad or one or more input elements, and also relates to human interface and input systems for use with the hand-held acceleration devices.

[0003] Electronic devices have become increasingly sophisticated and physically smaller due in part to a decrease in the price of processing power and a concurrent increase in demand by consumers for smaller devices. Such devices, however, tend to be limited in function and utility by the user’s ability to interface with the device for data input (e.g., text, numeric, and functional input) and/or device control, which becomes increasingly more difficult to do as the available space on the device’s surface for positioning the input elements, which are used for data input and/or device control, continues to decrease.

[0004] Moreover, as the use of applications such as text centric applications (e.g., inputting data for e-mail, instant messaging, SMS, and MMS), list navigation applications (e.g. 1-D or 2-D navigation such as scrolling down a long list of songs to choose a song), and game applications (e.g. steering a car in a first person driving game) increases, the keypad on electronic devices, such as a cellular phone, is increasingly becoming a bottleneck to speed, accuracy and ease of data entry. playing games, picking items from long lists, web browsing, and launching applications.

[0005] For example, many hand-held electronic devices, in particular cellular phones, typically use a D-pad as the primary way to navigate up and down a list of items, such as a list of songs, on an item-by-item basis. Such item-by-item scrolling, however,

is typically inefficient in navigating from the first item in the list to the last item in the list, especially if the list includes hundreds of items. Although most of these electronic devices provide the user with page up and page down functionality, which permits the user to scroll a number of items at once, e.g., some applications may associate ten items per page, often times such page up and page down functionality must be executed through multiple taps or presses of one or more input elements, typically those making up the keypad. The particular number of taps or number of input elements required to evoke such page up and down functionality typically depends on the application developer's preference, and therefore often differ from application to application within the same electronic device. Even the same application may be implemented using different user interfaces in different hand-held electronic devices.

[0006] Various human interface and input systems and techniques for hand-held electronic devices have been developed for data input and device control. These include miniature keyboards and keypads used in combination with chordal input techniques, modal input techniques and/or smart keys; and touch screens used in combination with on-screen keyboard or keypad software or hand-writing recognition software. Additionally, for gaming, some hand-held electronic devices, such as cellular phones, have incorporated miniature thumb joysticks on the face of the device itself in lieu of the directional navigation pad (D-pad).

Keyboard or Key pad Used With Chordal, Modal and Smart Key Techniques

[0007] Miniature keyboards and keypads are similar to their standard full-size versions—i.e., a keyboard generally has a full set or substantially full set of numeric, character, and functional input elements, while key pads typically have a reduced set of numeric, character and/or functional input elements compared to keyboards. These miniature input devices typically are designed to fit the available space on one surface of a hand-held electronic device or are designed as small, easily transportable, external plug-in devices. Thus, as hand-held electronic devices become smaller, the size of the input elements typically has been reduced in order for the desired number of input elements to fit on one surface of the electronic device.

[0008] For data input and device control, miniature keyboards and keypads typically either require one of two input techniques-- use of one or more thumbs or fingers to press the desired input elements or use of a stylus to “peck” the desired input elements (which is usually done where the input element is of smaller size). Various techniques, such as chordal input techniques, modal input techniques and smart keys, have been developed and implemented to improve the efficiency and effectiveness of using miniature keyboards and keypads.

Chordal Input Techniques

[0009] Chordal input techniques generally are based upon the principle that characters, symbols, words, phrases or concepts can be represented by a reduced set of input elements. Thus, by only having to press a reduced combination of input elements, functionality can be increased and quicker and more accurate data input can be realized. Chordal input techniques can be used on any keyboard or keypad configuration or any device having more than one input element, and typically results in fewer input elements or more functions compared to conventional keyboards or keypads. An example of an electronic device using two-handed chordal input techniques is a court reporter or stenographer’s typewriter. One chordal input technique using a keypad to decrease the number of actuations to achieve a large number of functions is described in U.S. Patent No. 5,973,621 to Levy, entitled “Compact Keyed Input Device,” which is incorporated herein by reference.

Modal Input Techniques

[0010] Modal input techniques are based on the concept that functions of the electronic device, e.g., text messaging in a cell-phone or PDA, can be accessed by pressing a particular input element (or combination of elements) on a keyboard or keypad. Once that particular input element is pressed, the functionality of all or a portion of the input elements on the keyboard or keypad may change. Modal techniques typically are used in calculators, cellular phones, and PDAs. For example, in cellular phones, a modal technique called multi-tap is common, in which individual input elements on the keypad are associated with multiple symbols, such as characters, letters,

numbers, icons or other types of symbols, which tends to reduce the number of input elements required to achieve the desired functions, e.g., a twelve-input-element keypad can be used to represent all letters of the English alphabet and the decimal digits. A user can input a desired symbol within a set of symbols associated with a certain input element by tapping on that particular input element with a thumb, finger, or stylus, one or more times to input the desired character. Thus, if a user desires to send a text message, the user may press a functional input element, e.g., a mode key, to access the text messaging functionality of the cellular phone and then tap an individual input element one or more times to select the associated symbol for input. The number of taps needed to input a particular symbol may differ depending on the language character set chosen. For example, Japanese keypad or keyboards typically require a minimum set of 46 characters for text input, while English or American keyboards and keypads usually require a minimum set of 26 characters for text input. These modal input techniques have gained some popularity as users perform more text functions, but these techniques can be cumbersome because to access some letters or characters, an input element on the keypad may have to be tapped three or four times. Also, in hand-held devices with a keypad, such as a cellular phone, these modal input techniques typically rely on the user's thumb, which is not generally as dexterous as the user's fingers.

Smart Keys

[0011] Smart keys are typically used on keypads and refer to a single key or combination of keys that, when pressed, predict the users next logical action. Some implementations work better than others and some applications reduce the number of keystrokes required to complete a function better than others. Word-predictor software, for example, attempts to predict the word or character the user intends to input based upon one or more letters inputted by the user and the likely probabilities within a given language. The probability of the software guessing correctly increases with the length of the word or number of letters or characters inputted. In a device using smart keys on the keypad, a user may tap the keys 2, 2 and 8 in sequence to generate the word "cat" and the device would display that word first because it is usually the most common combination, whereas the word "bat," which can be generated by pressing the same keys, would not be

displayed first because it is not as common. Also, the word “cat” may be displayed after pressing the 2 key the second time based on a guess by the word-predictor software.

[0012] Smart keys also are typically used for Japanese data input where a user phonetically inputs letters representing the sound of the Japanese character (e.g., a Kanji character). Based on the inputted letters, the predictor software guesses the Japanese character. To select the character, a user would press the accept button or use the scrolling function to go to the next character with a similar set of phonetic inputs.

Touch Screen Using On-Screen Keyboard or Handwriting Recognition Software

[0013] Using on-screen keyboard or keypad software with a touch screen offers users the ability to enter data with fingers or thumbs on a screen-sized keyboard or buttons, allowing faster data input without a stylus or physical keyboard or keypad accessory; while using handwriting recognition software with a touch screen, such as Graffiti™ on the Palm operating system, offers users the ability to enter text with a stylus by writing the text directly on the touch screen. Touch screens usually consume more power and are more expensive than non touch-sensitive screens. This higher power consumption can be a problem for hand-held electronic devices, which typically have limited power resources. Moreover, touch screens usually require the user to use both hands (e.g., one hand is used to hold and steady the device while the other hand is used to grasp the stylus), which is generally undesirable for interfacing with and controlling one handed hand-held electronic device, such as cellular phones. Handwriting recognition software has improved the slowness and awkwardness inherent in stylus, finger or thumb input but other drawbacks still remain, such as high power consumption, the necessity to use both hands, and lack of tactile feedback to inform a user when an input element has been. Moreover, recognition software requires training to use properly, and, even then, still results in a high error rate.

Game Control

[0014] For game control, many of the above approaches have been used, but in most hand-held electronic devices, a user typically controls game play through the use of some form of input element, such as on a miniature keypad and/or D-pad, which typically

is located on the front surface of the device. Game control on some hand-held electronic devices, such as cellular phones, is inherently one handed or at most two thumbed because of the size of the device, while game control on other hand-held electronic devices, such as PDAs and conventional game console controllers, is typically two-handed. The input elements associated with game control on these devices are typically digital, particularly the D-pad, even though analog input elements have been used on game controllers for PC and console game systems, such as Microsoft's Xbox or Sony's Play Station 2.

SUMMARY

[0015] The present inventors recognized that conventional human interface and input systems for hand-held electronic devices tended to be relatively inflexible, cumbersome, and inefficient to use, among other reasons, because they were not designed to take advantage of the biomechanics of the human hand, particularly the advantages associated with the opposition of the thumb to the fingers and the beneficial attributes of the thumb, e.g., its large range of motion and ability to impart large sustained forces, and the beneficial attributes of the fingers, e.g., their fine motor control, spatial memory and rapidity of motion.

[0016] The present inventors also recognized that the input techniques developed to improve the efficiency of data input and device control, such as chordal and modal techniques, were limited by the inefficiencies inherent in conventional input systems. For example, miniature keyboards and keypads used in combination with chordal input techniques not only required the user to memorize numerous input combinations and develop the necessary motor skills to control a reduced number of input elements to provide even more complex functionality compared to typical QWERTY keyboards, but also did not use or allocate input tasks to the fingers and thumb of the human hand effectively. Moreover, miniature keyboards and keypads used in combination with modal input techniques tended to limit the user's ability to efficiently input data depending on the number of taps required to input a particular symbol and how fast the user could tap the input element with his thumb or a stylus to select the particular symbol.

[0017] The present inventors also recognized that, with the emergence of multimedia capabilities, such as MP3, in many hand-held electronic devices, there is a need to support fast and intuitive scrolling and list navigation actions. For example, many hand-held electronic devices, in particular cellular phones, typically use a D-pad as the primary way to navigate up and down a list of items, such as a list of songs, on an item-by-item basis. Such item-by-item scrolling, however, is typically inefficient in navigating from the first item in the list to the last item in the list, especially if the list includes hundreds of items. Moreover, the page up and page down functionality provided on many of these devices to make it easier for a user to navigate long lists of items often must be executed through multiple taps or presses of one or more input elements. The particular number of taps or number of input elements required to evoke such page up and down functionality usually depends on the application developer's preference, and therefore often differs from application to application within the same electronic device.

[0018] The present inventors also recognized that a user's ability to control game play in such devices was greatly limited. For example, while analog game control has been available to users of PC and console game systems, analog game control generally has not been widely available on hand-held electronic devices, such as cellular phones and PDAs. As noted above, most high end games that run on a gaming platform such as the Xbox or the Play Station 2 involve analog or continuous inputs from one or more input elements, such as a miniature or full sized joystick. Cellular phones and PDAs, in contrast, provide only buttons or keys as input elements for game play. Moreover, to the present inventors knowledge, there are no standards for input element layout for cellular phones, or in the way that the input elements are mapped to gaming functions. For example, often times, the D-pad provided on most of these cellular phones is not available to the game developer to use as a game input. The result is that directional movement input is often provided using the number input elements on the keypad, particularly the "2", "8", "4", and "6" input elements on the keypad for up, down, left and right directional movement. The present inventors recognized that this layout presents several problems. First, the input is discrete, so there is no way to provide a continuous input, such as steering a car in a first person driving game. In such as game, the car can be steered to move only left, straight, or right in preset increments, which

severely limits the quality of the gaming experience. Second, directional movement is provided by the number input elements while the clearly labeled arrow keys on the D-pad remain unused. This typically requires getting used to and may create user confusion. Third, the number input elements are typically located on one end of the phone's surface, and are thus less comfortable to use than the D-pad which is typically located above the number input elements. The result is that game play is limited and not as widely adopted as it might be with a better interface.

[0019] Consequently, the present inventors have developed a flexible and efficient human interface and input system and techniques that may be implemented on a variety of small hand-held accessory devices or "input accelerator" devices, such as a key fob or remote control. An input accelerator device may connect to one or more conventional hand-held electronic devices (i.e., a host electronic device), such as a cellular phone, PDA, pocket PC, smart phone, MP3 player, or other similar devices using a wired or wireless communication protocol, such as Bluetooth, and remotely control all functions of the connected host electronic devices. The input accelerator device may be used in conjunction with the input elements on the host electronic device to accelerate the user's ability to perform functions such as text input, game play, list navigation and scrolling. Alternatively, the input accelerator device can even eliminate the need to directly interface with the inefficient human interface and input systems of the connected host electronic devices. The input accelerator device may also be implemented to include various hybrid devices including a wireless headset in addition to the functions of a remote control. The input accelerator device (whether one handed or two handed) may also be implemented to utilize the opposed thumb and finger ergonomics inherent in the hand and the skills already developed for using conventional input techniques to accomplish data input, list navigation, device control, and game control in a timely, efficient, comfortable, fun, and intuitive manner. Thus, no specialized training beyond that normally expected with any newly purchased hand-held device is expected.

[0020] Implementations of the human interface and input system and techniques for the input accelerator device described here may include various combinations of the following features.

[0021] The input accelerator device may include or be configured to include a communication channel configured to interface with a hand-held host device, an input assembly having a number of input elements that can be selectively mapped to one or more functions of a software application in order to minimize the number of times a particular input element on the hand-held host device needs to be actuated (which may none), and an input controller communicatively coupled to the input assembly and the communication channel, the input controller being configured to generate an input signal upon actuation of at least one of the input elements and being further configured to relay the input signal to the communication channel for transmission to the hand-held host device to control execution of the one or more functions of the software application mapped to the actuated input element. The input accelerator device may also include a display unit for displaying textual, graphical and video information. The input accelerator device may also include a storage device for storing instructions, such as firmware, mapping software and/or software applications, such as text applications, scrolling/navigational applications and game applications. The input accelerator device may further include a processor configured to interpret the input signal and execute the instructions, a main memory configured to load the instructions and a bus configured to direct communications to and from the processor.

[0022] The input assembly may include a front input assembly, a rear input, and/or a side input assembly. The input elements of the input assembly may include or more of the following types of input elements: analog buttons, digital buttons, keys, rockers, sliders, rotary dials, touch pads, pressure sensors, force sensitive resistors, piezoelectric resistive sensors, capacitive sensors, positional sensors, rotary encoders, linear potentiometers, directional or D-pads, and miniature analog thumb joysticks. The communication channel may be a Universal Serial Bus port, a IEEE 1394 Firewire port, a serial port, a parallel port, a headphone port, and/or a data port. The communication channel may also be a wireless data connection such as a Bluetooth connection, an Infrared connection, and a Wi-Fi connection.

[0023] In another implementation, a technique of controlling multiple hand-held host devices may include providing an input accelerator device having a plurality of input elements, actuating one of the plurality of input elements; interpreting a generated input

signal based on the one or more functions mapped to the actuated input element; and executing the one or more functions mapped to the actuated element. The method may also include configuring one of the plurality of input elements to be mapped to one or more indexing functions, and actuating an input element on one of the plurality of hand-held host devices in conjunction with the input element mapped to one or more indexing functions.

[0024] The input accelerator device and human interface and input systems and techniques described herein may provide one or more of the following advantages. The human interface and input system and associated techniques offer the functionality of a high performance game controller, which can support the most demanding game input requirements, and the speed and accuracy of data input that can be obtained with the use of a conventional standard QWERTY keyboard, but without the large footprint. Also, the human interface and input system and associated techniques can increase the number of functions that may be associated with a given number of input elements without increasing the number of keystrokes or taps that is required. Moreover, it allows the input element size to remain consistent with the ergonomics of the human hand without increasing the time it takes to learn how to use the input system compared to conventional input systems.

[0025] Implementing the human interface and input system and techniques on an input accelerator device can eliminate the need to interface with inflexible, cumbersome, and inefficient input systems provided with conventional hand-held electronic devices. Since the input accelerator device can connect to multiple hand-held electronic devices using wired or wireless communication protocols a singled input accelerator device can make up for deficiencies of multiple conventional hand-held electronic devices. Thus, the input accelerator device can eliminate the need to retrofit or redesign conventional hand-held electronic devices to directly implement the disclosed human interface and input system and associated techniques. In addition, the input accelerator device can be small and aesthetically valuable as a fashion accessory. For example, the input accelerator device may be implemented to include logos of sports teams or cartoon characters in addition to a wide selection of colors. The input accelerator device also

may be easily attached to a keychain or a phone leash or clipped on or carried in a pocket or purse.

[0026] Details of one or more implementations are set forth in the accompanying drawings and the description below. Other features and advantages will be apparent from the description and drawings, and from the claims.

DESCRIPTION OF DRAWINGS

[0027] FIG. 1 is a block diagram of a hand-held input accelerator device upon which the human interface and input system may be implemented.

[0028] FIG. 2 is another block diagram of a hand-held input accelerator device upon which the human interface and input system may be implemented.

[0029] FIG. 3 is a block diagram of the human interface and input system.

[0030] FIG. 4 is a detailed block diagram of the input assembly of the human interface and input system.

[0031] FIGS. 5a-d show front, side, and back views, respectively, of a hand-held input accelerator device wherein a second input assembly includes a pressure sensor arrays having a plurality of configurable active areas.

[0032] FIG. 6 illustrates an alternate implementation of the second input assembly on a hand-held input accelerator device.

[0033] FIGS. 7a-d depict one implementation of a hand-held input accelerator device comprising a combination of a remote control and a wireless headset.

[0034] Like reference symbols in the various drawings indicate like elements.

DETAILED DESCRIPTION

Biomechanics of the Human Hand

[0035] The human hand comprises an opposable thumb and four fingers, i.e., the thumb may be used in opposition, in concert, in combination or functional relation with any of the four fingers. Compared to the human fingers, the human thumb may be characterized as having larger range of motion, stronger sustaining force actuation and poorer dexterity. The human base joint of the thumb has three degrees of freedom, such as side-to-side movement, up and down movement, and rotation about the thumb's long axis; while the base joint of the fingers has two degrees of freedom, such as side-to-side and up and down movement. Thus, the thumb typically is considered to have better range of motion than any of the fingers. Also, because the human thumb has a bigger actuation muscle than any of the fingers, it can provide larger sustaining forces than the fingers. But also because of the larger muscle, the human thumb may suffer from diminished fine motor control and rapidity of motion that can be exerted compared to the fingers. Thus, the human fingers are more suitable for performing tasks that require fine motor coordination or the ability to pinpoint or rapidly repeat actuation.

Hand-Held Input Accelerator Device Hardware Overview

[0036] FIG 1 is a high-level block diagram of a hand-held input accelerator device 100 upon which the human interface and input system and associated input techniques described herein may be implemented for controlling software applications stored and running on a hand-held host device 117. The input accelerator device 100 is a companion auxiliary device to the hand-held host device 117, whereby a user may interface with the auxiliary device and the hand-held host device concurrently 117 or the auxiliary device alone in lieu of the hand-held host device 117. The input accelerator device 100 is communicatively coupled to a hand-held host device 117, such as a cellular phone, PDA, pocket PC, or smart phone, or other similar devices using a communication link 111, such as the Bluetooth protocol. The Bluetooth protocol is a short-range, low-power 1 Mbit/sec wireless network technology operated in the 2.4 GHz band, which is appropriate for use in piconets. A piconet can have a master and up to seven slaves. The master transmits in even time slots, while slaves transmits in odd time slots. The devices

in a piconet share a common communication data channel with total capacity of 1 Mbit/sec. Headers and handshaking information are used by Bluetooth devices to strike up a conversation and find each other to connect.

[0037] The communication link 111 alternatively may be a wired link using standard data ports such as Universal Serial Bus interface, IEEE 1394 firewire, or other serial or parallel port connections. Additionally, the communication link 111 can be other standard wireless links such as infrared, wireless fidelity (Wi-Fi), or any other wireless connection. Wi-Fi refers to any type of IEEE 802.11 protocol including 802.11a/b/g. Wi-Fi generally provides wireless connectivity for a device to the Internet or connectivity between devices. Wi-Fi operates in the unlicensed 2.4 GHz radio bands, with an 11 Mbit/sec (802.11b) or 54 Mbit/sec (802.11a) data rate or with products that contain both bands. Infrared refers to light waves of a lower frequency out of range of what a human eye can perceive. Used in most television remote control systems, information is carried between devices via beams of infrared light. The standard infrared system is called infrared data association (IrDA) and is used to connect some computers with peripheral devices in digital mode.

[0038] The communication link 111 connects a communication interface 116 of the input accelerator device with a communication interface 118 of the hand-held host device 117. The input accelerator device 100 includes an interface and input system 114 in communication with the communication interface 116. The interface and input system 114 includes input elements (not shown), such as keys, buttons, pressure sensor pads, touch pads, rotary dials, thumb joysticks, linear strip sensors or other actuators associated with one or more sensors that can be manipulated by one or both of a human user's thumbs or fingers. The input elements are selectively mapped to one or more functions of the software applications stored on the host device 100. The mapping or re-mapping of the input elements to one or more functions of the software applications may be accomplished by using one of the techniques disclosed in co-pending U.S. Patent Application Serial No. 11/221,412, entitled "A Method of Remapping the Input Elements of a Hand-Held Device," which is incorporated herein in its entirety by reference.

In this implementation, the interface and input assembly 114 is implemented with four input elements, but may be implemented with more or fewer input elements. Upon

actuation of an input element, an electrical signal is generated by the input assembly 114. The generated electrical signal is converted into input signals 122, which are transmitted over the communication link 111 to the hand-held host device 117, which receives the input signals 122 through communication interface 118. The input signals 122 are processed by the hand-held host device 117 to execute the software function mapped to the actuated input element. Typically, hand-held host device 117 has a processor (not shown), such as an ARM, OMAP, or other similar processor for processing the input signals and the software applications stored and running thereon.

[0039] FIG. 2 is a block diagram illustrating an input accelerator device 200 upon which the human interface and input system and associated input techniques described herein may be implemented. In this implementation, optional hardware components are implemented to configure a more powerful auxiliary device to handle more of the processing duties from the hand-held host device 117 onto the input accelerator device 200. The input accelerator device 200 may be used in conjunction with the hand-held host device 117 to control software applications stored and running on the input accelerator device 200 itself. For example, in this implementation, the input accelerator device 200 may have stored and running thereon re-mapping software such as that described in co-pending U.S. Patent Application Serial No. 11/221,412. As another example, the input accelerator device 200 may have stored and running thereon an Internet browsing application, which may be used in combination with communication functionality provided with hand-held host devices, such as the cellular communication protocols (e.g., CDMA or GSM/GPRS) provided with cellular phones, to browse the Internet.

[0040] The input accelerator device 200 is in wireless (or alternatively wired) communication with the hand-held host device 117. The hand-held host device 117 may include some of the same components as shown for the input accelerator device 200. In this implementation, the hand-held host device 117 is a conventional cellular phone, but other types of hand-held electronic devices may be used with the input accelerator device 200. The input accelerator device 200 may include a bus 202 or other communication mechanism for communicating information, and a processor 204, such as an ARM,

OMAP or other similar processor, coupled with bus 202 for processing information, such as one or more sequences of one or more instructions, which may be embedded software, firmware, or software applications for controlling the hand-held host device 117, such as re-mapping software or text, gaming or scrolling applications, or any other software application.

[0041] The input accelerator device 200 also may include a main memory 206, such as a random access memory (RAM) or other dynamic storage device, coupled to bus 202 for storing information and instructions to be executed by processor 204. Main memory 206 also may be used for storing temporary variables or other intermediate information during execution of instructions to be executed by processor 204. The input accelerator device 100 further may include a read only memory (ROM) 208 or other static storage device coupled to bus 202 for storing static information and instructions for processor 204. A storage device 210 may be provided and coupled to bus 202 for storing information and instructions for the processor 204. The storage device 210 can include a flash memory such as EEPROM, compact flash, or a similar storage unit for storing device firmware. Upgrades to the firmware can be easily downloaded through the host device. The input accelerator device 200 may also include an optional display 212, such as a liquid crystal display (LCD), for displaying information to a user, and a human interface and input system 114 for communicating information and command selections from a human user to processor 204. The command selections from a human user are communicated as input signals 122 from the interface and input system 114 to the bus 202 for distribution to other components such as the processor 204. Input accelerator device 200 also may include a communication interface 216 coupled to bus 202.

[0042] Communication interface 216 provides a two-way data communication 211 coupling to the hand-held host device 117, a wireless service device, or wireless service station. The two-way data communication 211 allows for an exchange of interactive data between the hand-held host device 117 and the input accelerator device 200. The interactive data may include voice data for conducting a conversation using a cellular phone host device. The interactive data may also include a graphical user interface (GUI) for browsing the Internet, which may be displayed on the optional display 212. In this implementation, the cellular phones host device serves as a communication

conduit for receiving data from the Internet as previously mentioned. Communication interface 216 may be a wireless link such as Bluetooth or any other wireless communication interface known to one of ordinary skill in the art. In the wireless link implementation, communication interface 216 may send and receive electrical, electromagnetic or optical signals that carry digital data streams representing various types of information.

[0043] The input accelerator device 200 also can display a graphical user interface (GUI) on the display unit 212 to provide a list of hand-held host devices 117 within communication range of the input accelerator device 200. The list of hand-held host devices 117 within communication range can be displayed using text names of each device, an icon representing each device, or a combination of text name and icon representing each device. The input elements in the input assemblies 406, 408, 409 (described in detail in FIG. 4 below) can be actuated in combination or individually to select a desired hand-held host device 117 from the list of devices in communication range of the input accelerator device 200.

[0044] The input accelerator device 100, 200 as described above can obviate the need to remove the hand-held host device 117 from the user's pocket, bag or other storage location by performing most simple text/voice control functions. The input accelerator device 100, 200 may also include a device driver (not shown) to effect control over the host hand-held device 117 and all associated software applications on the hand-held host device 117.

Human Interface and Input System Overview

[0045] FIG. 3 depicts a block diagram of the subsystems of the human interface and input system 114 of the input accelerator device 100 or the input accelerator device 200. The human interface and input system 114, which is described in more detail in co-pending U.S. Patent Application Serial No. 10/699,555, entitled "Human Interface System," which is incorporated herein in its entirety by reference, includes an input assembly 305 in communication with an input controller 316 to interpret and generate input signals in response to user interaction with the input assembly 305. The input

assembly 305 can include multiple input assemblies (described in detailed below in FIG 4), each assembly including a number of input elements, located on one or more surfaces of the input accelerator device 100 or the input accelerator device 200. The input elements are selectively mapped to one or more functions of a software application that is stored on the hand-held host device 117 so that when one of the input elements is actuated, the function mapped to the actuated input element is executed.

Specifically, when an input element is actuated, one or more electrical signals 312 are produced, which are received and interpreted by the input controller 316. The input controller 316, which may include one or more processors, receives the one or more electrical signals 312 and converts them into input signals 122 which are transmitted to the hand-held host device 117 via communication link 111 connecting the communication interface 116 of the input accelerator device 100 with the communication interface 118 of the hand-held host device 117. Similarly, the input signals 122 are transmitted to the hand-held host device 117 via communication link 211 connecting the communication interface 216 of the input accelerator device 200 with the communication interface 118 of the hand-held host device 117. In one implementation the hand-held host device 117 interprets the input signals 122 on the fly using software, such as mapping software, to execute the function mapped to the actuated input element. Alternatively, the input accelerator device 200 may interpret the input signals 122 using software stored in the storage unit 210.

[0046] FIG 4 illustrates one implementation of input assembly 305 including multiple input assemblies. The input assembly 305 includes a front input assembly 406, a rear input assembly 408, and a side input assembly 409. The front input assembly 406 and the rear input assembly 408 includes one or more input elements. The input elements produce one or more electrical signals 312 upon actuation of the input elements. The input controller 316, which may include one or more processors, receives the one or more electrical signals 312 and converts them into input signals 122, which are in a form suitable to be received and interpreted by the hand-held host device 117. Alternatively the input signal 122 may be interpreted by the processor 104 on the input accelerator device 200.

[0047] The hand-held host device 117 receives the input signals 122 and interprets it using the re-mapping software noted above and described in more detail below, which may be loaded on the host hand-held device. Specifically, the input signals 122 transmitted from the input accelerator device 100,200 are received by a communication interface 118 on the hand-held host device 117 using standard communications protocols, such as the Bluetooth wireless protocol. The Bluetooth protocol allows the input signals 122 transmitted from the input accelerator device 100, 200 to control execution of embedded software, firmware, or software applications, such as a text messaging or game applications, on the hand-held host device 117. The input signals 122 are received and used by the hand-held host device 117 to map and remap the input elements in the front input assembly 406, the rear input assembly 408 and the side input assembly 409 to one or more software functions of a software application running on the host hand-held device 117.

[0048] For example, if a text application is running on the hand-held host device 117, then an input controller (not shown) on the hand-held host device 117 maps one or more input elements on the hand-held host device 117 (e.g., input elements forming the keypad on a cellular phone) to one or more symbols, such as characters, letters, numbers, icons, other types of symbols, or combinations of different types of symbols, and map one or more input elements of the front input assembly 406 on the input accelerator device 100, 200 to a shifting or indexing functionality. Thus, if a user wants to insert the letter "X", the user may press a first shift key on the input accelerator device 100, 200 and then the number key "9" on the hand-held host device 117. If the user wants to insert the letter "Y", the user may press a second shift key on the input accelerator device 100, 200 and then the number key "9" on the hand-held host device 117. If the user wants to insert the letter "Z", the user may press a third shift key on the input accelerator device 100,200 and then the number key "9" on the hand-held host device 117. So instead of having to press the number key "9" on the hand-held host device 117 three times to insert the letter "Z", which is the norm on most multi-tap interfaces, the user can insert the same letter with one press of the number key "9" on the hand-held host device 117 in combination with one press of the third shift key on the input accelerator device 100, 200.

[0049] Also, one or more input elements of the rear input assembly 408 on the input accelerator device 100, 200 can be mapped to scrolling, navigation, or cursor control functions. Furthermore, one or more input elements of the side input assembly 409 can be mapped as a short-cut key for executing a favorite application on the host hand-held device 117, such as a text, game or music application. If the hand-held host device 117 is executing a game application, then the input signals 122 may be used to control game play. That is, the input controller (not shown) on the hand-held host device 117 may map the input elements of the input assemblies 406, 408, 409 from the input accelerator device 100, 200 to game functions. The mapping of the input elements to particular input functions for a given software application, whether done by an input controller or processor on the hand-held host device 117 in response to the input signals 122 transmitted by the input accelerator device 100, 200, may be customized by the application developer or the user through downloads or other programming modalities. Moreover, the mapping of the input elements may be done for language key set changes, which may reduce the cost of manufacturing hand-held electronic devices for manufacturers servicing multiple countries.

[0050] Alternatively, the processor 204 of the input accelerator device 200 may perform the mapping function described above and alleviate some of the processing burden of the hand-held host device 117. Moreover, the human interface and input system 114 need not have the input controller 316, particularly where cost is a concern. In those instances, the processor 204 can directly receive the electrical signal 312 and interpret it into a suitable input signal 122, which is mapped using the mapping techniques noted above and described in more detail below.

[0051] The co-pending U.S. Patent Application Serial No. 11/221,412, describes techniques to selectively map and re-map the input elements on a hand-held electronic device optimally for a particular class of application software with common requirements (e.g., games, text entry, music and scrolling) and/or for a particular user. These techniques may also be used to map and remap the input elements of the input accelerator device 100, 200 disclosed herein and/or the hand-held host device 117. Alternatively, the input accelerator device 100, 200 may simply transmit the input signals 122 in response to user manipulation of the input elements to the hand-held host device 117, where an

application software executing on the hand-held host device 117 interprets the input signals accordingly.

[0052] In one implementation, a technique for remapping a hand-held electronic device includes receiving configuration settings, which may include at least one physical input element associated with at least one function, for a software application or a class of software applications; modifying a mapping function based on the configuration settings; and executing the function associated with the physical input element upon an activation, e.g., a press or actuation, of the physical input element during operation of the software application. The activation of the physical input elements may be from the three input assemblies 406, 408, 409 of the input accelerator device and/or the input assemblies of the host hand-held devices. As described above, using standard wireless communication protocols, such as Bluetooth, signals generated from the physical activations of the input assemblies of the input accelerator device 100,200 is transmitted to the hand-held host device 117 to control execution of specific software or software application. And in response to the execution of the software or software application by the signal transmitted from the input accelerator device, mapping and remapping procedures are performed. The mapping function may comprise a keyboard device driver, a device layout or a translation layer of the keyboard device driver, a combination of these or another mapping function.

[0053] In an implementation where the mapping function comprises a device layout, the step of executing the function associated with the physical input element upon an activation of the physical input element may include writing a scan code to a buffer; retrieving the scan code from the buffer; converting the retrieved scan code to a virtual input element code using the modified device layout; calling a keyboard event with the scan code and the virtual input element code; and executing the function associated with the keyboard event, which is the function associated with the physical input element.

[0054] In an implementation where the mapping function comprises a translation layer, the step of executing the function associated with the physical input element upon an activation of the physical input element may include writing a scan code to a buffer; retrieving the scan code from the buffer; converting the scan code to an original virtual input element code; converting the original virtual input element code to a new input

element code using the modified translation layer of the keyboard device driver; calling a keyboard event with the scan code and the new virtual input element code; and executing the function associated with the keyboard event, which is the function associated with the physical input element.

[0055] In another implementation, a method of re-configuring or re-mapping a software application or class of software applications may include associating one or more physical input elements disposed on the input accelerator device with at least a first executable function; and causing a modification of a mapping function to form an association of the one or more physical input elements with a second executable function to an association of the one or more physical input elements with the first executable function so that the first executable function is configured to be initiated upon an activation of the one or more physical input elements during operation of the software application or the a software application within a class of software applications. The second executable function is typically a default function typically provided with the software application to be executed in the default state when the one or more physical input elements are pressed or activated.

[0056] In yet another implementation , a graphical user interface identifying functions that are available to be associated with one or more physical input elements may be provided. The graphical user interface may also identify software applications for which a user can select to apply his physical input element to function associations. In one instance the graphical user interface may include input element icons, which correspond to physical input elements, and function icons, which correspond to an executable function. The user may then specify the functions to associate with physical input elements.

Hand-Held Input Accelerator Device Implementations

[0057] FIGS. 5a-d illustrates front, side, back, and “hand-held” views, respectively, of a hand-held input accelerator device 500 upon which the human interface and input system may be implemented. In one implementation, the input accelerator device 500 is implemented as a remote control device including four planar or contoured

surfaces: a front surface 502, a back surface 508, a left side surface 504, and a right side surface 306. Although, in other implementations, the input accelerator device 500 may have more or fewer planar and/or contoured surfaces. The input accelerator device 500 may be a miniature standalone wireless accessory device that communicates with a variety of hand-held devices such as a cellular phone, PDA, pocket PC, smart phone, laptop, or other similar devices through a wired or wireless communications protocol, such as the Bluetooth wireless protocol.

[0058] As shown in FIG. 5a, on the front surface 502, a display (not shown), such as an LCD, and a front input assembly 526 may be disposed adjacent to each other. Alternatively, the display may be on a separate assembly such as those displays for PDA's and cellular phones with a swivel-mounted screen or flip-phone configurations. Also, the front input assembly 526 may be disposed on more than one surface. The front input assembly 526 may include four input elements 510, 512, 514, and 516, although any number of input elements may be provided, which may be actuated by a user's thumb or fingers. The input elements 510, 512, 514, and 516 may be mapped to function as shift or index keys, such as Shift1 (510), Shift2 (512), Shift3 (514), and Shift4 (516), to facilitate shifting or indexing between symbols, such as characters, letters and/or numbers, associated with input elements on the host electronic device, such as a keypad on a cellular phone or PDA. For example, on a host electronic device, such as a cellular phone, typically a keypad is provided, which has a "7PQRS" key or input element. By using the input accelerator device 500, any one of these symbols-- P, Q, R, and S-- may be entered by tapping the appropriate input element 510, 512, 514, and 516 and tapping the "7PQRS" key on the host electronic device. That is, the "P" character, e.g., can be entered on the host electronic device by pressing input element 510 (which is mapped as Shift1) and pressing the "7PQRS" key on the host electronic device. Likewise, the Shift2 input element 512 may be pressed with the "7PQRS" key to produce the "Q" character. The Shift3 input element 514 may be pressed with the "7PQRS" key to produce the "R" character. Pressing the "7" key without shift keys can either produce the number "7" or the "P" character depending on user preference, which can be configured in software. The Shift4 input element 516 can be pressed with the "7PQRS" key to produce the "S" character. Thus, the need to tap the same key on the host device multiple times (i.e.,

three times) to enter, for example the “S” character” is eliminated. The implementation of multiple shift or indexing input elements as described above can dramatically improve the comfort, accuracy and speed of text entry for a variety of host hand-held device users.

[0059] As shown in FIG. 5b, a rear input assembly 528 may be disposed on the back surface 308. In this implementation, the front input assembly 526 (FIG. 5a) is disposed relative to the rear input assembly 528 to take advantage of the opposition of the human thumb and finger. Alternatively, a user may flip over the input accelerator device to use the rear input assembly his thumb instead of his fingers. The rear input assembly 528 may include two sensor arrays configured in software to represent one or more delineated active areas corresponding to different programmable functions depending on the application. The sensor arrays may include a ring-shaped curved sensor array 518 and a strip-shaped linear sensor array 520. The curved sensor array 518 may be implemented to be swept sideways along a natural freedom of motion of a thumb (or finger) to map horizontal cursor movements. In addition, the linear sensor array 520 may be swept vertically using the thumb (or finger) to map vertical cursor movements or control the scroll bar in a long selection list. The curved 518 and linear 520 sensor arrays in this implementation may include an actuator, such as an elastomeric material, attached to a force sensitive resistor array, a capacitive mat or array, or other similar pressure sensitive device or grid that can provide multiple outputs corresponding to the pressure readings of a plurality of active areas on the sensor arrays. In another configuration of the pressure sensor arrays 518, 520, the entire surface of the sensor arrays 518, 520 may be covered by rectangular active areas interspersed between small rectangular inactive areas to achieve any desired number of active areas. Other configurations of the pressure sensor arrays 518, 520 may be realized depending on the requirements of the desired application.

[0060] Alternatively, the rear input assembly 528 can be free of sensors and the input elements on the front input surface 502 may be programmed in software to allow the user to stroke the linear sensor array 520 up or down to effect a vertical scrolling motion in list selection. This implementation facilitates the user in navigating through long lists efficiently and effectively without any additional sensors on the back. Additionally, the front 502 or back 508 input surfaces can optionally provide access to a

miniature thumb joystick with analog inputs in both left-right and up-down directions. This thumb joystick can provide analog signals to control a game on the mobile phone host device 117.

[0061] The side input assembly 529 may be disposed on the left-side surface 504 and/or the right-side surface 506 as shown in FIGS. 5a-c. The left side surface 504 and right side surfaces 506 of the input accelerator 300 may be implemented to include additional input or selection elements 522, 524, 526, 528, which may be used to map to other types of cellular phone functions using re-mapping techniques described above and in the co-pending U.S. Patent Application Serial No. 11/221,412. The input or selection elements of the side input assembly 529 can also be implemented to effect shifting between modes. For example, holding down one of the input or selection elements 522, 524, 526, 528 may act as a shortcut key whereby a favorite application such as short message service (SMS), instant messenger (IM) or music may be activated. Holding down one of the selection elements may also act as a shortcut key to activate cellular phone functions such as phone number search and select, phone number dial, and call answer. Two of the input or selection elements 522, 524 may be implemented for left-handed users and the other two selection elements 526, 528 for right-handed users.

[0062] It is to be understood that the input elements 510, 512, 514, 516 of the front input assembly 526, the side input elements 522, 524, 526, 528 of the side input assembly 529, and the back input elements 518, 510 of the rear input assembly 528 in this implementation and any other implementation may be analog and/or digital buttons, keys, rockers (which may be a one or more position buttons or an analog joystick-type button), sliders, dials or touch pads used in combination with pressure sensors (such as force sensitive resistors, piezoelectric resistive sensors, and capacitive sensors), positional sensors (such as rotary encoders, linear potentiometers and the like), miniature analog thumb joysticks or other sensors or a combination of them.

[0063] FIG. 6 illustrates an alternative implementation of the rear input assembly 408. Input element 610 is implemented as a conventional rotary dial (such as the Blackberry thumb wheel), which may be used to control horizontal and vertical cursor, scroll, and/or navigation movements. In other implementations, other sensors as

described above may be utilized depending upon the user age and application categories to be covered.

[0064] FIGS. 7a-d illustrates an implementation of the hand-held input accelerator device as a wireless headset. As shown in FIG. 7a, the headset 700 may be implemented to include a thumb wheel as input element 710 on a front surface 730 that allows the user to scroll left and right. The front surface 730 may also include multiple input elements 722, 724, which with the input element 710, comprise a front input assembly. The front input elements 722, 724 may be actuated in conjunction with the input element 710 to perform object selections while scrolling left and right.

[0065] As shown in FIG. 7b, a back surface 760 of the headset 700 represents one implementation of a rear input assembly. The back surface 760 may include a linear sensor array 720 to facilitate vertical scrolling, selection from long lists, and navigation operations. The input elements and active areas on the four surfaces may be substantially similar to those as described above.

[0066] FIGS. 7b and 7c also illustrate a left side surface 740 and a right side surface 750 on which is disposed a side input assembly of the headset 700, which may be configured to include at least four side selection elements 712, 714, 716, 718 to facilitate shifting or indexing between modes and text input. The selection elements may be mapped to shortcuts to variety of functions, such as dialing and answering a call. Two of the selection elements 712, 714 may be implemented for left-handed users and the other two selection elements 716, 718 for right-handed users.

[0067] FIG. 7d depicts the headset 700 being used as a remote control. That is, by integrating the remote control inputs into the headset 700, a user can remotely perform all functions of one or more host hand-held electronic devices using just the headset 700 that serves multiple functions. When talking or listening to music on a host device, such as a cellular phone, the headset 700 may be use as a regular headset receiving and transmitting audio signals through a speaker (not shown) and a microphone (not shown). When inputting text, the headset 700 may be held in either or both hands and used to accelerate text entry. When executing applications on host devices, the thumb wheel 710 and the sensor array 720 may be used to navigate and scroll through long lists and icon arrays. Thus, the headset 700 with integrated remote control may be implemented to

operate a host device, such as a cellular phone, without ever removing the host device from its storage location (e.g., the user's pocket, jacket, backpack or purse).

[0068] Moreover, the input accelerator device described herein can be implemented as a "Master" device in communication link with multiple "Slave" or host devices. The user can easily switch from one host device to another easily just by selecting the desired host device from a list of host devices that may be displayed on a screen or LC disposed on the input accelerator device. For example, a user can selectively control a host device, such as a cellular phone, to answer a phone call using the input accelerator device. While talking to the caller using the headset 700, the user can put the caller on hold and look up an e-mail address from another host device, such as a PDA by selectively controlling the PDA. After retrieving the e-mail address, the user can return to the phone conversation by selectively switching back to controlling the cellular phone.

[0069] In any of the above implementations, active and/or passive tactile feedback may be implemented. To provide passive tactile feedback, the input elements of the first and/or second input assemblies may be combined with a palpable detent, such as a dome cap or dome spring so that a user can tactilely perceive, through his fingers or thumbs, activation and/or deactivation of an input element. In one implementation, among others, the palpable detent may be positioned between the actuator and sensor components of the input elements. To provide active tactile feedback, one or more vibratory units or force producing units may be mounted in the hand-held electronic device and activated to provide tap or index level or other information to a user. The vibratory unit may be an electric motor with an eccentric mass attached to the motor's shaft, a solenoid, a variable reluctance device, a loud speaker or any other vibrator that can provide tactile feedback. A force producing unit may be a solenoid in non-vibratory mode, a motor, non-vibratory actuators or any other actuator that can produce forces. A vibratory unit and/or force producing unit may be provided for each input element. In that case, the vibratory unit and/or force producing unit may be mounted below the input element so that when the vibratory unit and/or force producing unit is activated, the vibratory unit and/or force producing unit can push out the surface of the electronic device to a different level or position depending on the information to be communicated.

Thus, in implementations using a pressure sensor pad or touch-pad as the input element, a stepped array may be configured to indicate higher and higher levels of index positions across the touch pad or pressure sensor pad. The vibratory units and/or force producing units may also be used to provide tactile feedback to indicate the momentary achievement of an objective, such as target lock in game applications. Tactile feedback may also be accomplished by actuators, such as a solenoid, which changes the stiffness of the input element electronically or pushes against the user's hand or fingers to indicate an event of interest in the software application.

[0070] The computational aspects described here can be implemented in analog or digital electronic circuitry, or in computer hardware, firmware, software, or in combinations of them. Where appropriate, aspects of these systems and techniques can be implemented in a computer program product tangibly embodied in a machine-readable storage device for execution by a programmable processor; and method steps can be performed by a programmable processor executing a program of instructions to perform functions by operating on input data and generating output.

[0071] The systems and techniques described above may utilize the biomechanics of the thumb and fingers, i.e., it uses the function of opposition, the fine motor control of the fingers, and the larger range of motion and stronger actuation provided by the thumb. By using the fingers and thumb in concert, the number of taps and time needed to accomplish a given function is reduced, the accuracy is improved, and the natural programming inherent in the human hand replaces the training required for other systems.

[0072] A number of implementations have been described. Other implementations may include different or additional features. For example, other configurations of the one or more input elements of the front, rear and side input assemblies may be realized. Also, the input accelerator devices described herein may have more or less than six planar or contoured surfaces. Moreover, the number of input elements in the input assemblies are not limited to the number of input elements described in the implementations above. Also, the one or more input elements of the input assemblies may be any input or selection type known to one of skill in the art, such as keys, buttons, touch pads, other types of pads, rockers, sliders, dials, contact sensors or other actuators associated with any sensor. Each sensor associated with an actuator may

include digital momentary on/off switches or analog sensors, such as pressure sensors (e.g., force sensitive resistors, piezoelectric film sensors, or capacitive sensors), or positional sensors (e.g., rotary or linear potentiometers or encoders), or other analog sensors known to those of ordinary skill, or accelerometers or gyroscopes. The input assemblies may include a combination of these different types of input or selection elements, which may be mounted in the configurations shown in the figures or imbedded within the device to permit control through motion of the overall device.

[0073] Further, other implementations of the hybrid auxiliary input acceleration device are possible. People already carry around existing accessory devices, which can be instrumented with additional sensors to provide additional input signals to the host device for input acceleration. Devices carried in the purse, in the wallet, or on a keychain are ideal because these devices already serve another primary function, and providing input acceleration via these devices may result in a convergent accelerator device that substantially improves user experience without increasing the number of items that a person needs to carry around. Like the standalone remote control implementation, these convergent input accelerator devices may communicate with the host device wirelessly through a Bluetooth protocol or wirelessly through a rough-line-of-sight infrared link. Alternatively, the convergent input accelerator devices may physically plug into the host device via connectors already present in the host device, such as a headset jack or one of many data ports described above.

[0074] In another implementation, the auxiliary input accelerator device may be a car key with a remote keyless entry device, which is a common device that most people carry on their keychain. The remote keyless entry device already has a button, a radio frequency (RF) link, and an on board processor to transmit security information from the remote keyless entry device to a host vehicle to open a door, window, or a trunk; alter climate control settings; or control any other vehicle functions remotely. Most remote keyless entry devices are also small in size and possess comfortable form factor. One or more input assemblies including buttons, touchpads, or continuous sensor strips may be integrated into the remote keyless entry device to convert it into a hybrid device, which may function as an input accelerator device for a host device. The hybrid remote keyless

entry input accelerator device can communicate with the host device using a Bluetooth protocol, a long range RF protocol, or Infrared protocol.

[0075] In yet another implementation, the auxiliary input accelerator device may be a remote garage door opener. While these remote openers typically tend to be clipped to the visor in a car, they can also be more miniature in size and carried on a keychain. These devices can easily be augmented to have buttons and sensors appropriate for use as an input accelerator device for host device.

[0076] In one implementation, the auxiliary input accelerator device may be a programmable radio frequency identification (RFID) keyfob. Today, many workers gain access to their secure workplace via an RFID keyfob. The circuitry in such a keyfob may be housed inside an input accelerator with buttons, sensor arrays and a wireless communication protocol to be used as an auxiliary input accelerator device to the host device.

[0077] In another implementation, the auxiliary input accelerator device may be a smartcard. In Europe and Asia, contactless, wireless smartcards based on similar technologies as the RFID keyfob are increasingly being used for a variety of commerce transactions. For example, in District of Columbia Metro Subway System, every terminal is smartcard enabled and people can pay for their subway rides by waving their wallet containing a prepaid smartcard in front of a grounded receptor. Such smartcard may be incorporated into an input accelerator device that may be carried on a keychain. Thus, the smartcard input accelerator may be used to augment interactions with a host device as well as serve as the primary mode of identification and payment in everyday life.

[0078] In yet another implementation, the auxiliary input accelerator device may be a universal remote control device. A pocket size universal remote control device with soft keys may be configured to control all standard home entertainment devices such as televisions, DVD players, VHS players, and sound systems in addition to a host device such as a cellular phone. The universal remote control device may either use the same infrared link to communicate with home entertainment devices and with the cellular phone, or it may communicate with the cellular phone using another wireless protocol, such as Bluetooth protocol.

[0079] In yet another implementation, the auxiliary input accelerator device may be a digital wristwatch incorporating the functionality of the input accelerator device. Digital wrist watches, especially running or exercise watches, typically have a digital display and a number of buttons for tracking lap times, heart rate and other important biostatistics. They also typically have a larger surface area than typical wrist watches. These watches may readily be programmed and retrofitted with optional additional sensor arrays to be used as an input accelerator for the host device.

[0080] In one implementation, the auxiliary input accelerator device may be an MP3 device such as an iPod. While multimedia content delivery on the mobile platform is becoming a norm, currently many people still carry a separate MP3 player for listening to music. The iPod or other MP3 players already incorporate sensors and buttons, which may be easily augmented to be used as the input accelerator device for interfacing with the host device, such as a cellular phone. The MP3 player may connect to the host device using an existing or added wireless protocol, such as Bluetooth.

[0081] In one implementation, the auxiliary input accelerator device may be an ultimate wireless converged remote controller device. Some or all of the above implementations may be combined into a single converged input accelerator device. The form factor of the device may be a keyfob form factor to go on a key chain, a wrist watch form factor to go on the wrist, or any other miniature form factor that facilitate portability. The ultimate converged remote controller device may perform all of the following functions in addition to controlling any additional devices possessing a short or long range wireless link. The ultimate converged remote controller device may function as an input accelerator for cellular phones, with keys and optional sensor arrays; a remote keyless entry device with a long range RF circuitry; a remote garage door opener; a RFID keyfob with a short range passive RF circuitry; a smartcard for identification and commerce with a short range passive RF circuitry; an universal remote controller device for home entertainment systems; and/or any other auxiliary functions people may want to incorporate.

[0082] Moreover, the methods to provide data input, device control or game control may be performed in a different order and still achieve desirable results. Accordingly, other implementations are within the scope of the following claims.

WHAT IS CLAIMED IS:

1. An input accelerator device for controlling a hand-held host device, the input accelerator device comprising:

a communication channel configured to interface with the hand-held host device;
an input assembly comprising a plurality of input elements, each input element being configured to be selectively mapped to one or more functions of a software application in order to minimize actuation required of at least one input element of the hand-held host device; and

an input controller communicatively coupled to the input assembly and the communication channel, the input controller being configured to generate an input signal upon actuation of at least one of the plurality of input elements and being further configured to relay the input signal to the communication channel for transmission to the hand-held host device to control execution of the one or more functions of the software application mapped to the actuated input element.

2. The input accelerator device of claim 1, wherein the input assembly further comprises

a front input assembly comprising at least a first one of the plurality of input elements, the first one of the plurality of input elements being located on a front surface; and

a rear input assembly having at least a second one of the plurality of input elements, the second one of the plurality of input elements being located on a rear surface.

3. The input accelerator device of claim 1 further comprising a display unit.
4. The input accelerator device of claim 1 further comprising a storage device configured to store one or more instructions.
5. The input accelerator device of claim 4, wherein the one or more instructions comprise at least one of a text application, a mapping software, a firmware, a gaming application, or a scrolling application.
6. The input accelerator device of claim 4 further comprising:
 - a processor configured to interpret the input signal and execute the one or more instructions;
 - a main memory configured to load the one or more instructions executed by the processor; and
 - a bus configured to direct communications to and from the processor.
7. The input accelerator device of claim 2, wherein the input assembly further comprises a side input assembly comprising at least a third one of the plurality of input elements, the third one of the plurality of input elements being located on a side surface.
8. The input accelerator device of claim 7, wherein at least one input element comprises at least one of an analog button, a digital button, a key, a rocker, a slider, a dial,

a touch pad, a pressure sensor, a force sensitive resistor, a piezoelectric resistive sensor, a capacitive sensor, a positional sensor, a rotary encoder, a linear potentiometer, a D-pad, or a miniature analog thumb joystick.

9. The input accelerator device of claim 1, wherein the communication channel comprises a wired data connection including at least one of a Universal Serial Bus port, a IEEE 1394 Firewire port, a serial port, a parallel port, a headphone port, or a data port.

10. The input accelerator device of claim 1, wherein the communication channel further comprises a wireless data connection including at least one of a Bluetooth connection, an Infrared connection, or a Wi-Fi connection.

11. The input accelerator device of claim 1 further comprising a secondary control unit configured to perform functions of one or more secondary devices including at least one of a headset, a garage door opener, an automobile keyless entry unit, a smartcard, a programmable RFID keyfob, a universal remote control unit, a digital wristwatch, or a MP3 player.

12. The input accelerator device of claim 7, wherein the front input assembly, the rear input assembly, and the side input assembly are further configured to optimize a biomechanical effect of the human user's opposing thumb and fingers.

13. The input accelerator device of claim 7, wherein at least one of the front input assembly, the side input assembly, and the rear input assembly is further configured to accelerate text input.

14. The input accelerator device of claim 7, wherein at least one of the front input assembly, the side input assembly, and the rear input assembly is further configured to accelerate at least one of scrolling, cursor control or navigational control.

15. The input accelerator device of claim 7, wherein at least one of the front input assembly, the side input assembly, and the rear input assembly is further configured to accelerate game play.

16. A method for configuring an input accelerator device, the method comprising:

disposing on one or more surfaces an input assembly comprising a plurality of input elements configured to receive human input through manipulation of the input elements, wherein at least one of the input elements is further configured to be selectively mapped to one or more functions of a software application stored on a hand-held host device in order to minimize actuation required of at least one input element on the hand held host device;

providing a communication channel configured to connect to the hand-held host device; and

connecting the input assembly to the communication channel using an input controller configured to generate an input signal upon actuation of at least one of the plurality of input elements and being further configured to relay the input signal to the communication channel for transmission to the hand-held host device to control execution of the one or more functions of the software application mapped to the actuated input element.

17. The method of claim 16, wherein disposing the input assembly on one or more surfaces further comprises:

disposing on a first surface a first input assembly comprising at least a first one of the plurality of input elements; and

disposing on a second surface a second input assembly comprising at least a second one of the plurality of input elements.

18. The method of claim 17, wherein disposing the input assembly on one or more surfaces further comprises disposing on a third surface a third input assembly comprising at least a third one of the plurality of input elements.

19. The method of claim 18, wherein disposing the input assembly on one or more surfaces further comprises disposing the first input assembly, the second assembly, and the third assembly in a configuration to optimize a biomechanical effect of the human user's opposing thumb and fingers.

20. The method of claim 16, wherein providing a communication channel further comprises providing a wired data connection including at least one of a Universal Serial Bus port, a IEEE 1394 Firewire port, a serial port, a parallel port, a headphone port, or a data port.

21. The method of claim 16, wherein providing a communication channel further comprises providing a wireless data connection including at least one of a Bluetooth connection, an infrared connection, or a Wi-Fi connection.

22. The method of claim 18, wherein disposing the input assembly on one or more surfaces further comprises disposing the first input assembly, the second input assembly, and the third input assembly in a configuration to provide control functions of one or more secondary devices including at least one of a headset, a garage door opener, an automobile keyless entry unit, a smartcard, a programmable RFID keyfob, a universal remote control unit, a digital wristwatch, or a MP3 player.

23. The method of claim 18, wherein disposing the input assembly on one or more surfaces further comprises disposing the first input assembly, the second input assembly and the third input assembly including at least one of an analog button, a digital button, a key, a rocker, a slider, a dial, a touch pad, a pressure sensor, a force sensitive resistor, a piezoelectric resistive sensor, a capacitive sensor, a positional sensor, a rotary encoder, a linear potentiometer, a D-pad, or a miniature analog thumb joystick.

24. The method of claim 18, wherein disposing on one or more surfaces the input assembly further comprises configuring at least one of the first input assembly, the second input assembly, and the third input assembly to accelerate textual inputs.

25. The method of claim 18, wherein disposing on one or one or more surfaces the input assembly further comprises configuring at least one of the first input assembly, the second input assembly, and the third input assembly to accelerate at least one of scrolling, cursor control or navigational control.

26. The method of claim 18, wherein disposing on one or more surfaces the input assembly further comprises configuring at least one of the first input assembly, the second input assembly, and the third input assembly to accelerate game play.

27. A method of controlling a plurality of hand-held host devices, the method comprising:

providing an input accelerator device comprising:

a communication channel configured to interface with the plurality of hand-held host devices;

an input assembly comprising a plurality of input elements, each input element being configured to be selectively mapped to one or more functions of a software application in order to minimize a number of actuation required for an input element of one of the plurality of hand-held host devices; and

an input controller communicatively coupled to the input assembly and the communication channel, the input controller being configured to generate an input signal upon actuation of one of the plurality of input elements and being further configured to relay the input signal to the communication channel for transmission to the hand-held host device to control execution of the one or more functions of the software application mapped to the actuated input element;

actuating one of the plurality of input elements;

interpreting the generated input signal based on the one or more functions mapped to the actuated input element; and

executing the one or more functions mapped to the actuated element.

28. The method of claim 27, wherein the input assembly further comprises:

a first input assembly comprising at least a first one of the plurality of input elements, the first one of the plurality of input elements being located on a first surface; and

a second input assembly having at least a second one of the plurality of input elements, the second one of the plurality of input elements being located on a second surface.

29. The method of claim 28, wherein the input assembly further comprises: a

third input assembly comprising at least a third one of the plurality of input elements, the third one of the plurality of input elements being located on a third surface.

30. The method of claim 29, wherein the first input assembly, the second input assembly, and the third assembly are further configured to optimize a biomechanical effect of the human user's opposing thumb and fingers.

31. The method of claim 27, wherein the communication channel further comprises a wired data connection including at least one of a Universal Serial Bus port, a IEEE 1394 Firewire port, a serial port, a parallel port, a headphone port, or a data port.

32. The method of claim 27, wherein the communication channel further comprises a wireless data connection including at least one of a Bluetooth connection, an Infrared connection, or a Wi-Fi connection.

33. The method of claim 27, wherein the plurality of host devices comprises at least one of a cellular phone, a personal digital assistant, a smart phone, a laptop, a garage door opener, an automobile keyless entry unit, a smartcard, a programmable RFID keyfob, a universal remote control unit, a digital wristwatch, a compact disc player or a MP3 player.

34. The method of claim 29, wherein at least one of the input elements comprises at least one of an analog button, a digital button, a key, a rocker, a slider, a dial, a touch pad, a pressure sensor, a force sensitive resistor, a piezoelectric resistive sensor, a capacitive sensor, a positional sensor, a rotary encoder, a linear potentiometer, a D-pad, or a miniature analog thumb joystick.

35. The method of claim 29, wherein at least one of the first input assembly, the second input assembly, or the third input assembly is further configured to accelerate textual inputs.

36. The method of claim 29, wherein at least one of the first input assembly, the second input assembly, or the third input assembly is further configured to accelerate at least one of scrolling, cursor control or navigational control.

37. The method of claim 29, wherein at least one of the first input assembly, the second input assembly, or the third input assembly is further configured to accelerate game play.

38. The method of claim 35, further comprising:
configuring the second one of the plurality of input elements to be mapped to one or more indexing functions; and
actuating an input element on one of the plurality of hand-held host devices in conjunction with the second one of the plurality of input elements.

ABSTRACT

A human interface and input system is implemented on an input accelerator device to remotely operate hand-held host electronic devices such as cellular phones, PDA's, pocket PC's, and smart phone's. The input accelerator device can control some or all functions of the host device to eliminate the need to directly interface with the host device. The input accelerator device may be configured to optimize a biomechanical effect of a human user's opposing thumb and fingers by including, on one surface, one or more software configurable input elements manipulatable by the user's thumb(s) or finger, and, on another surface, one or more software configurable selection elements manipulatable by a user's finger(s). The input accelerator device can be a hybrid device combining a wireless headset with the device control features.

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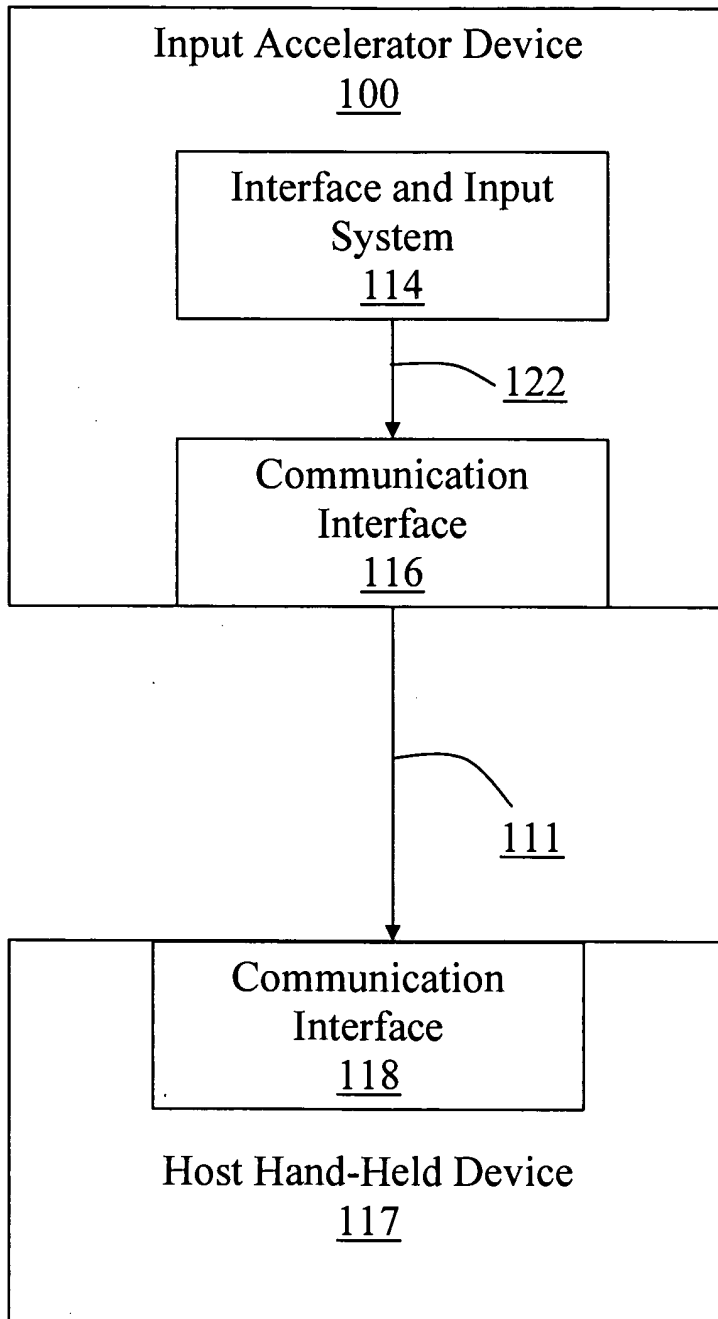


FIG. 1

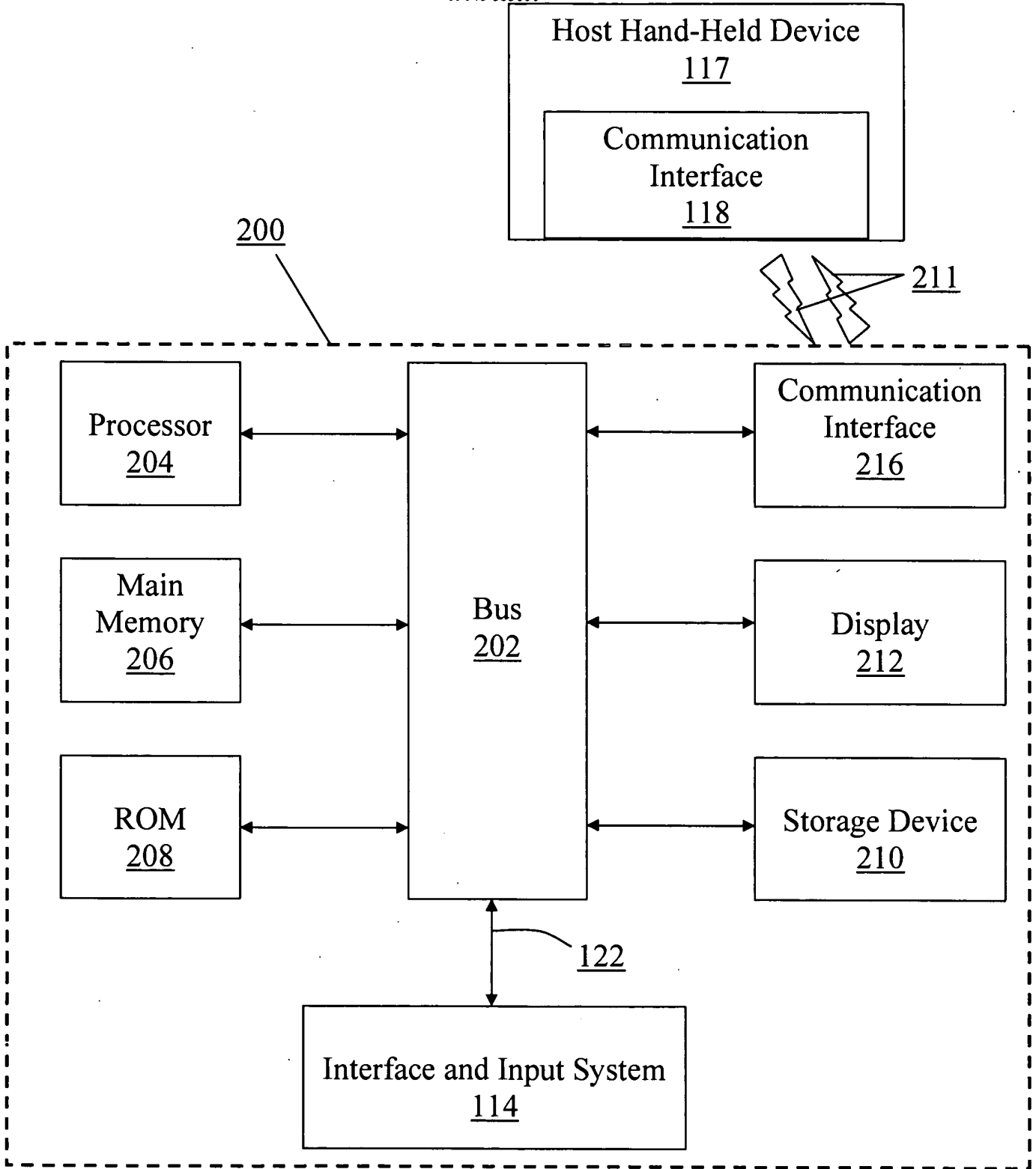


FIG. 2

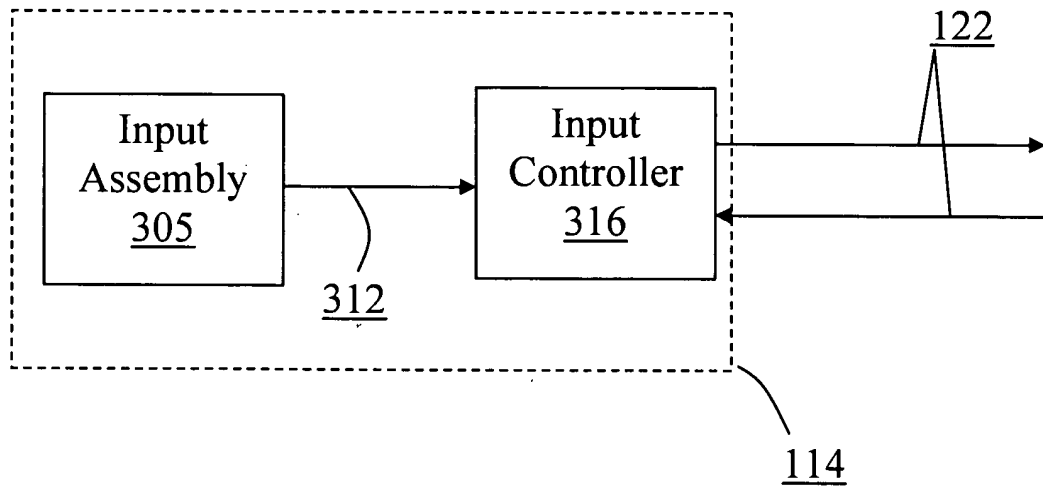


FIG. 3

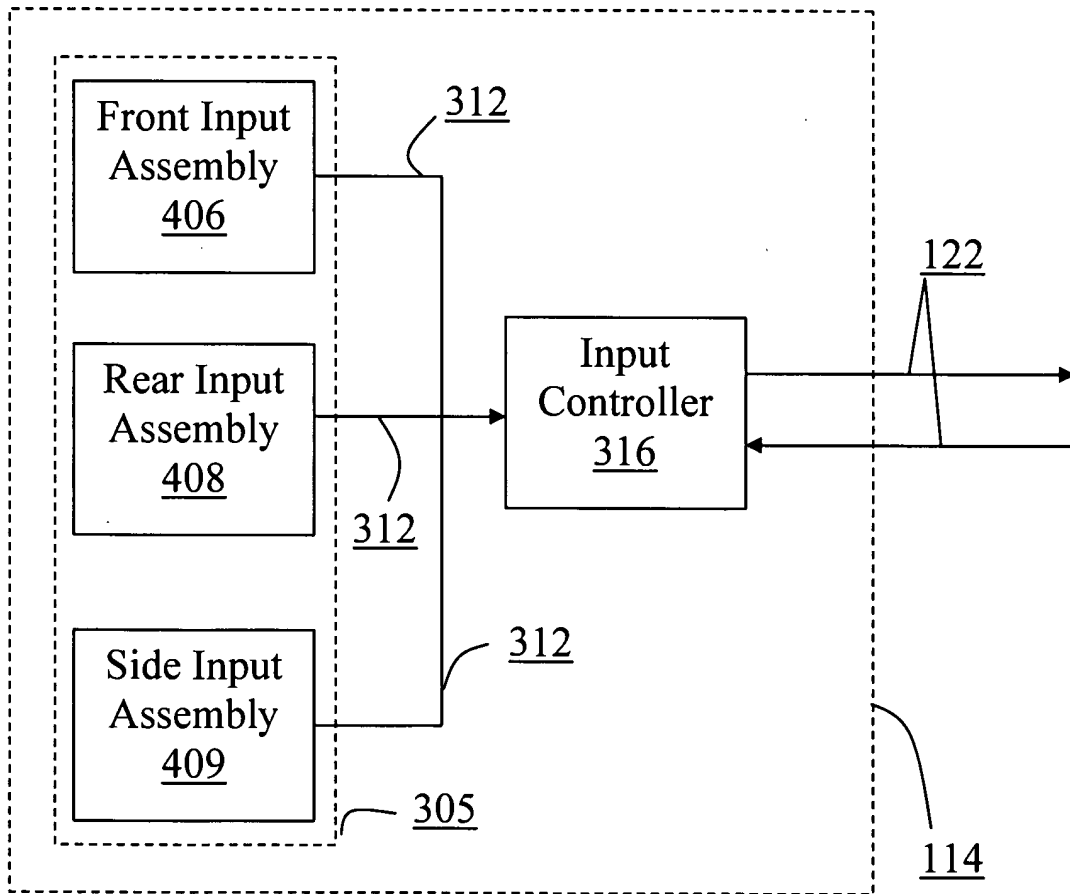


FIG. 4

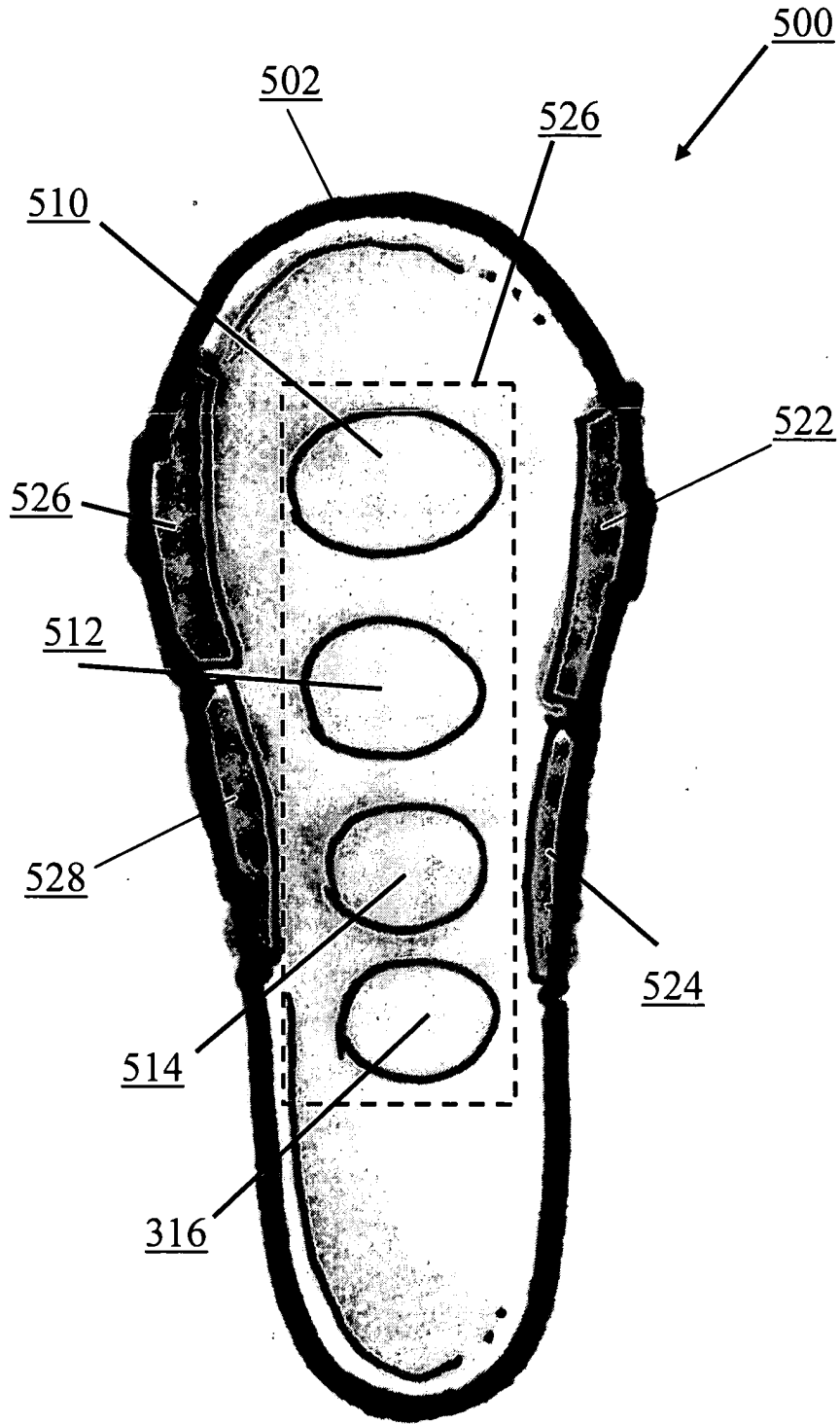


FIG. 5a

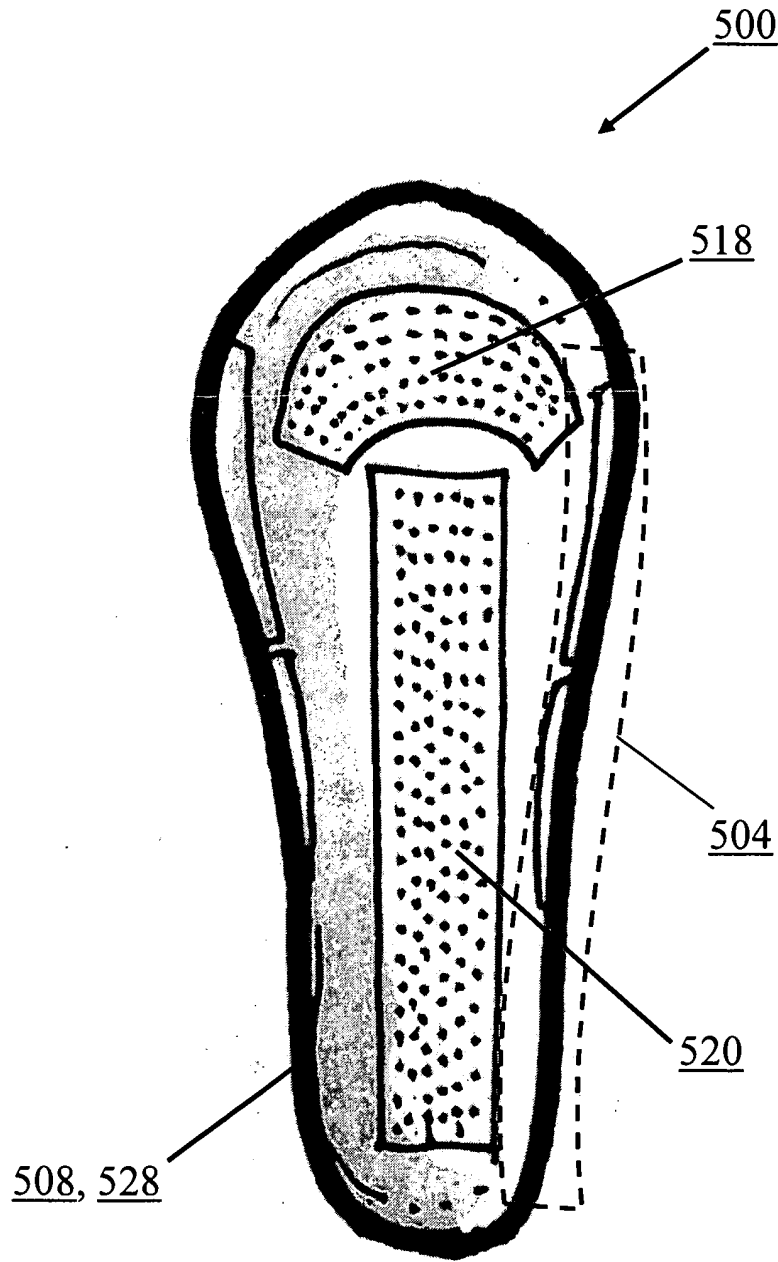


FIG. 5b

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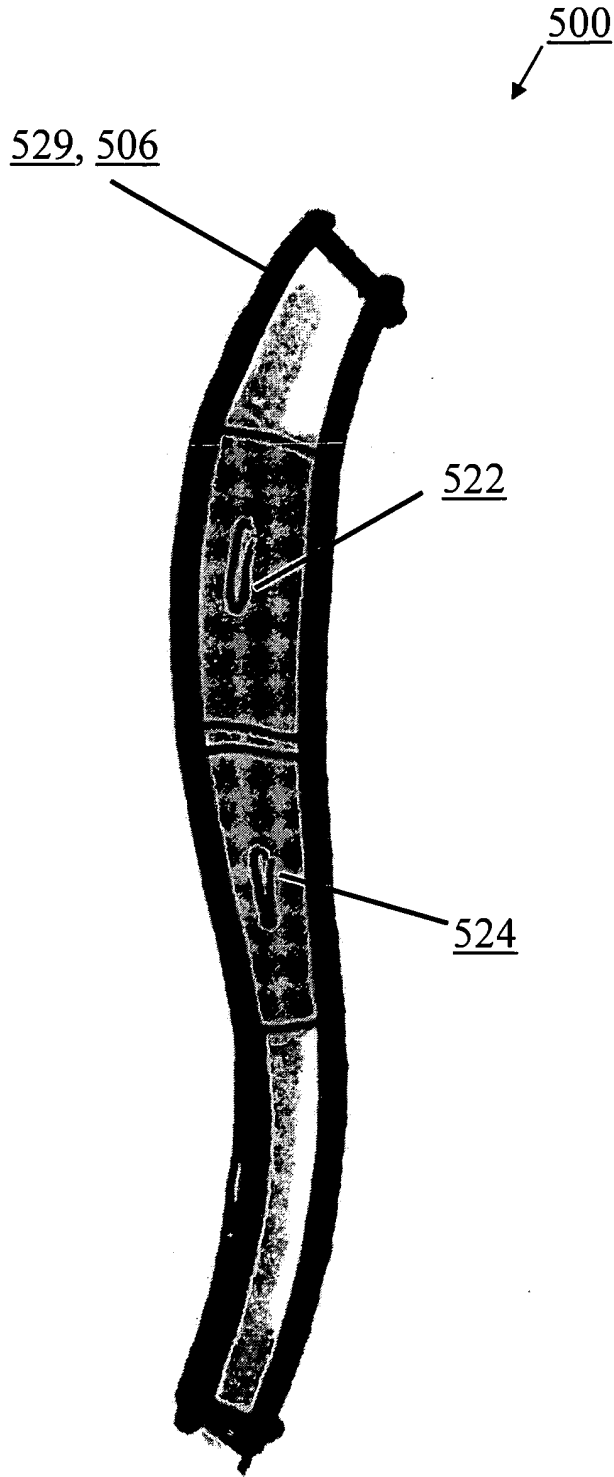


FIG. 5c

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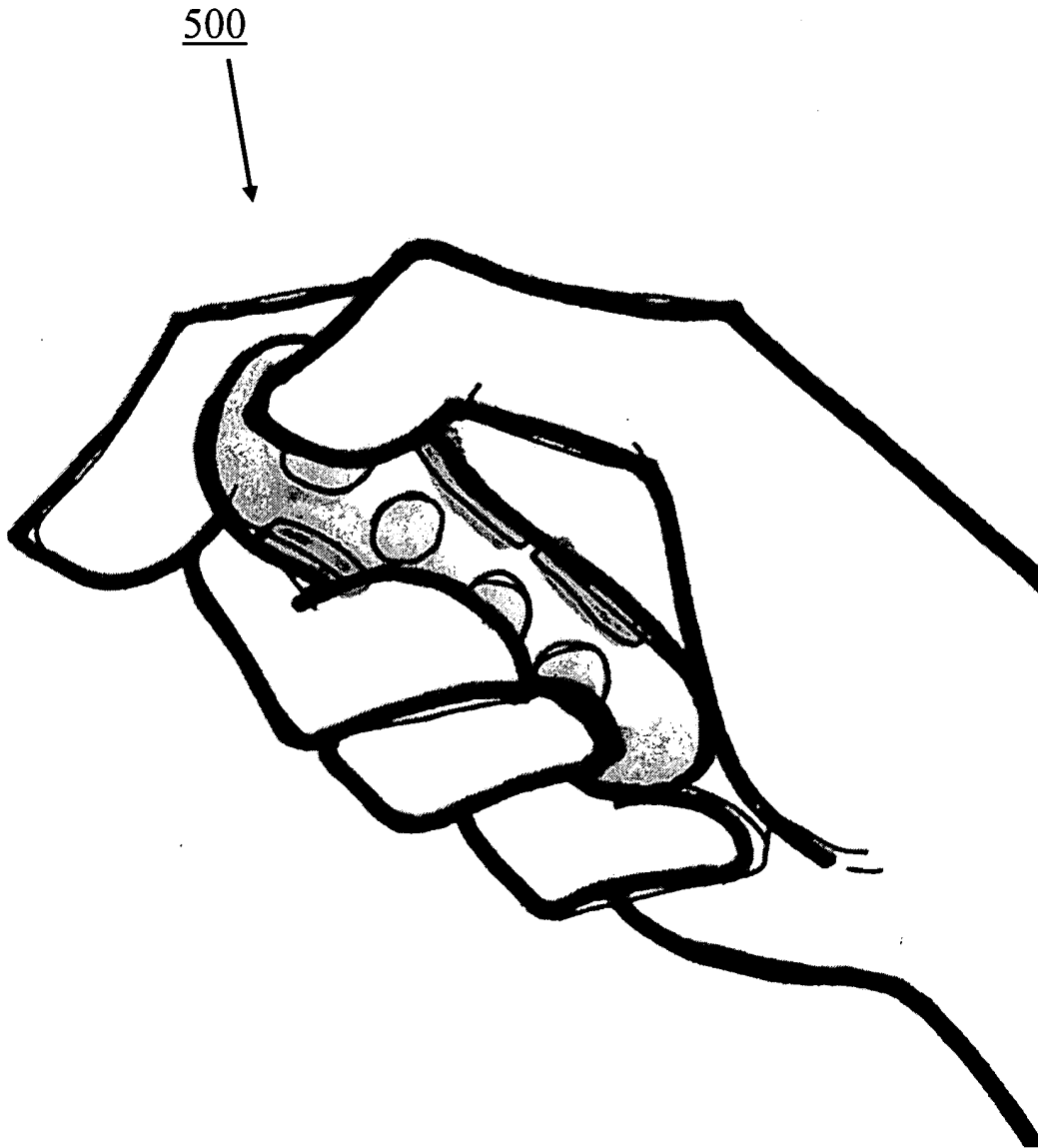


FIG. 5d

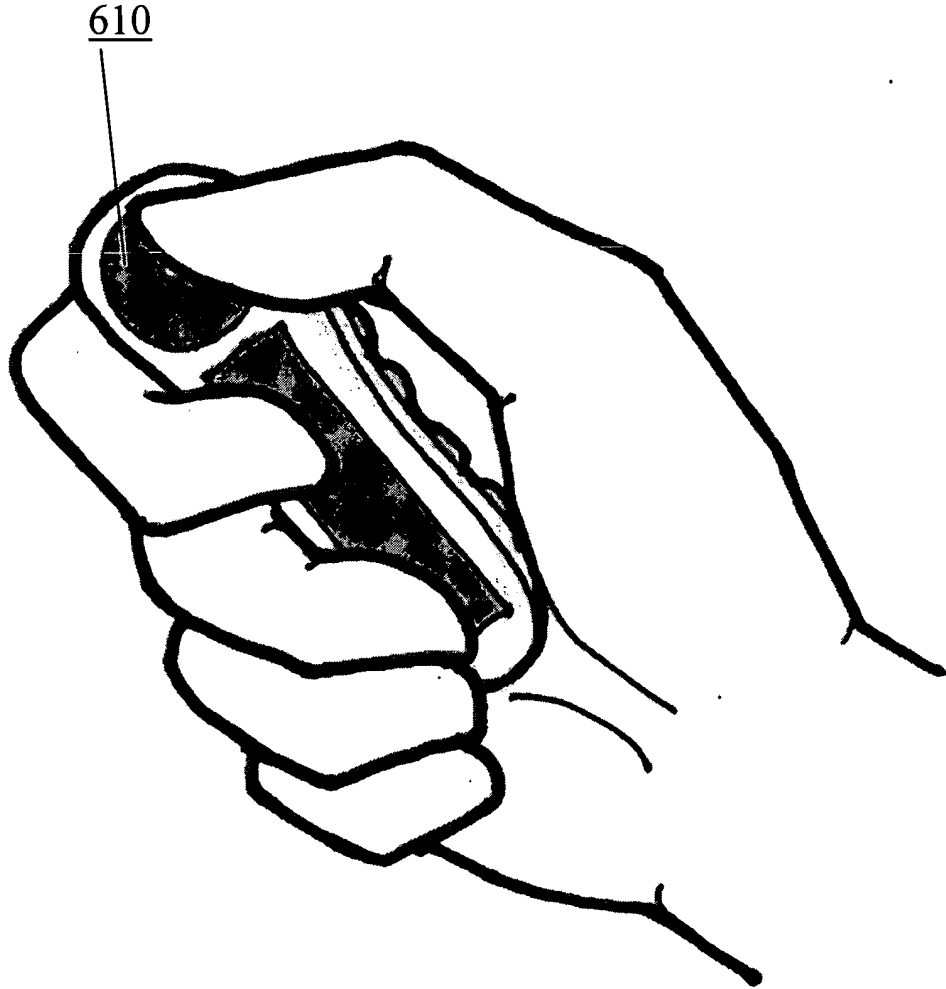


FIG. 6

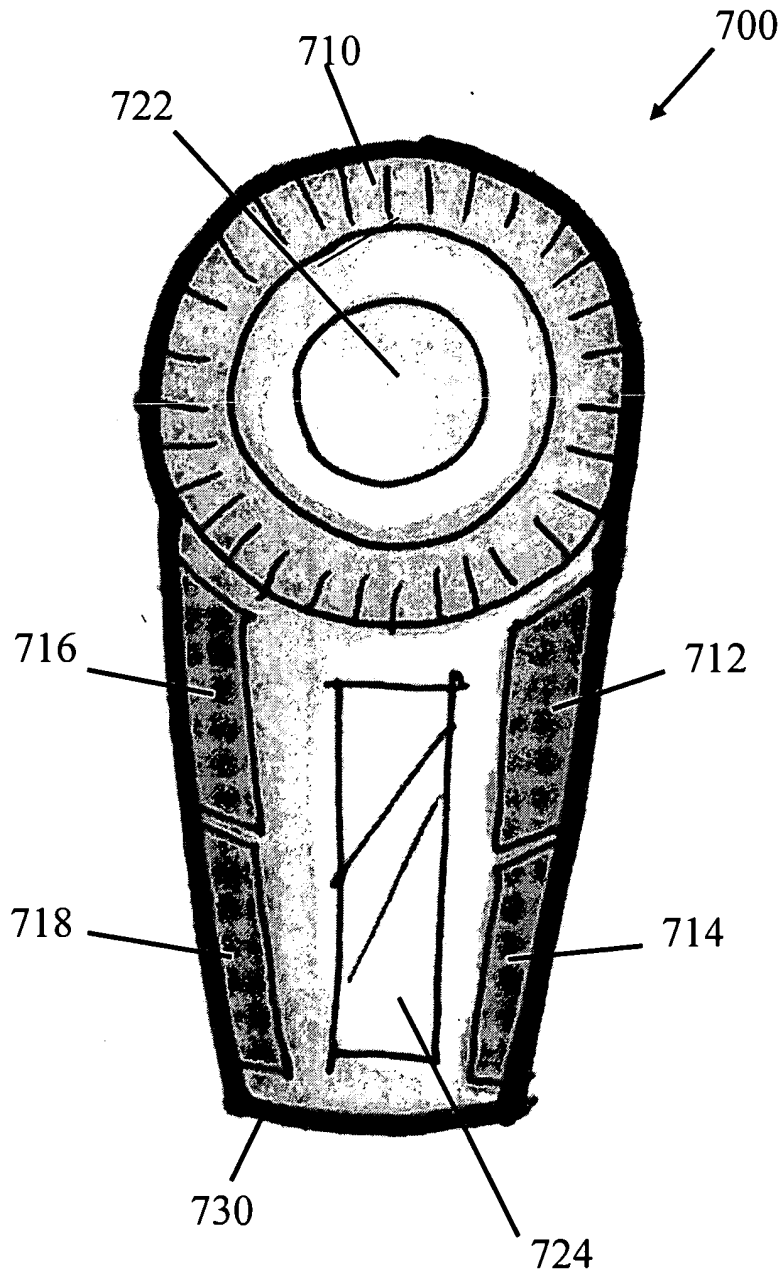


FIG. 7a

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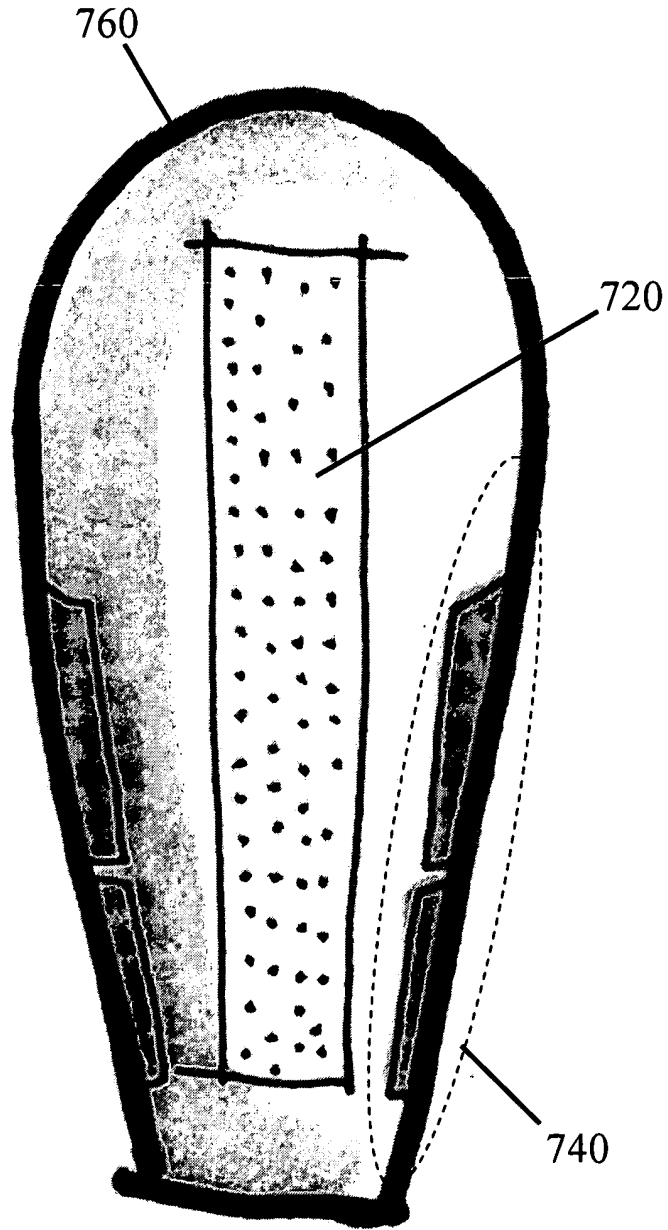


FIG. 7b

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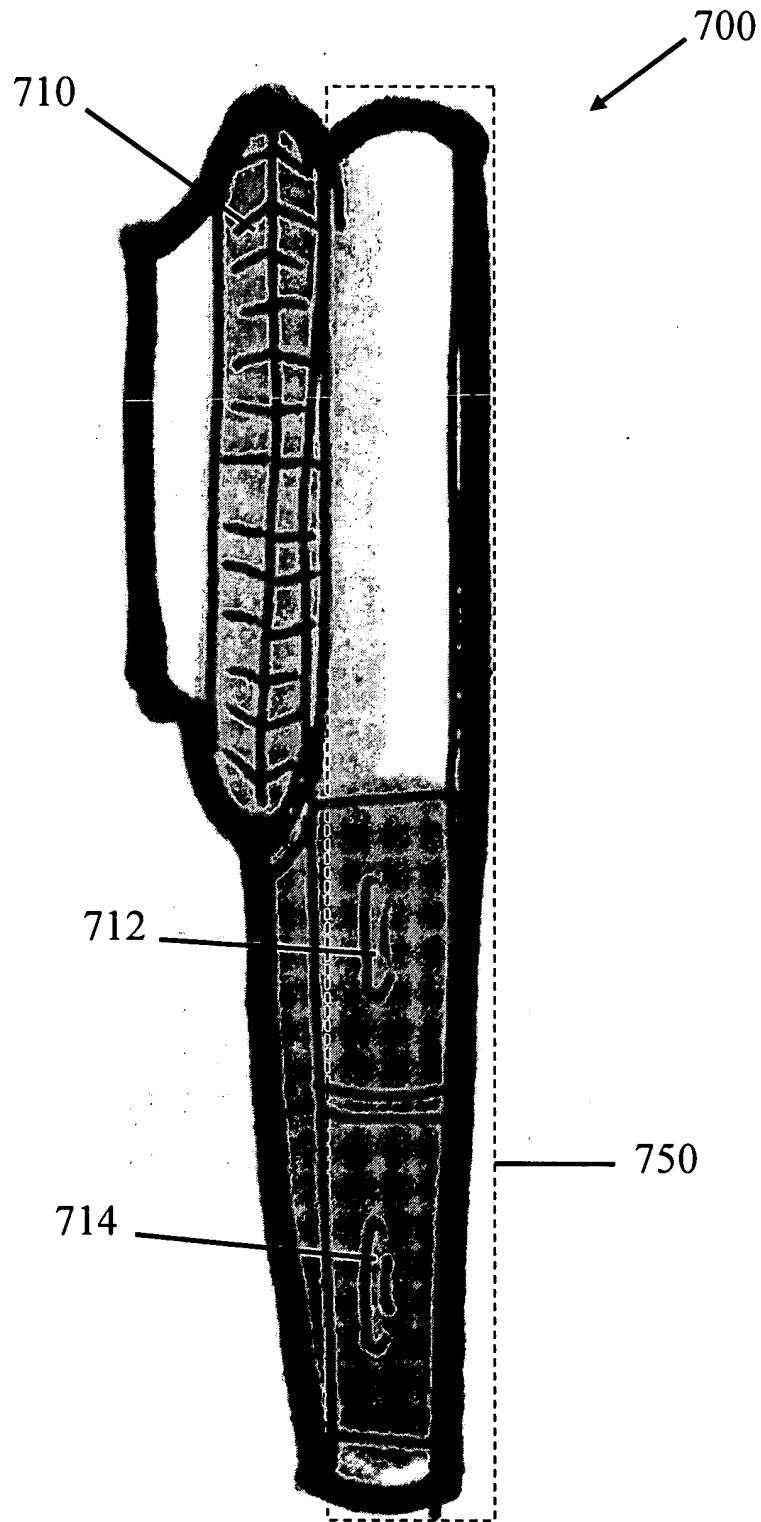


FIG. 7c

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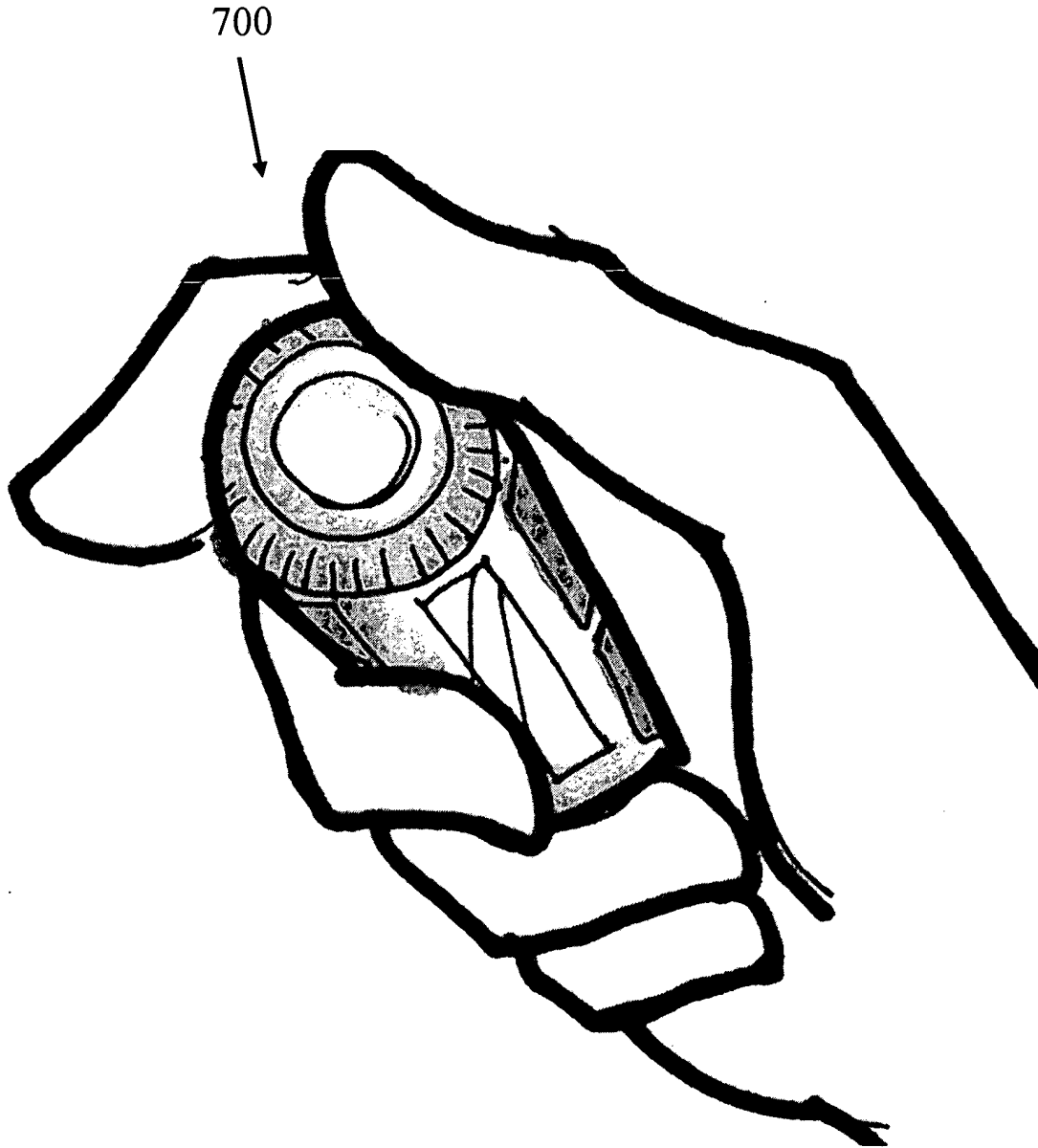


FIG. 7d

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875	Application or Docket Number 11249009
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APPLICATION AS FILED – PART I			SMALL ENTITY		OTHER THAN SMALL ENTITY	
(Column 1) (Column 2)						
FOR	NUMBER FILED	NUMBER EXTRA	RATE (\$)	FEE (\$)		
BASIC FEE (37 CFR 1.16(a), (b), or (c))				150		
SEARCH FEE (37 CFR 1.16(k), (l), or (m))				250		
EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))				100		
TOTAL CLAIMS (37 CFR 1.16(i))	38	minus 20 = * 18	X\$ 25=	450	X\$50=	
INDEPENDENT CLAIMS (37 CFR 1.16(h))	3	minus 3 = *	X\$100=		X\$200=	
APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is \$250 (\$125 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR					
MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))					N/A	
			TOTAL	950	TOTAL	

* If the difference in column 1 is less than zero, enter "0" in column 2.

APPLICATION AS AMENDED – PART II					SMALL ENTITY		OTHER THAN SMALL ENTITY	
(Column 1) (Column 2) (Column 3)								
AMENDMENT A	CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE (\$)	ADDITIONAL FEE (\$)	RATE (\$)	ADDITIONAL FEE (\$)
	Total (37 CFR 1.16(i))	*	Minus **	=	X =		X =	
	Independent (37 CFR 1.16(h))	*	Minus ***	=	X =		X =	
	Application Size Fee (37 CFR 1.16(s))						N/A	
	FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))						N/A	
					TOTAL ADD'T FEE		TOTAL ADD'T FEE	

(Column 1) (Column 2) (Column 3)								
AMENDMENT B	CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE (\$)	ADDITIONAL FEE (\$)	RATE (\$)	ADDITIONAL FEE (\$)
	Total (37 CFR 1.16(i))	*	Minus **	=	X =		X =	
	Independent (37 CFR 1.16(h))	*	Minus ***	=	X =		X =	
	Application Size Fee (37 CFR 1.16(s))						N/A	
	FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))						N/A	
					TOTAL ADD'T FEE		TOTAL ADD'T FEE	

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.
 ** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".
 *** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".
 The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1.

This collection of information is required by 37 CFR 1.16. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

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