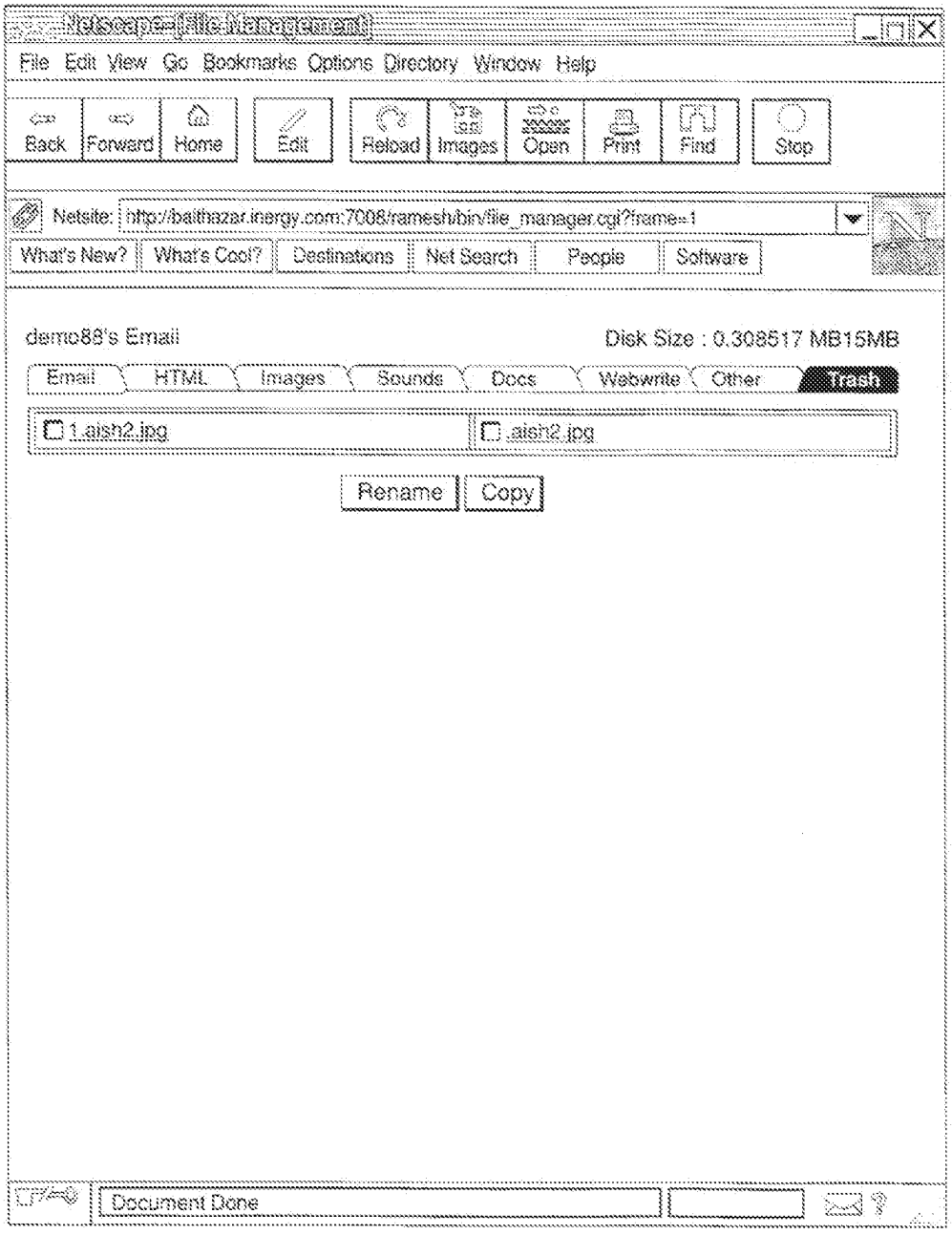

Netscape - [File Management]
File Edit View Go Bookmarks Options Directory Window Help
Back Forward Home Edit Reload Images Open Print Find Stop
Netsite: http://balthazar.inergy.com:7008/ramesh/bin/file_manager.cgi?name=1
What's New? What's Cool? Destinations Net Search People Software
demo88's Email
Disk Size : 0.308517 MB15MB
Email HTML Images Sounds Docs Webwrite Other Trash
1.aish2.jpg
.aish2.jpg
Rename Copy
Document Done

Fig. 27

```
<html>
<!-- Copyright (C) 1997 Inergy Online, Inc.  All rights reserved. -->
<!-- $Header: /proj/file_manager/CGI/file_manager.xcgi,v 1.1 1997/08/1
<HEAD><TITLE>file Manager</TITLE></HEAD>
<body bgcolor="#d5d1c0">
<center><table border=0 cellpadding cellspacing=2><tr><td align=left>
<h><font face=arial size=2>demo88 's Email</font></l></td><td align=ri
<font face=arial size=2> Disk Size :  0.398517 MB/15MB</font></td></tr
<form method=POST action="/ramesh/bin/file_manager.cgi">
<input type=hidden name=username value="demo88">
<input type=hidden name=frame value="1">
</td></tr><tr><td colspan=2><input type=image src="/ramesh/images/flef
<tr><td align=left>
<INPUT TYPE="checkbox" NAME="FILE" VALUE="1.aish2.jpg"><A HREF="/accou
<td align=left>
<INPUT TYPE="checkbox" NAME="FILE" VALUE="aish2.jpg"><A HREF="/account
</table></center>
        <center>
        <table width=544 cellpadding=0 cellspacing=0 border=0>
        <tr><td align=center>
<INPUT TYPE = "SUBMIT" NAME="SUBMIT" VALUE ="Rename">
<INPUT TYPE = "HIDDEN" NAME="current" VALUE ="">
        <INPUT TYPE = "SUBMIT" NAME="SUBMIT" VALUE ="Copy">
        <INPUT TYPE = "HIDDEN" NAME="current" VALUE ="">
        </td></tr></table>
        </center>
</form></BODY>
</HTML>
```

Fig. 28

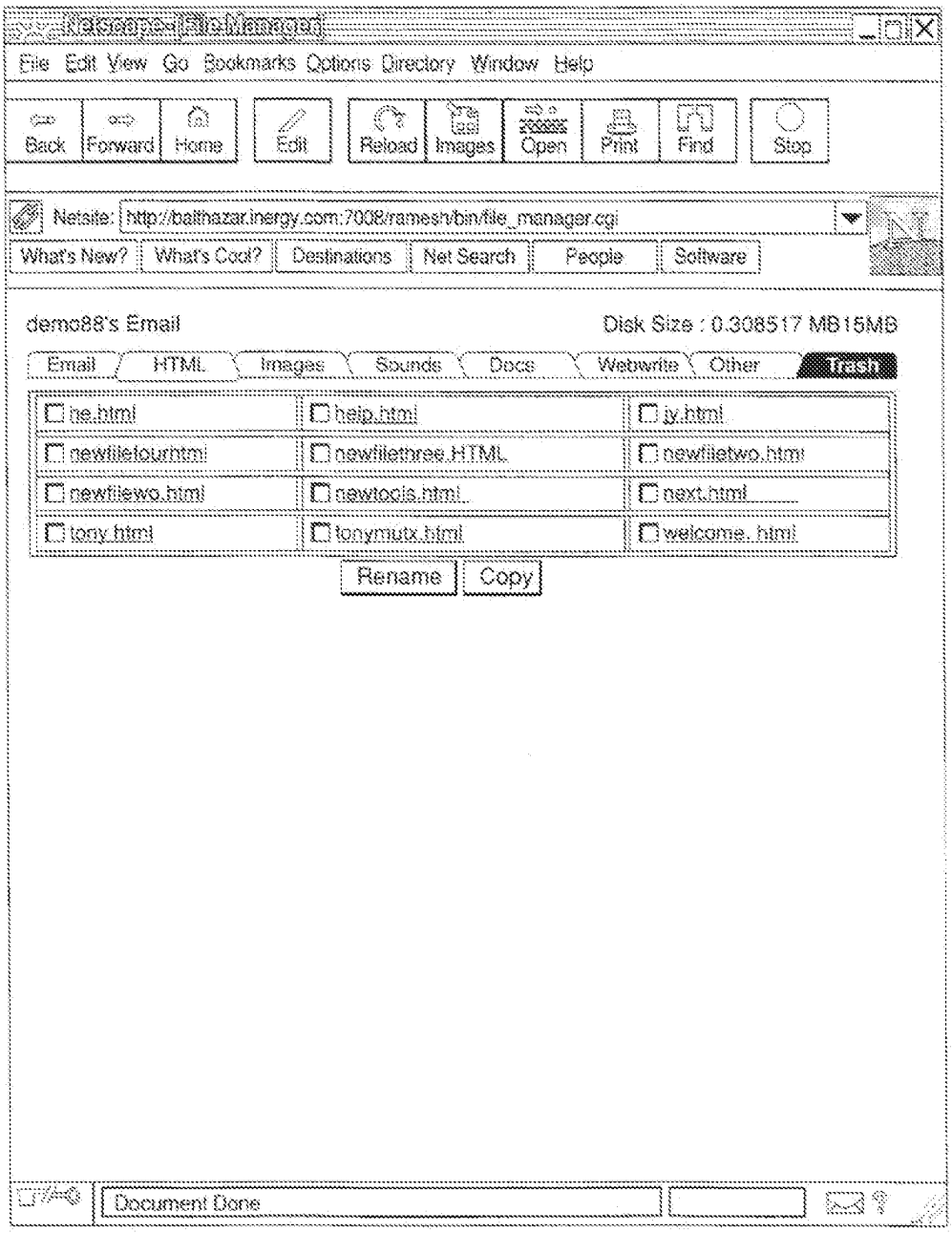
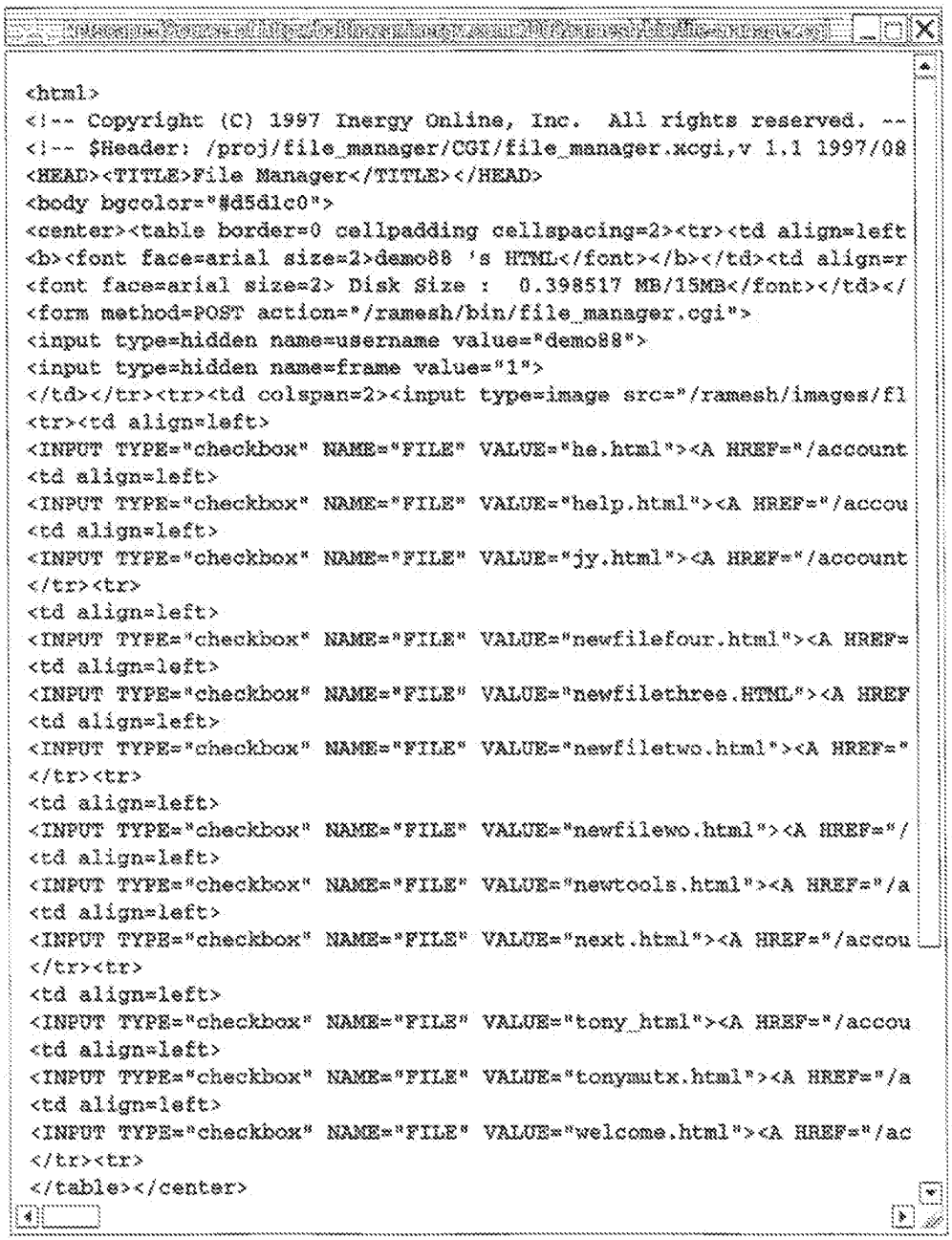

Netscape - [File Manager]
File Edit View Go Bookmarks Options Directory Window Help
Back Forward Home Edit Reload Images Open Print Find Stop
Netsite: http://balthazar.inergy.com:7008/ramesh/bin/file_manager.cgi
What's New? What's Cool? Destinations Net Search People Software
demo88's Email
Disk Size : 0.308517 MB15MB
Email HTML Images Sounds Docs Webwrite Other Trash
ne.html
help.html
jy.html
newfiletourhtml
newfilethree.HTML
newfiletwo.html
newfilewo.html
newtocis.html
next.html
tony.html
tonymutx.html
welcome. html
Rename
Copy
Document Done

Fig. 29



```
<html>
<!-- Copyright (C) 1997 Inergy Online, Inc.  All rights reserved. --
<!-- $Header: /proj/file_manager/CGI/file_manager.xcgi,v 1.1 1997/08
<HEAD><TITLE>File Manager</TITLE></HEAD>
<body bgcolor="#d5d1c0">
<center><table border=0 cellpadding cellspacing=2><tr><td align=left
<b><font face=arial size=2>demo88 's HTML</font></b></td><td align=r
<font face=arial size=2> Disk Size :  0.398517 MB/15MB</font></td></
<form method=POST action="/ramesh/bin/file_manager.cgi">
<input type=hidden name=username value="demo88">
<input type=hidden name=frame value="1">
</td></tr><tr><td colspan=2><input type=image src="/ramesh/images/fl
<tr><td align=left>
<INPUT TYPE="checkbox" NAME="FILE" VALUE="he.html"><A HREF="/account
<td align=left>
<INPUT TYPE="checkbox" NAME="FILE" VALUE="help.html"><A HREF="/accou
<td align=left>
<INPUT TYPE="checkbox" NAME="FILE" VALUE="jy.html"><A HREF="/account
</tr><tr>
<td align=left>
<INPUT TYPE="checkbox" NAME="FILE" VALUE="newfilefour.html"><A HREF=
<td align=left>
<INPUT TYPE="checkbox" NAME="FILE" VALUE="newfilethree.HTML"><A HREF
<td align=left>
<INPUT TYPE="checkbox" NAME="FILE" VALUE="newfiletwo.html"><A HREF="
</tr><tr>
<td align=left>
<INPUT TYPE="checkbox" NAME="FILE" VALUE="newfilewo.html"><A HREF="/
<td align=left>
<INPUT TYPE="checkbox" NAME="FILE" VALUE="newtools.html"><A HREF="/a
<td align=left>
<INPUT TYPE="checkbox" NAME="FILE" VALUE="next.html"><A HREF="/accou
</tr><tr>
<td align=left>
<INPUT TYPE="checkbox" NAME="FILE" VALUE="tony_html"><A HREF="/accou
<td align=left>
<INPUT TYPE="checkbox" NAME="FILE" VALUE="tonymutx.html"><A HREF="/a
<td align=left>
<INPUT TYPE="checkbox" NAME="FILE" VALUE="welcome.html"><A HREF="/ac
</tr><tr>
</table></center>
```

Fig. 30

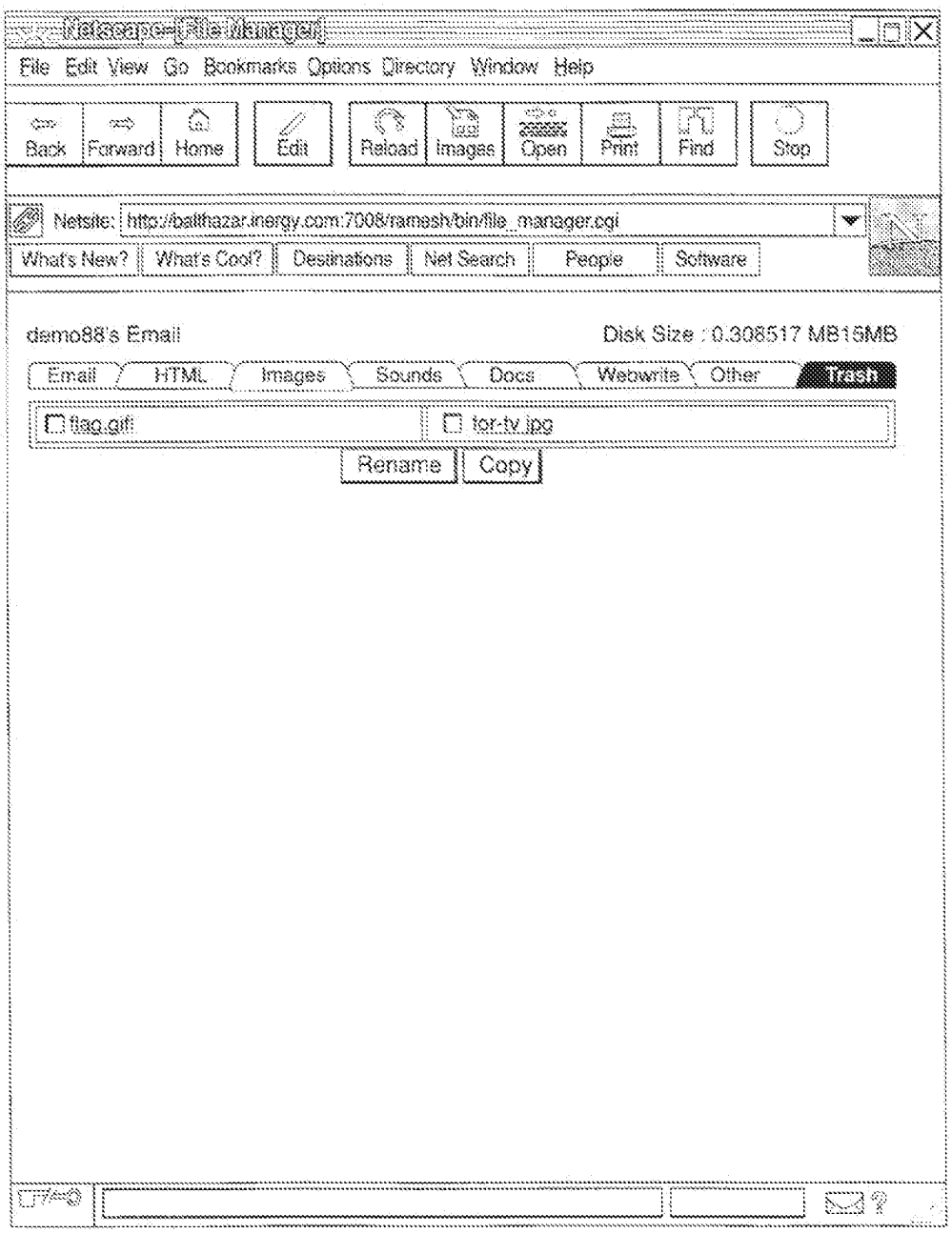

Netscape - [File Manager]
File Edit View Go Bookmarks Options Directory Window Help
Back Forward Home Edit Reload Images Open Print Find Stop
Netsite: http://balthazar.inergy.com:7008/ramesh/bin/file_manager.cgi
What's New? What's Cool? Destinations Net Search People Software
demo88's Email
Disk Size : 0.308517 MB15MB
Email HTML Images Sounds Docs Webwrite Other Trash
flag.gif
tor-tv.jpg
Rename Copy

Fig. 31

```
<html>
<!-- Copyright (C) 1997 Inergy Online, Inc.  All rights reserved. -->
<!-- $Header: /proj/file_manager/CGI/file_manager.xcgi,v 1.1 1997/08/1
<HEAD><TITLE>File Manager</TITLE></HEAD>
<body bgcolor="#d5d1c0">
<center><table border=0 cellpadding cellspacing=2><tr><td align=left
<b><font face=arial size=2>demo88 's Images</font></b></td><td align=r
<font face=arial size=2> Disk Size :  0.398517 MB/15MB</font></td></tr
<font method=POST action="/ramesh/bin/file_manager.cgi">
<input type=hidden name=username value="demo88">
<input type=hidden name=frame value="1">
</td></tr><tr><td colspan=2><input type=image src="/ramesh/images/flef
<tr><td align=left>
<INPUT TYPE="checkbox" NAME="FILE" VALUE="flag.gif"><A HREF="/accounts
<td align=left>
<INPUT TYPE="checkbox" NAME="FILE" VALUE="for-tv.jpg"><A HREF="/accoun
</table></center>
        <center>
        <table width=544 cellspacing=0 cellspacing=0 border=0>
        <tr><td align=center>
<INPUT TYPE = "SUBMIT" NAME="SUBMIT" VALUE ="Rename">
<INPUT TYPE = "HIDDEN" NAME="CURRENT" VALUE ="Images">
        <INPUT TYPE = "SUBMIT" NAME="SUBMIT" VALUE ="Copy">
        <INPUT TYPE = "HIDDEN" NAME="current" VALUE ="Images">
        </td></tr></table>
        </center>
</form></BODY>
</HTML>
```

Fig. 32

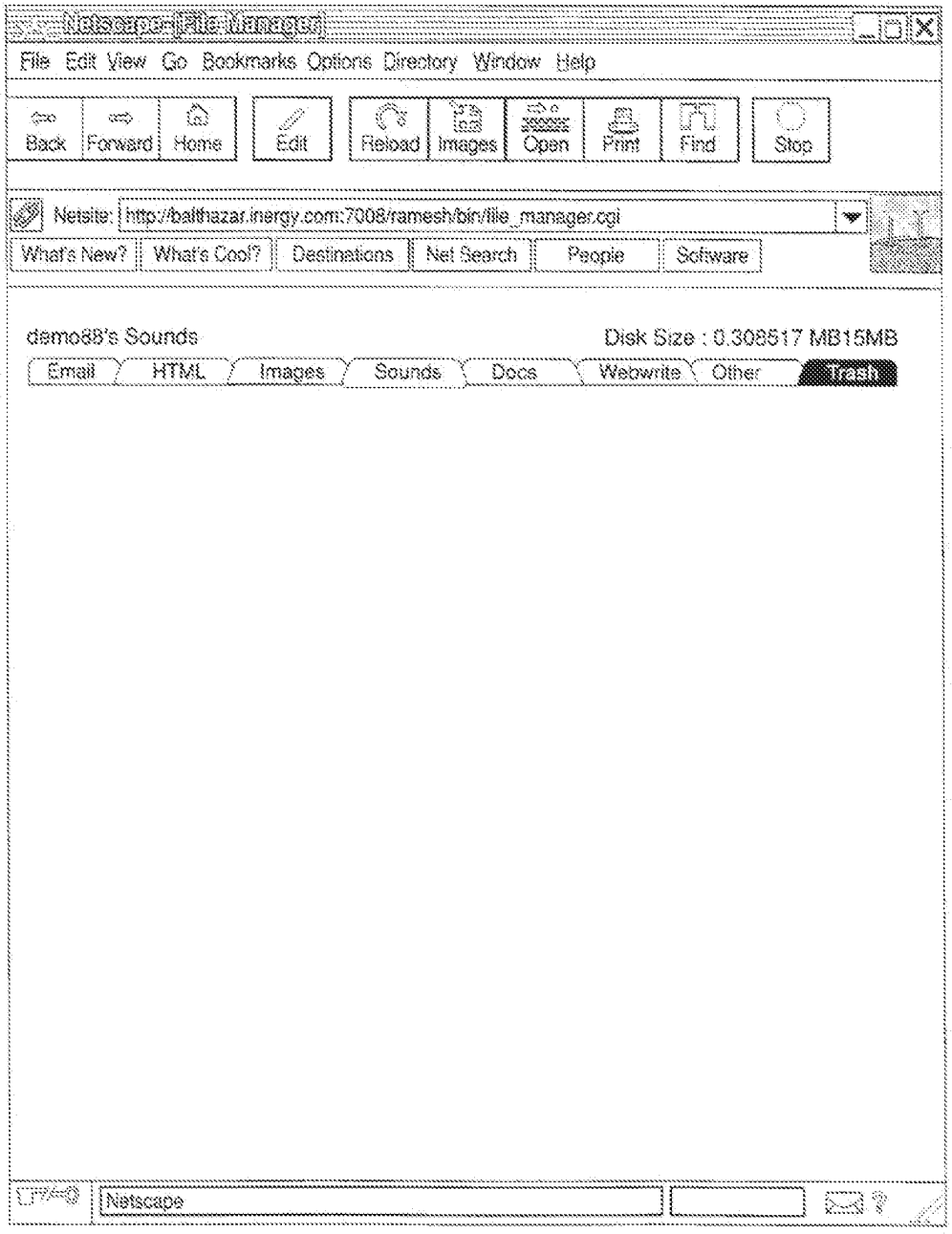

Netscape - [File Manager]
File Edit View Go Bookmarks Options Directory Window Help
Back Forward Home Edit Reload Images Open Print Find Stop
Netsite: http://balthazar.inergy.com:7008/ramesh/bin/file_manager.cgi
What's New? What's Cool? Destinations Net Search People Software
demo88's Sounds
Disk Size : 0.308517 MB15MB
Email HTML Images Sounds Docs Webwrite Other Trash
Netscape

Fig. 33

```
<html>
<!-- Copyright (C) 1997 Inergy Online, Inc.  All rights reserved. -->
<!-- $Header: /proj/file_manager/CGI/file_manager.xcgi,v 1.1 1997/08/1
<HEAD><TITLE>File Manager</TITLE></HEAD>
<body bgcolor="#d5d1c0">
<center><table border=0 cellpadding cellspacing=2><tr><td align=left>-
<b><font face=arial size=2>demo88 's Images</font></b></td><td align=r
<font face=arial size=2> Disk Size :  0.398517 MB/15MB</font></td></tr
<font method=POST action="/ramesh/bin/file_manager.cgi">
<input type=hidden name=username value="demo88">
<input type=hidden name=frame value="1">
</td></tr><tr><td colspan=2><input type=image src="/ramesh/images/flef
<tr></table></center>
</form></BODY>
</HTML>
```

Fig. 34

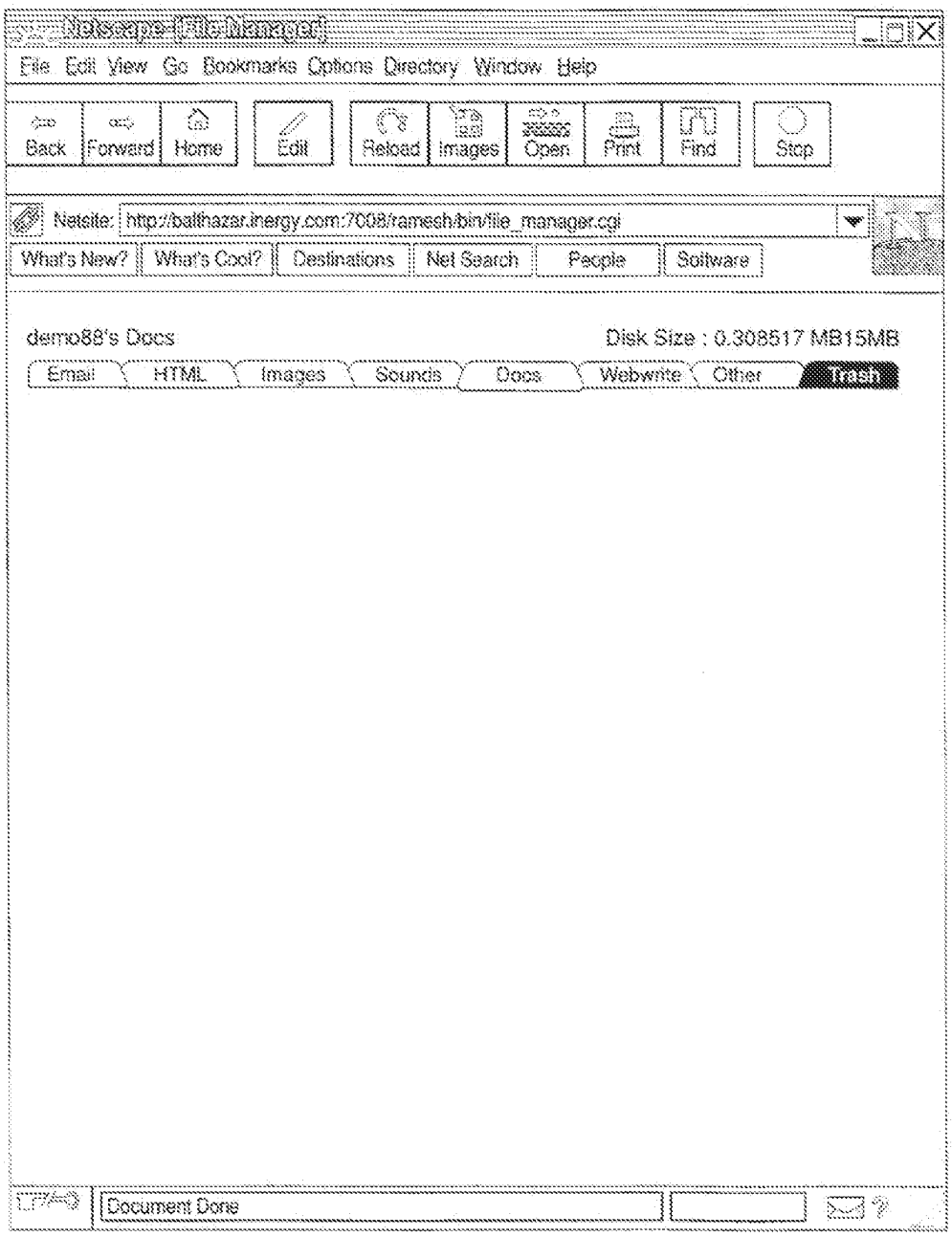
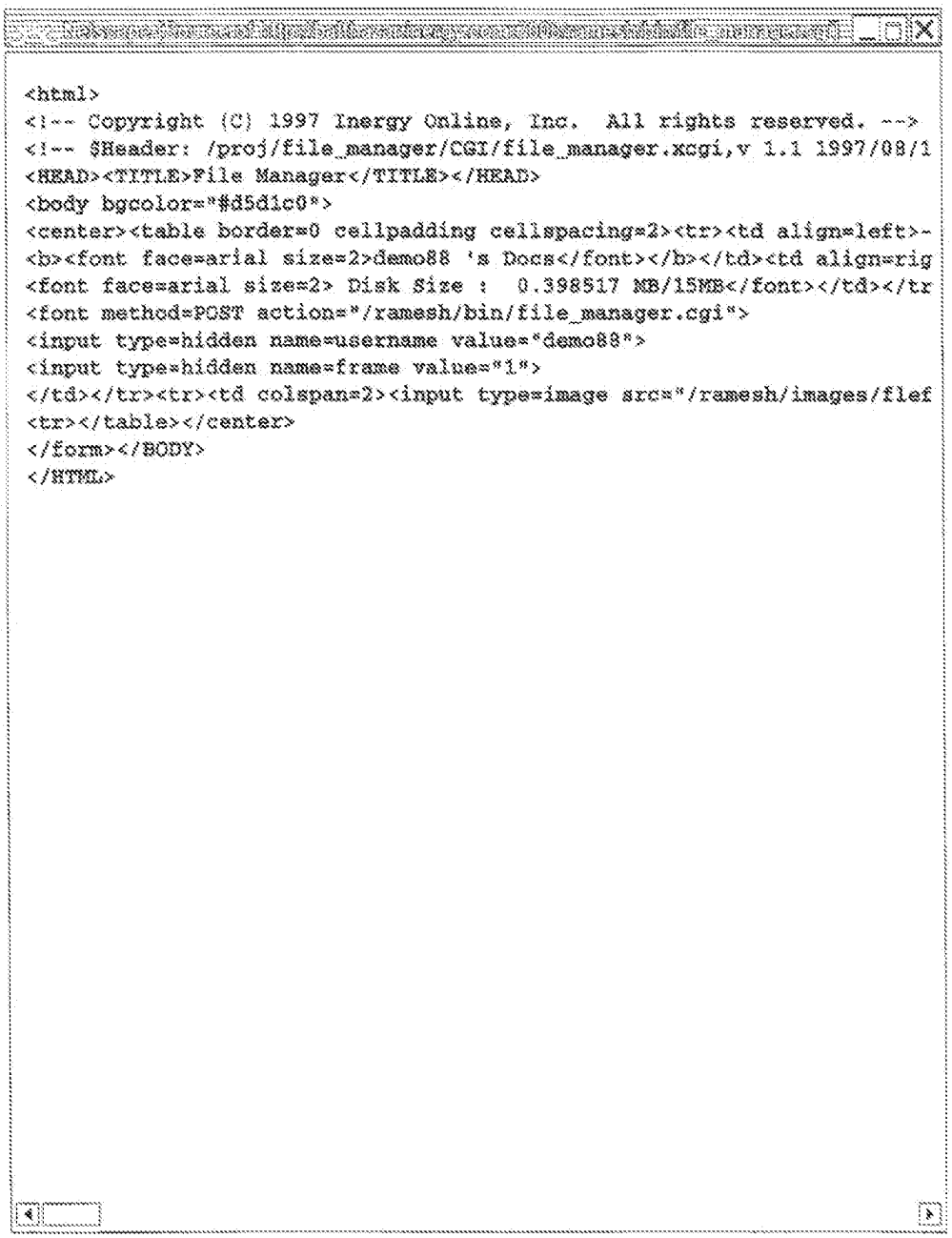

Netscape [File Manager]
File Edit View Go Bookmarks Options Directory Window Help
Back Forward Home Edit Reload Images Open Print Find Stop
Netsite: http://balthazar.inergy.com:7008/ramesh/bin/file_manager.cgi
What's New? What's Cool? Destinations Net Search People Software
demo88's Docs
Disk Size : 0.308517 MB15MB
Email HTML Images Sounds Docs Webwrite Other Trash
Document Done

Fig. 35



```
<html>
<!-- Copyright (C) 1997 Inergy Online, Inc.  All rights reserved. -->
<!-- $Header: /proj/file_manager/CGI/file_manager.xcgi,v 1.1 1997/08/1
<HEAD><TITLE>File Manager</TITLE></HEAD>
<body bgcolor="#d5d1c0">
<center><table border=0 cellpadding cellspacing=2><tr><td align=left>-
<b><font face=arial size=2>demo88 's Docs</font></b></td><td align=rig
<font face=arial size=2> Disk Size :  0.398517 MB/15MB</font></td></tr
<font method=POST action="/ramesh/bin/file_manager.cgi">
<input type=hidden name=username value="demo88">
<input type=hidden name=frame value="1">
</td></tr><tr><td colspan=2><input type=image src="/ramesh/images/flef
<tr></table></center>
</form></BODY>
</HTML>
```

Fig. 36

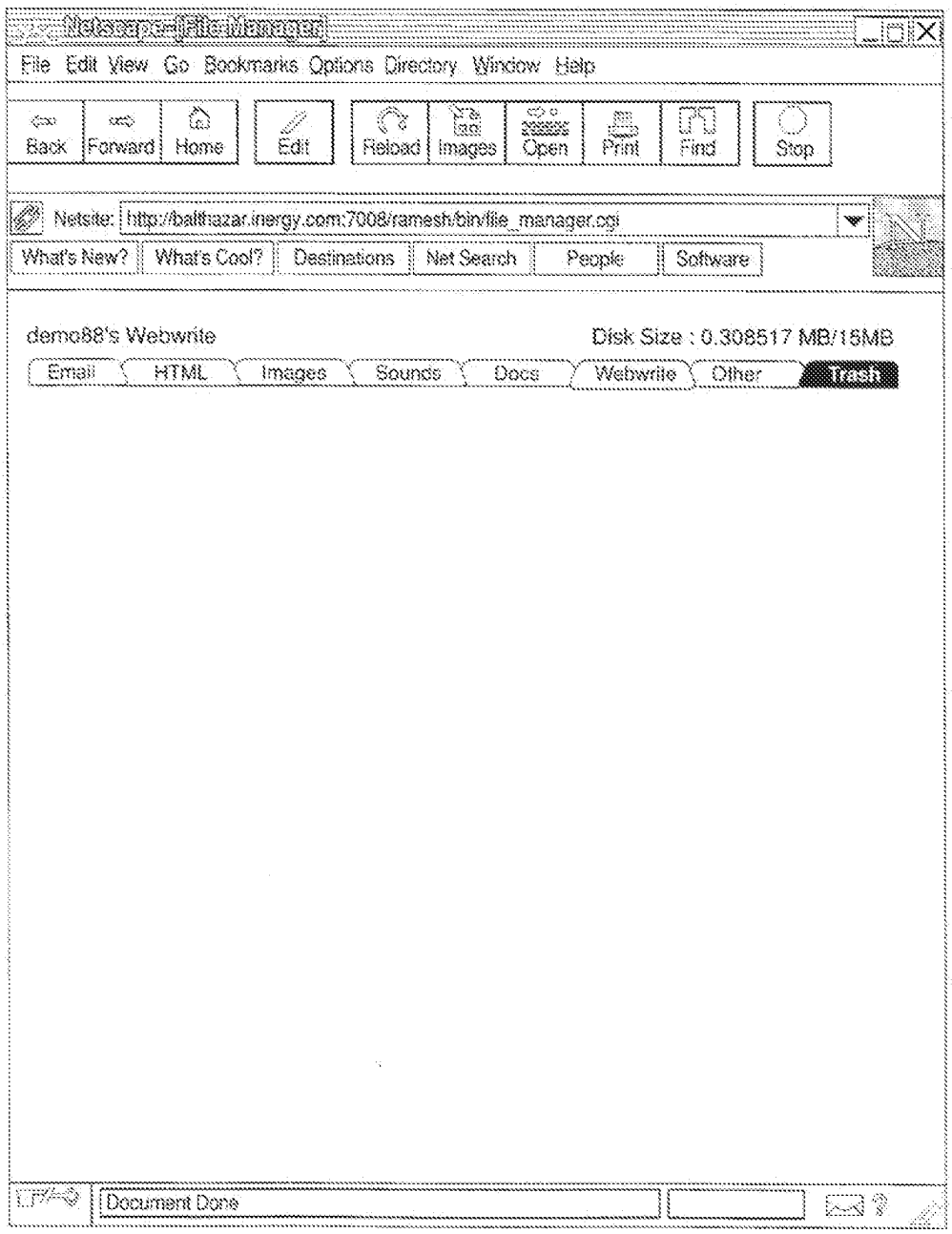

Netscape - [File Manager]
File Edit View Go Bookmarks Options Directory Window Help
Back Forward Home Edit Reload Images Open Print Find Stop
Netsite: http://balthazar.inergy.com:7008/ramesh/bin/file_manager.cgi
What's New? What's Cool? Destinations Net Search People Software
demo88's Webwrite
Disk Size : 0.308517 MB/15MB
Email HTML Images Sounds Docs Webwrite Other Trash
Document Done

Fig. 37

```
<html>
<!-- Copyright (C) 1997 Inergy Online, Inc.  All rights reserved. -->
<!-- $Header: /proj/file_manager/CGI/file_manager.xcgi,v 1.1 1997/08/1
<HEAD><TITLE>File Manager</TITLE></HEAD>
<body bgcolor="#d5d1c0">
<center><table border=0 cellpadding cellspacing=2><tr><td align=left>~
<b><font face=arial size=2>demo88 's Docs</font></b></td><td align=rig
<font face=arial size=2> Disk Size :  0.398517 MB/15MB</font></td></tr
<font method=POST action="/ramesh/bin/file_manager.cgi">
<input type=hidden name=username value="demo88">
<input type=hidden name=frame value="1">
</td></tr><tr><td colspan=2><input type=image src="/ramesh/images/flef
<tr></table></center>
</form></BODY>
</HTML>
```

Fig. 38

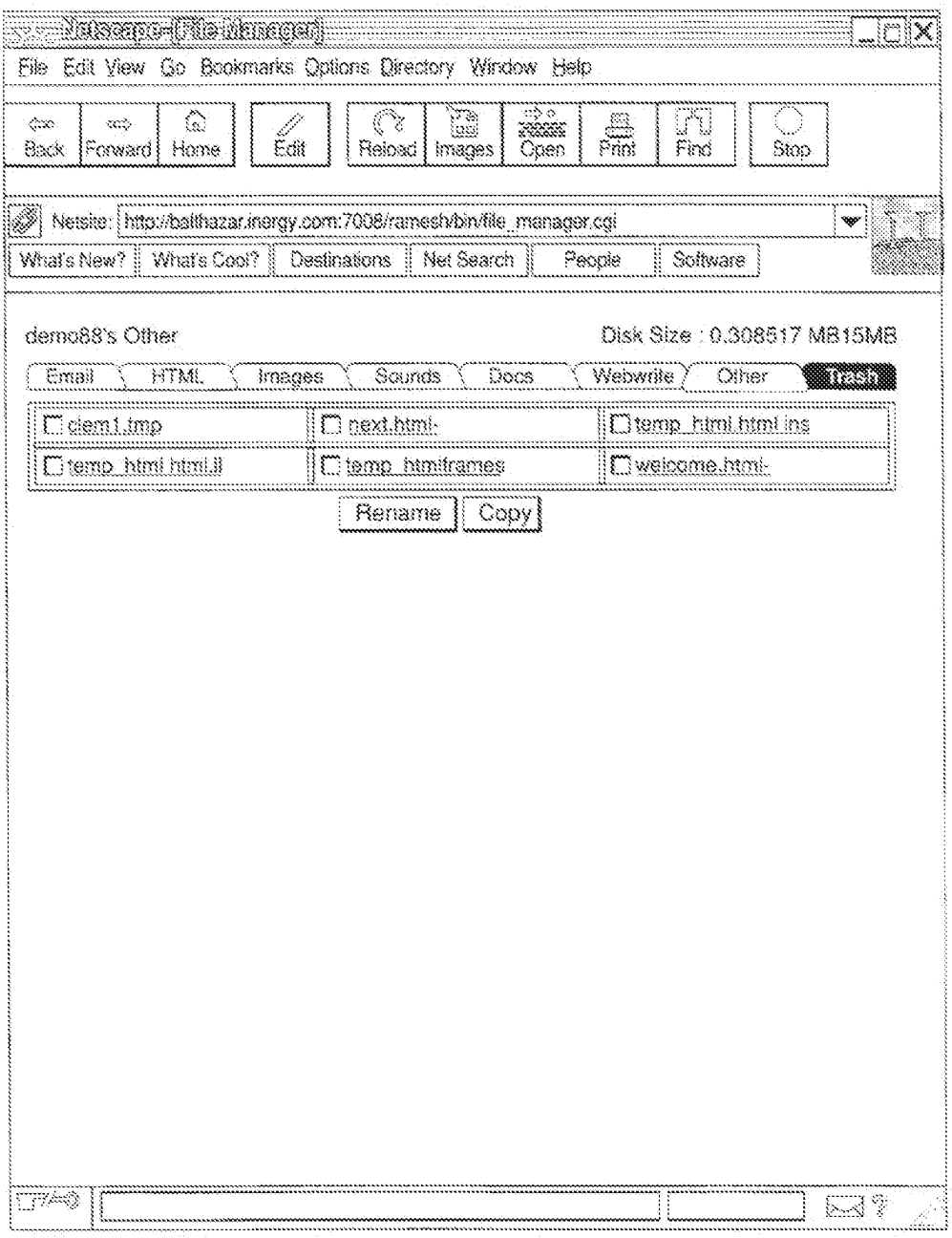

Netscape: [File Manager]
File Edit View Go Bookmarks Options Directory Window Help
Back Forward Home Edit Reload Images Open Print Find Stop
Netsite: http://balthazar.inergy.com:7008/ramesh/bin/file_manager.cgi
What's New? What's Cool? Destinations Net Search People Software
demo88's Other
Disk Size : 0.308517 MB15MB
Email HTML Images Sounds Docs Webwrite Other Trash
clem1.tmp
next.html~
temp_html.html.ins
temp_html.html.jl
temp_html:frames
welcome.html~
Rename Copy

Fig. 39

```
<html>
<!-- Copyright (C) 1997 Inergy Online, Inc.  All rights reserved. -->
<!-- $Header: /proj/file_manager/CGI/file_manager.xcgi,v 1.1 1997/08/1
<HEAD><TITLE>File Manager</TITLE></HEAD>
<body bgcolor="#d5d1c0">
<center><table border=0 cellpadding cellspacing=2><tr><td align=left>
<b><font face=arial size=2>demo88 's Webwrite</font></b></td><td align
<font face=arial size=2> Disk Size :  0.398517 MB/15MB</font></td></tr
<font method=POST action="/ramesh/bin/file_manager.cgi">
<input type=hidden name=username value="demo88">
<input type=hidden name=frame value="1">
</td></tr><tr><td colspan=2><input type=image src="/ramesh/images/flef
<tr></table></center>
</form></BODY>
</HTML>
```

Fig. 40

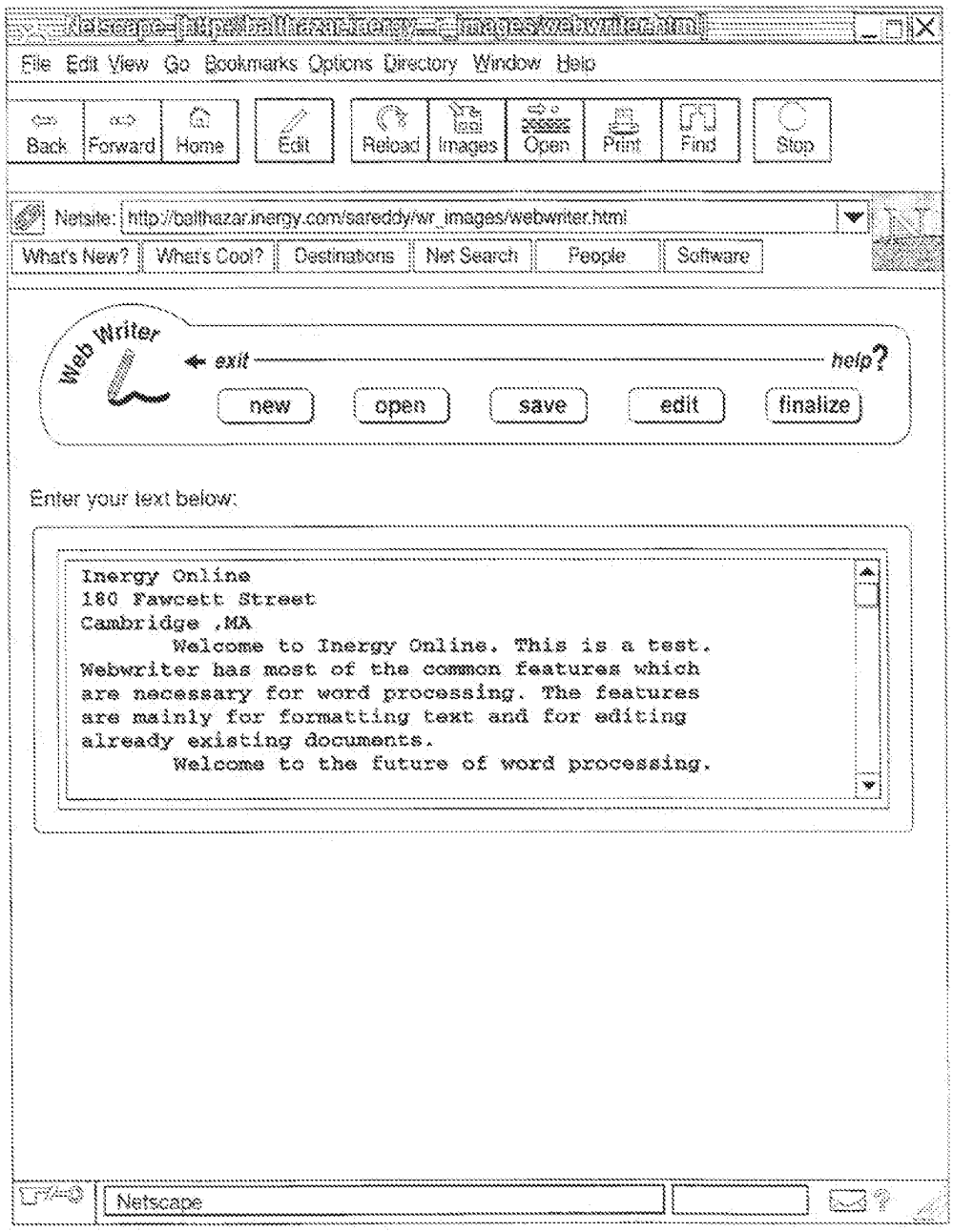
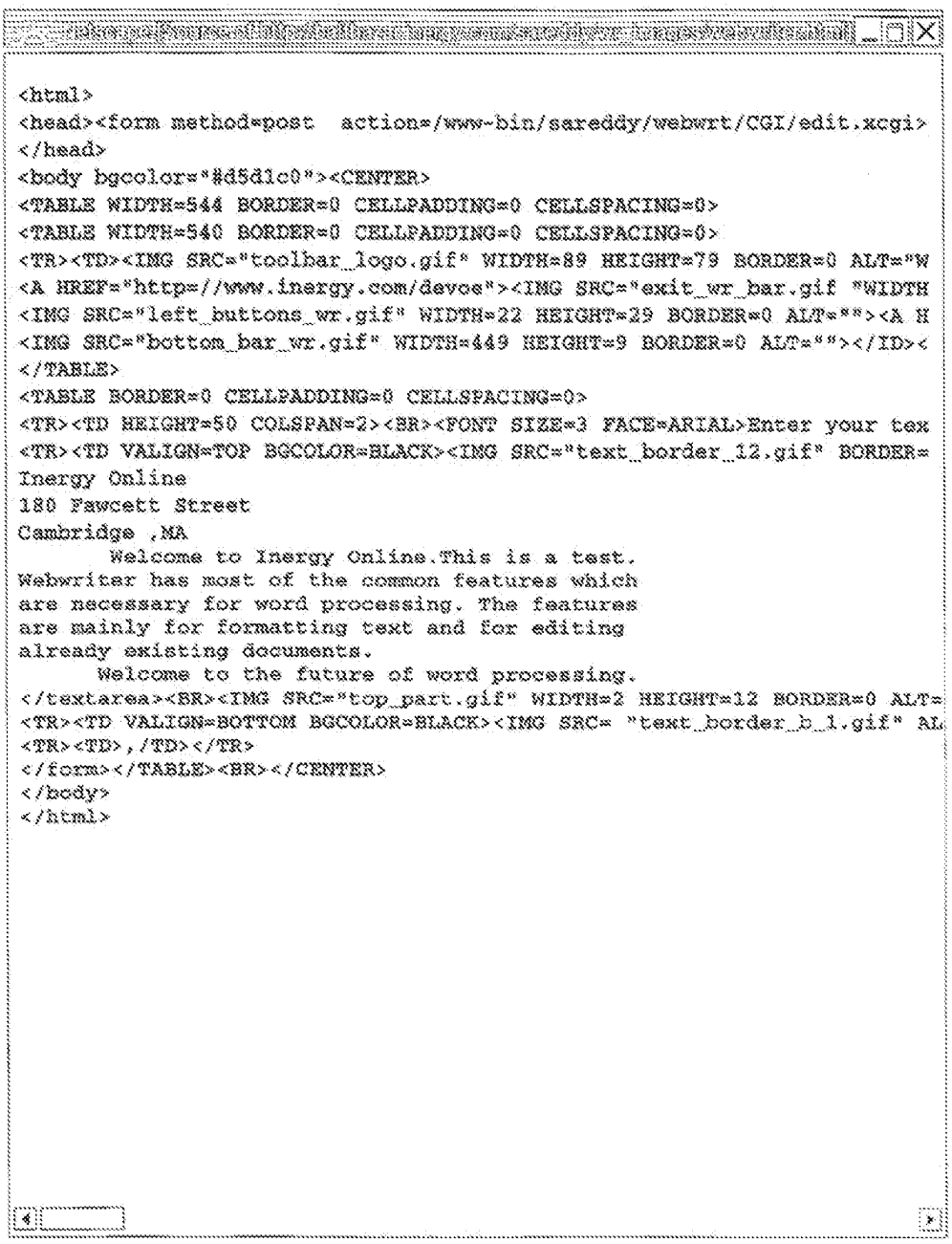

Netscape - [http://balthazar.inergy.com/sareddy/wr_images/webwriter.html]
File Edit View Go Bookmarks Options Directory Window Help
Back Forward Home Edit Reload Images Open Print Find Stop
Netsite: http://balthazar.inergy.com/sareddy/wr_images/webwriter.html
What's New? What's Cool? Destinations Net Search People Software
Web Writer
exit
help?
new open save edit finalize
Enter your text below:
Inergy Online
180 Fawcett Street
Cambridge ,MA
Welcome to Inergy Online. This is a test.
Webwriter has most of the common features which
are necessary for word processing. The features
are mainly for formatting text and for editing
already existing documents.
Welcome to the future of word processing.
Netscape

Fig. 41



```
<html>
<head><form method=post  action=/www-bin/sareddy/webwrt/CGI/edit.xcgi>
</head>
<body bgcolor="#d5d1c0"><CENTER>
<TABLE WIDTH=544 BORDER=0 CELLPADDING=0 CELLSPACING=0>
<TABLE WIDTH=540 BORDER=0 CELLPADDING=0 CELLSPACING=0>
<TR><TD><IMG SRC="toolbar_logo.gif" WIDTH=89 HEIGHT=79 BORDER=0 ALT="W
<A HREF="http=//www.inergy.com/devoe"><IMG SRC="exit_wr_bar.gif "WIDTH
<IMG SRC="left_buttons_wr.gif" WIDTH=22 HEIGHT=29 BORDER=0 ALT=""><A H
<IMG SRC="bottom_bar_wr.gif" WIDTH=449 HEIGHT=9 BORDER=0 ALT=""></ID><
</TABLE>
<TABLE BORDER=0 CELLPADDING=0 CELLSPACING=0>
<TR><TD HEIGHT=50 COLSPAN=2><BR><FONT SIZE=3 FACE=ARIAL>Enter your tex
<TR><TD VALIGN=TOP BGCOLOR=BLACK><IMG SRC="text_border_12.gif" BORDER=
Inergy Online
180 Fawcett Street
Cambridge ,MA
       Welcome to Inergy Online.This is a test.
Webwriter has most of the common features which
are necessary for word processing. The features
are mainly for formatting text and for editing
already existing documents.
      Welcome to the future of word processing.
</textarea><BR><IMG SRC="top_part.gif" WIDTH=2 HEIGHT=12 BORDER=0 ALT=
<TR><TD VALIGN=BOTTOM BGCOLOR=BLACK><IMG SRC= "text_border_b_1.gif" AL
<TR><TD>,/TD></TR>
</form></TABLE><BR></CENTER>
</body>
</html>
```

Fig. 42

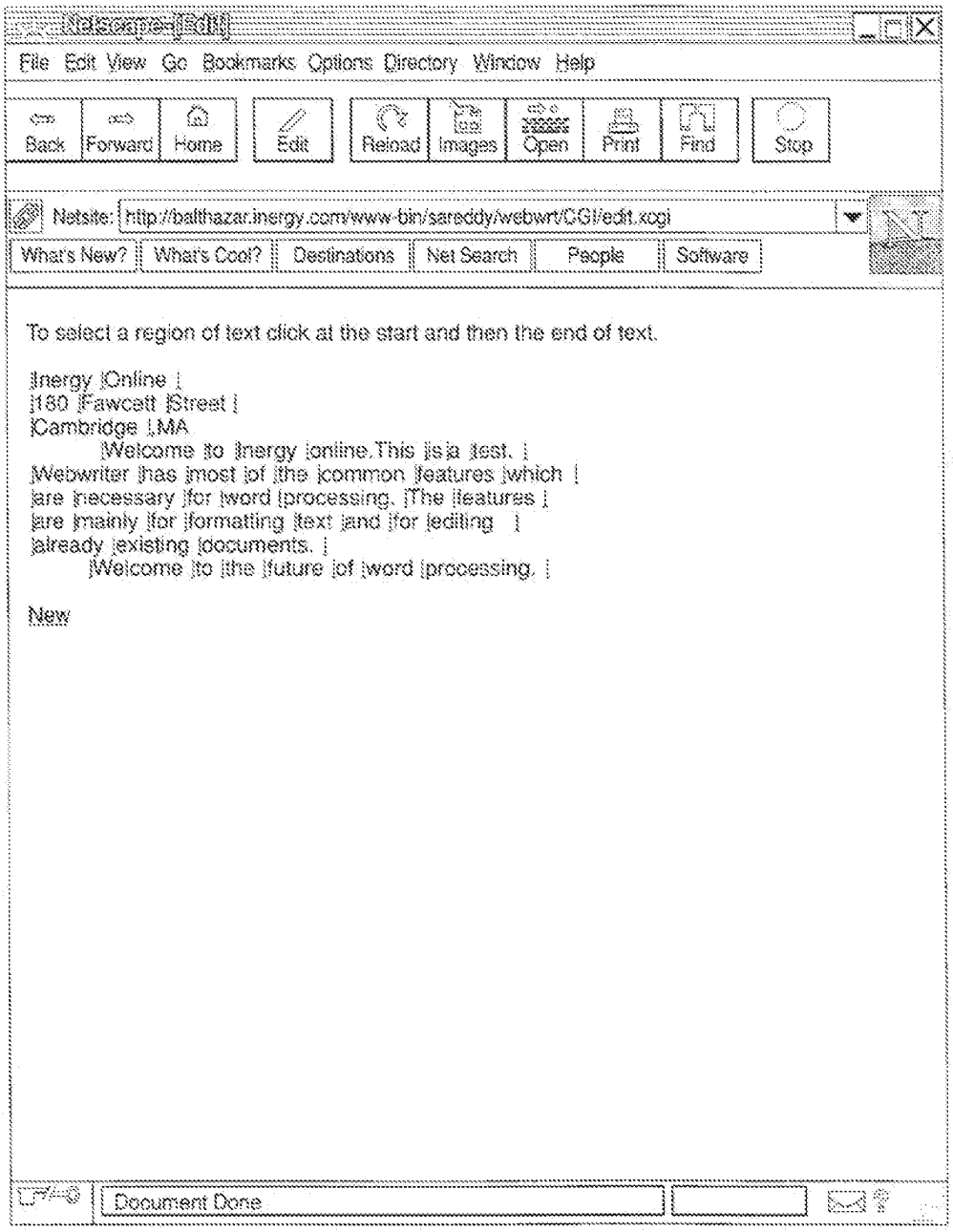
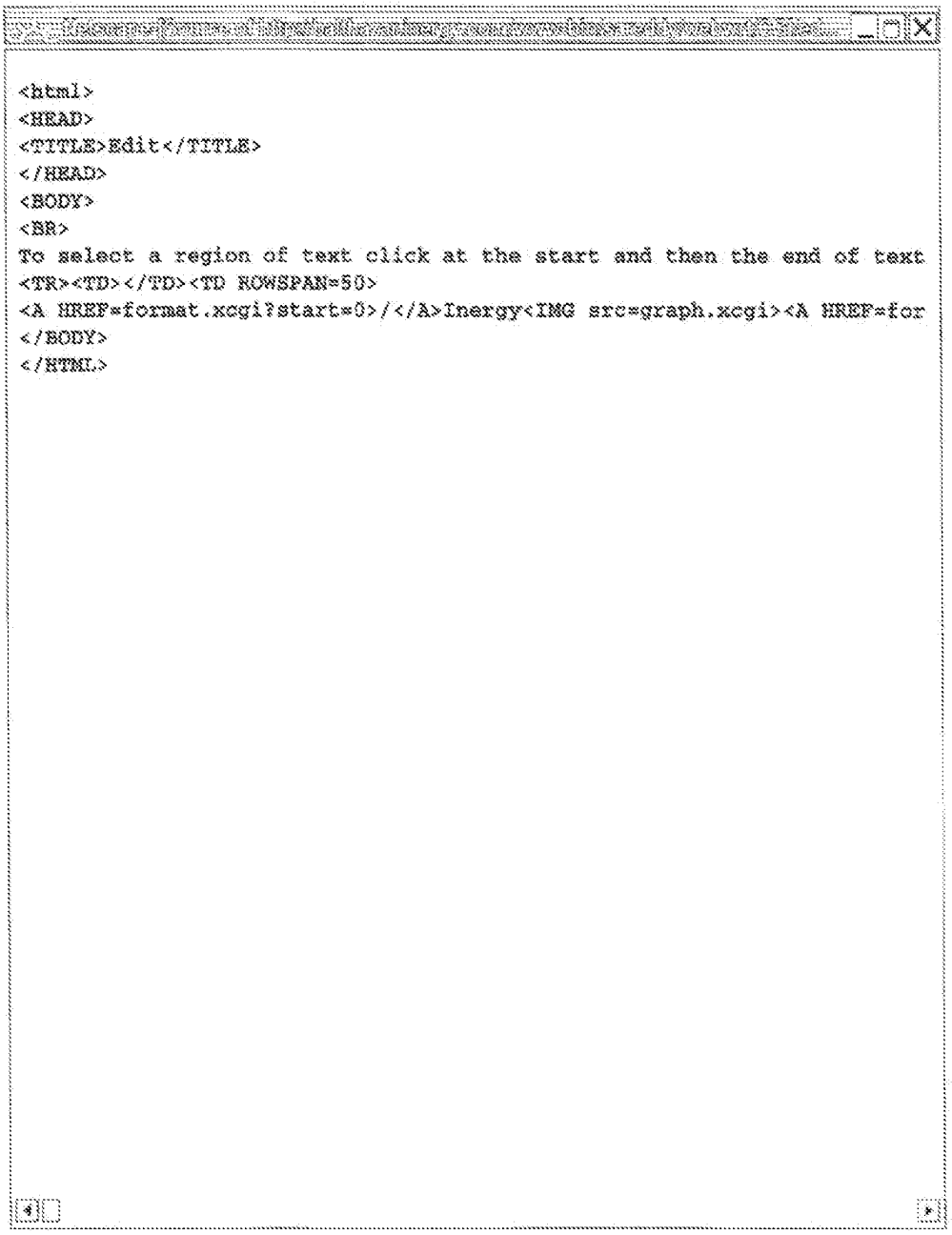

Netscape - [Edit]
File Edit View Go Bookmarks Options Directory Window Help
Back Forward Home Edit Reload Images Open Print Find Stop
Netsite: http://balthazar.inergy.com/www-bin/sareddy/webwrt/CGI/edit.xcgi
What's New? What's Cool? Destinations Net Search People Software
To select a region of text click at the start and then the end of text.
Inergy Online
160 Fawcett Street
Cambridge MA
Welcome to Inergy online.This is a test.
Webwriter has most of the common features which
are necessary for word processing. The features
are mainly for formatting text and for editing
already existing documents.
Welcome to the future of word processing.
New
Document Done

Fig. 43


<html>
<HEAD>
<TITLE>Edit</TITLE>
</HEAD>
<BODY>

To select a region of text click at the start and then the end of text
<TR><TD></TD><TD ROWSPAN=50>
<A HREF=format.xcgi?start=0>/</A>Inergy<IMG src=graph.xcgi><A HREF=for
</BODY>
</HTML>

Fig. 44

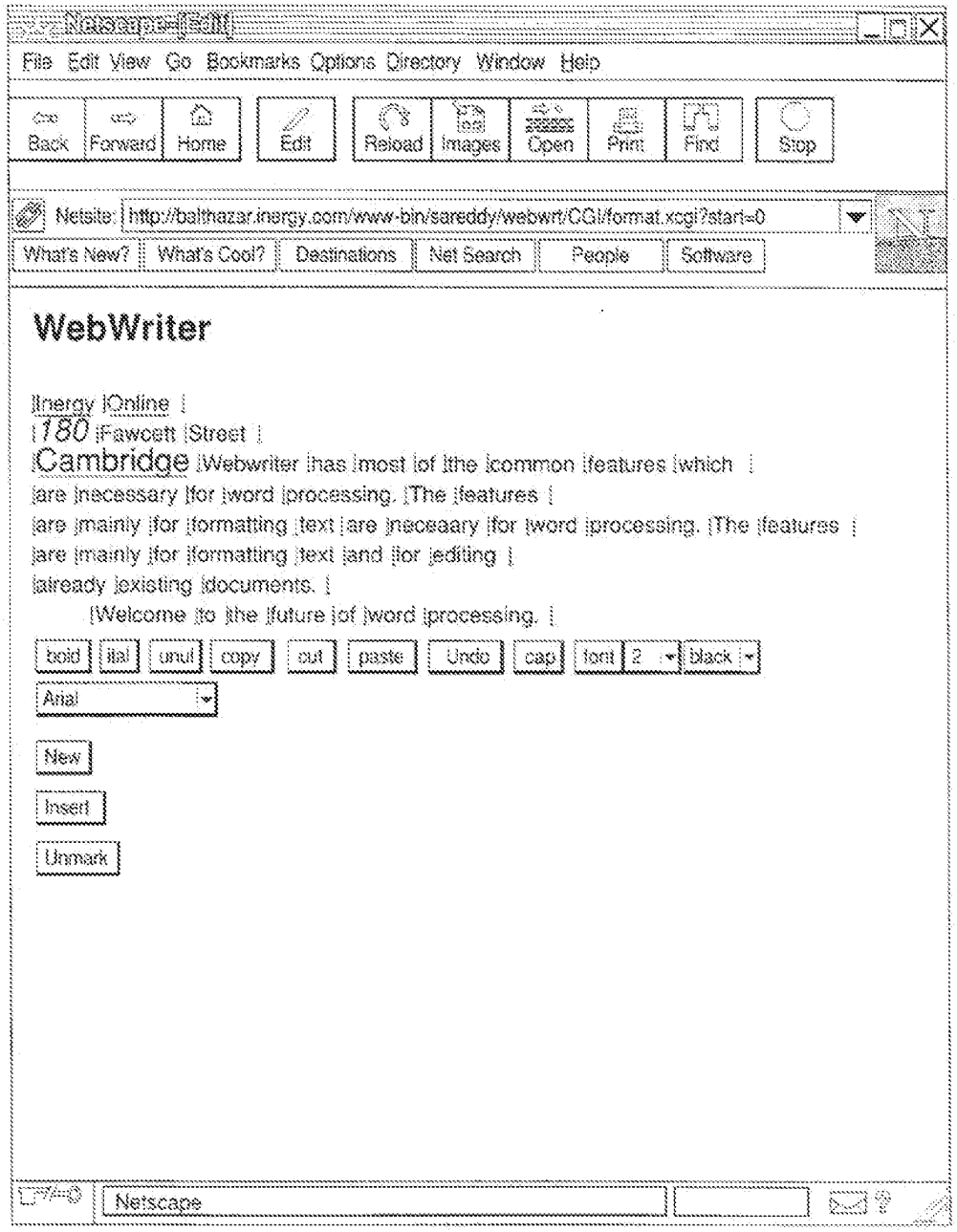

Netscape - [Edit]
File Edit View Go Bookmarks Options Directory Window Help
Back Forward Home Edit Reload Images Open Print Find Stop
Netsite: http://balthazar.inergy.com/www-bin/sareddy/webwrt/CGI/format.xcgi?start=0
What's New? What's Cool? Destinations Net Search People Software
WebWriter
Inergy	Online
180 |Fawcett |Street
Cambridge |Webwriter |has |most |of |the |common |features |which
are |necessary |for |word |processing. |The |features
are |mainly |for |formatting |text |are |neceaary |for |word |processing. |The |features
are |mainly |for |formatting |text |and |for |editing
already |existing |documents.
Welcome |to |the |future |of |word |processing.
bold ital unul copy cut paste Undo cap font 2 black
Arial
New
Insert
Unmark
Netscape

Fig. 45

```
<html>
<HEAD>
<TITLE>Edit</TITLE>
</HEAD>
<BODY>
<TR><TD></TD ROWSPAN=50>
<TR><TD ALIGN =center><H1>WebWriter</H1></TD></TR>
<form METHOD=POST action=test_bold.xcgi>
<TR><TD></TD>
        <TD ROWSPAN=60 >
<font color=red><A HREF=format_reg.xcgi?start=0&end=0>/</A><u><font si
<option value=3>3</option>
<option value=4>4</option>
<option value=5>5</option>
<option value=6>6</option>
<option value=7>7</option>
</select><select name=color><option selected value=black>black</option
<option value=blue>blue</option>
<option value=yellow>yellow</option>
,option value=red>red</option>
<option value=green>green</option>
</select><select name=face><option selected value=Arial>Arial</option>
<option value=Times-Roman>Times-Roman</option>
<option value=Times>Times</option>
<option value=Courier>Courier</option>
<option value=Helvetica>Helvetica</option>
</select></FORM><FORM Action=clean.xcgi><INPUT Type=submit name=new va
</TD></TR>
<FORM action=select.xcgi><input type=submit value=Unmark></FORM>
</BODY>
</HTML>
```

Fig. 46

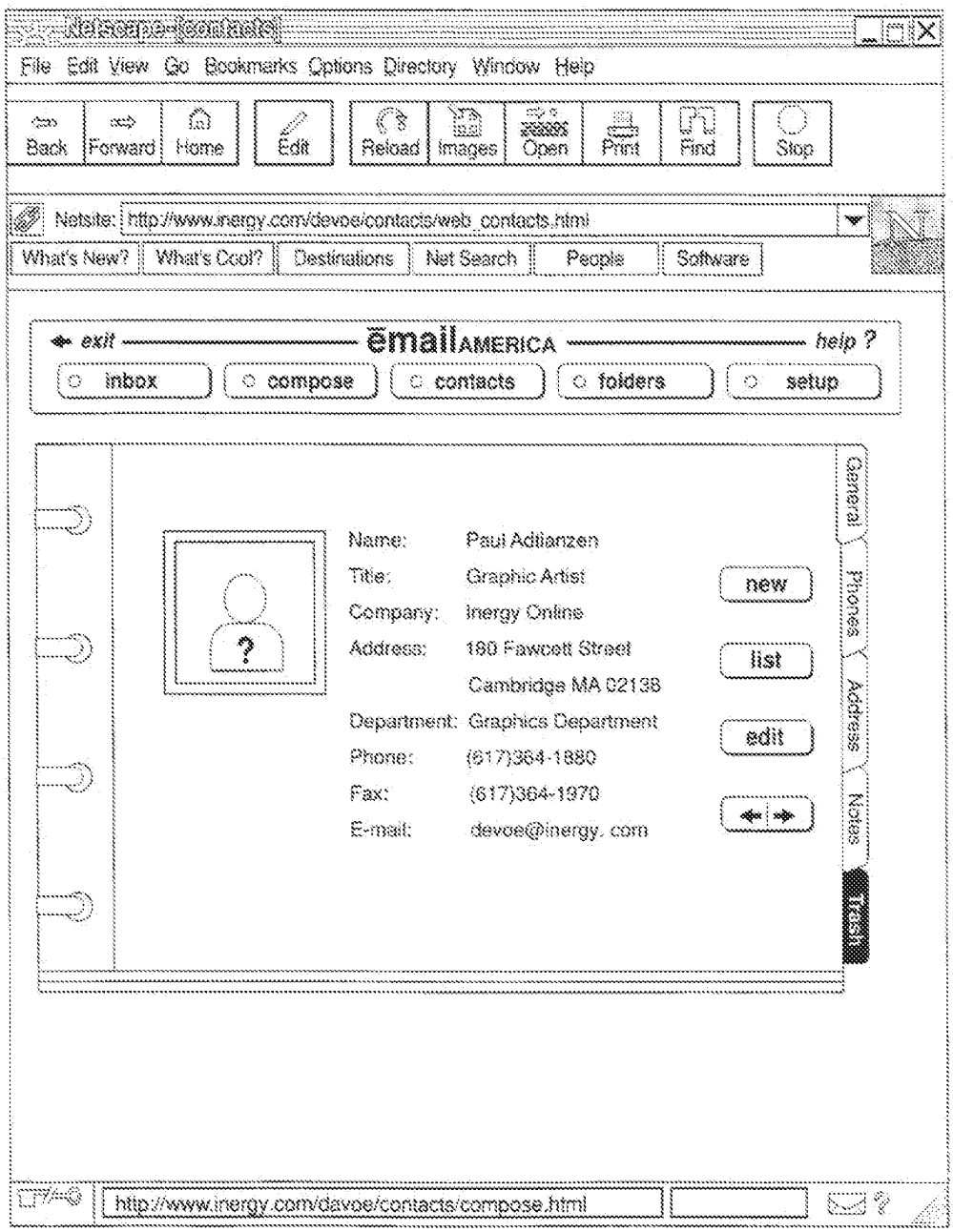


Fig. 47

```
<html>
<HEAD>
        <TITLE>Edit</TITLE>
</HEAD>

<BODY BGCOLOR="#D5CECO">
<CENTER>
<TABLE BORDER=0 WIDTH=544 CELLPADDING=0 CELLSPACING=0>

<TABLE BORDER=0 CELLSPACING=0 CELLPADDING=0>
<TR>
        <TD COLSPAN=7><IMG SRC="topbar.gif" WIDTH=542 HEIGHT=0 BORDE
</TR>
<TR>
        <TD ROWSPAN=2><IMG SRC="leftbar.gif" WIDTH=0 HEIGHT=59 BORDE
        <TD CULSPAN=5><A HREF="http://www.inergy.com/devoe"><IMG SRC
        <TD ROWSPAN=2><IMG SRC="rightbar.gif" WIDTH=6 HEIGHT=59 BORD
</TR>
<TR>
        <TD><A HREF="testea.html"><IMG SRC="nonactiveinbox.gif" BORD
        <TD><A HREF='compose.html"><IMG SRC="nonactivecompose.gif" B
        <TD><A HREF="conlist.html"><IMG SRC="nonactivecontacts.gif"
        <TD><A HREF="testea.html"><IMG SRC="nonactivefolders,gif" BO
        <TD><A HREF="e_setup.html"><IMG SRC="nonactivesetup.gif" BOR
</TR>
<TR>    <TD COLSPAN=7><IMG SRC="bottonbar.gif" WIDTH=542 HEIGHT=6 BO
</TR>
</TABLE>
<BR>
<TABLE CELLSPACING=0 CELLPADDING=0 BORDER=0>
        <TR>
                <TD ROWSPAN=3><IMG SRC="e_bindding4.gif" WIDTH=50 HE
                <TD COLSPAN=2><IMG SRC="black_line2.gif" WIDTH=455 H
                <TD ROWSPAN=3><IMG SRC="e_right_bar3.gif" WIDTH=24 H
        </TR>
        <TR>
                <TD ALIGN="CENTER" WIDTH=360 HEIGHT=288>
                <TABLE CELLSPACING=0 CELLPADDING=5 BORDER=0>
                <TR><TD VALIGN="TOP" ALIGN=CENTER><TABLE CELLPADDING
                        <TD><TABLE CELLSPACING=1 CELLPADDING=2 BORDE
```

Fig. 48

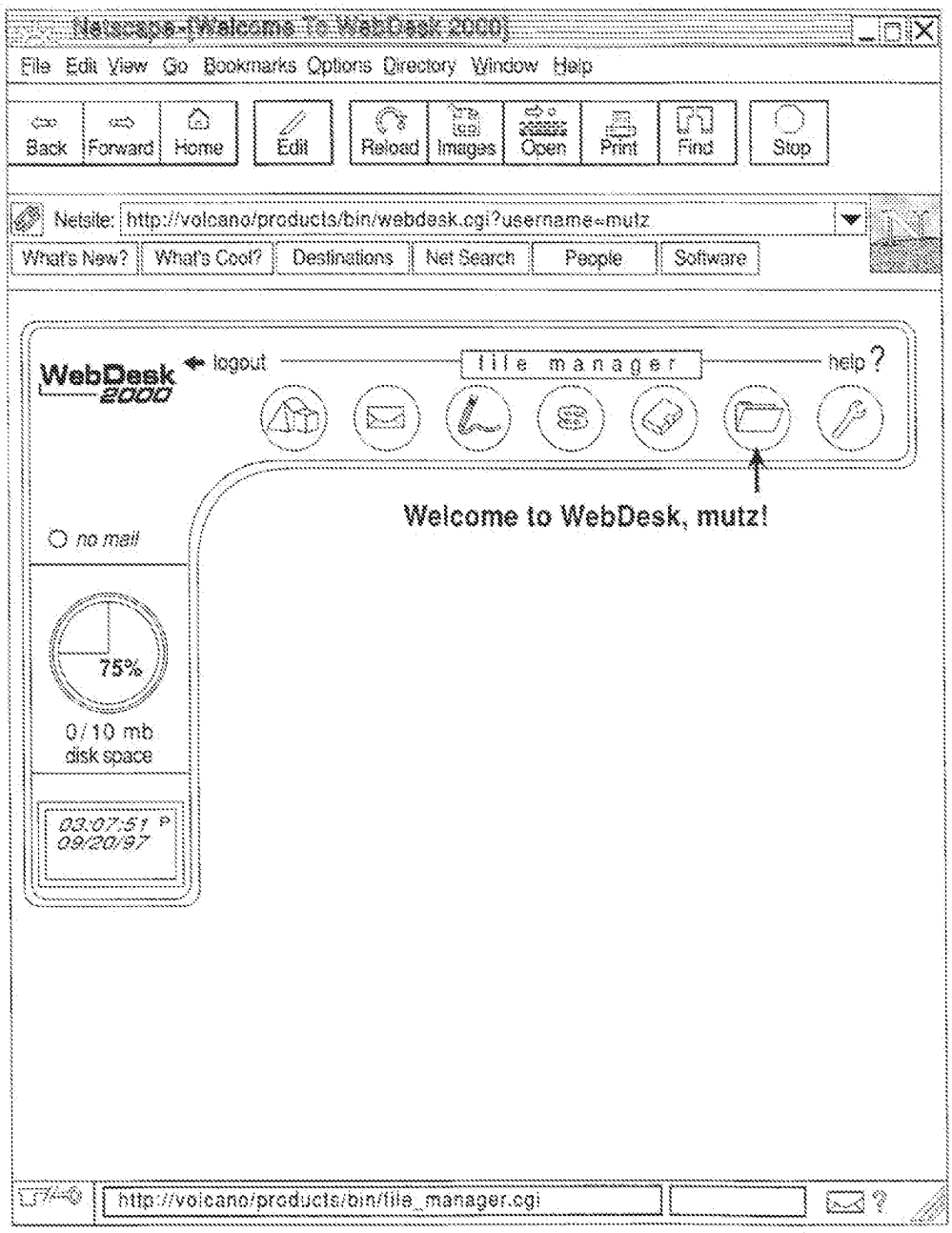


Fig. 49

SUBSTITUTE SHEET (RULE 26)

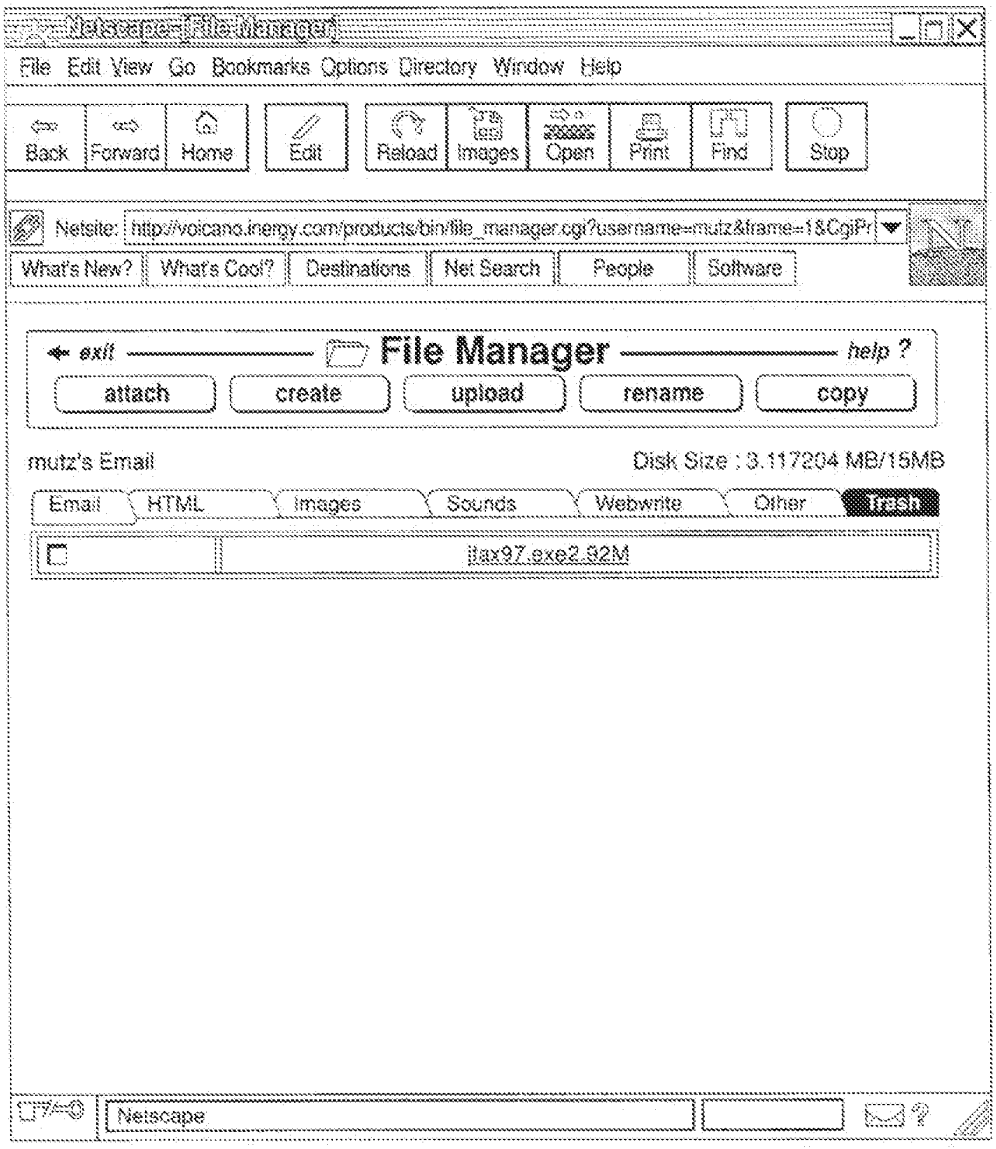

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Fig. 50

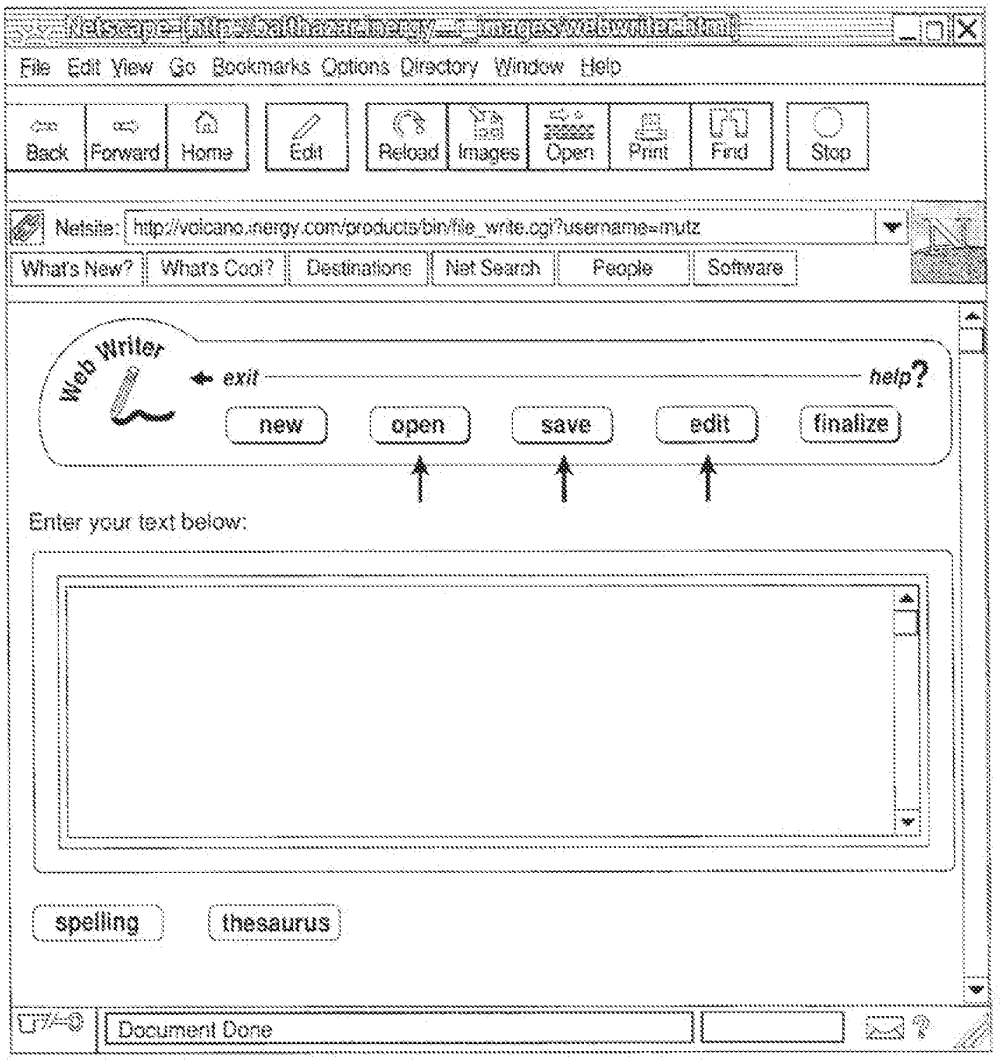
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Fig. 51

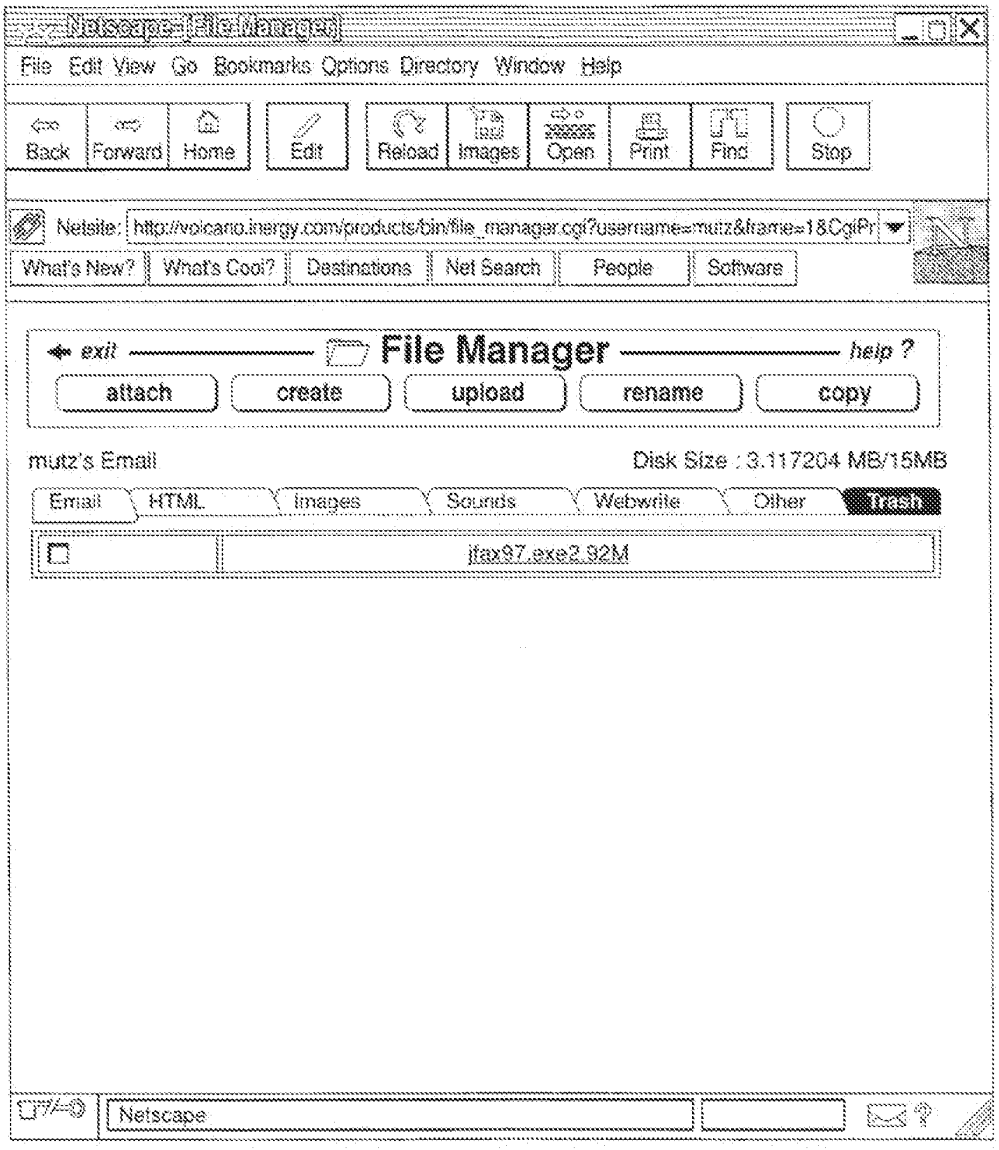
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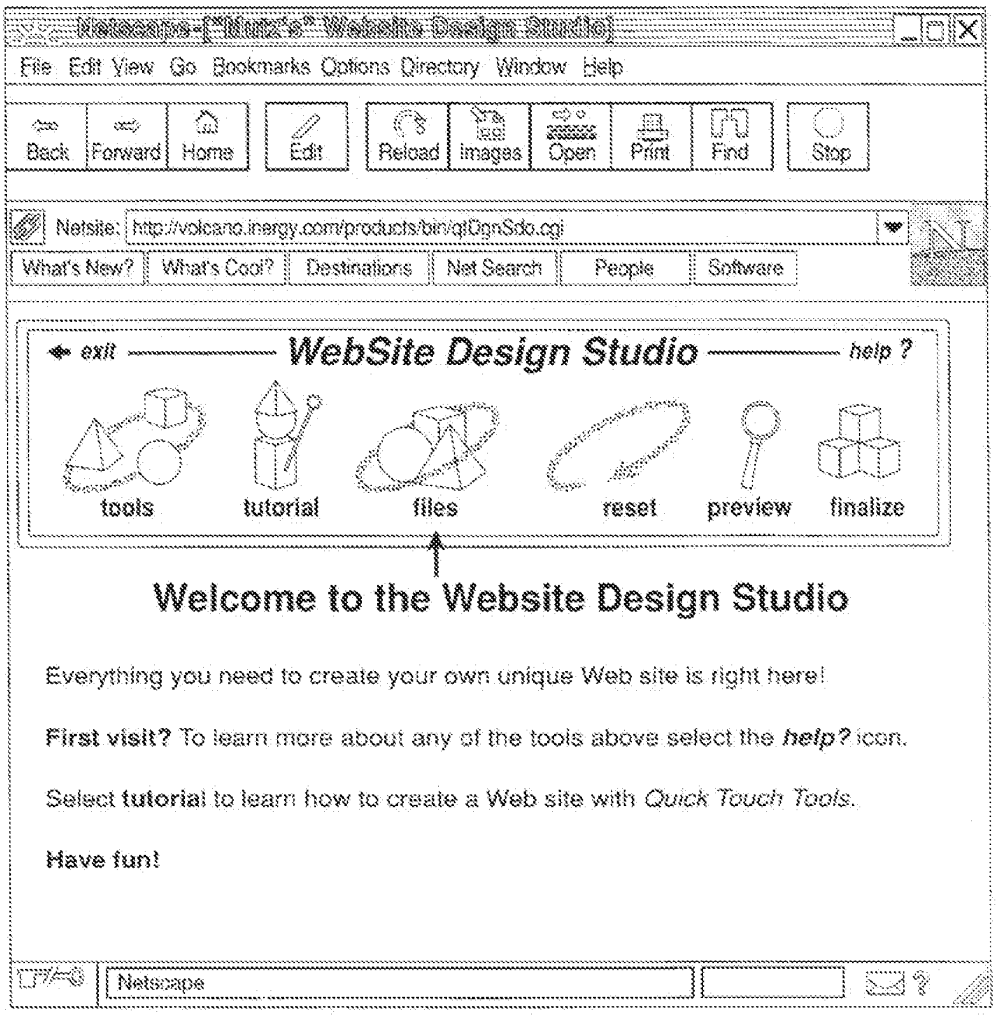
Fig. 52



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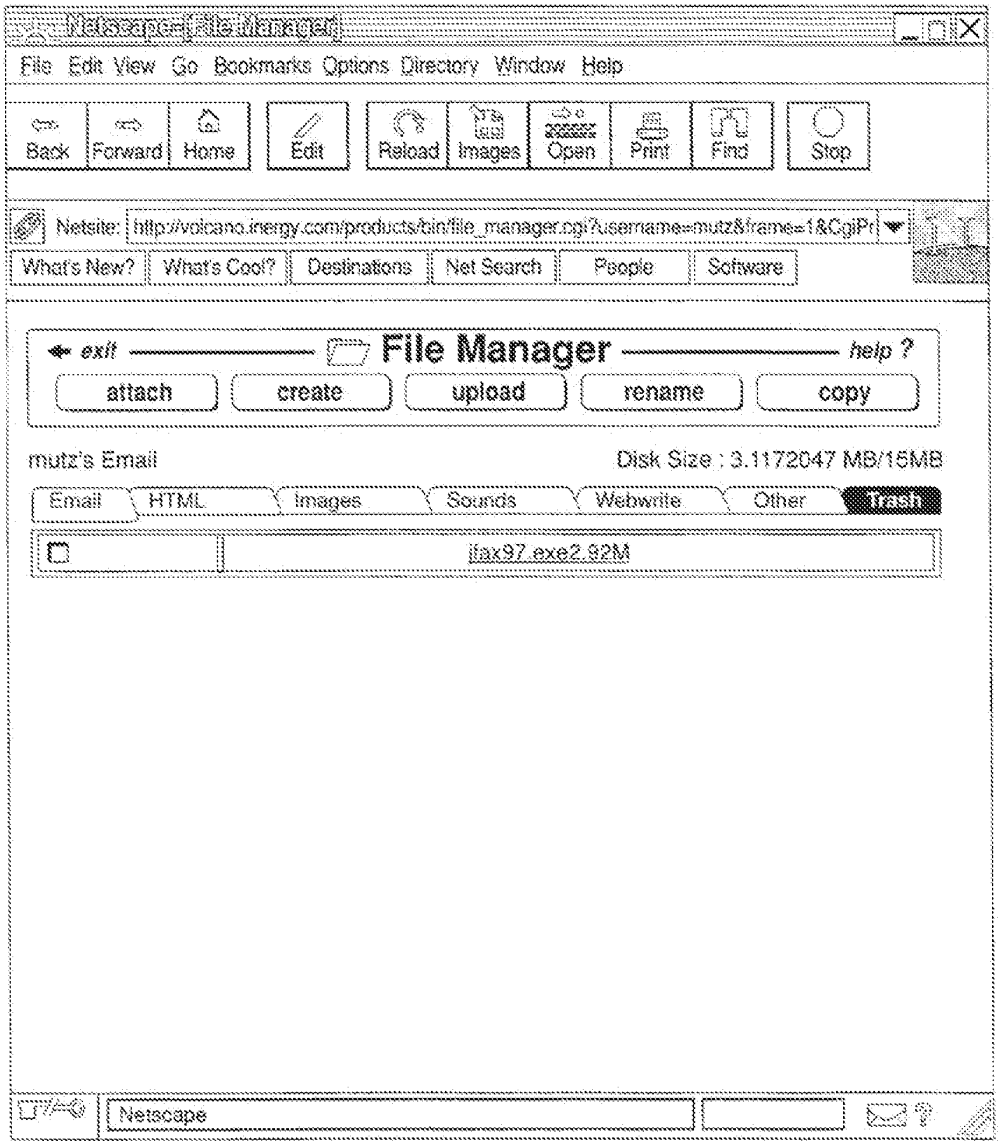
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Fig. 54

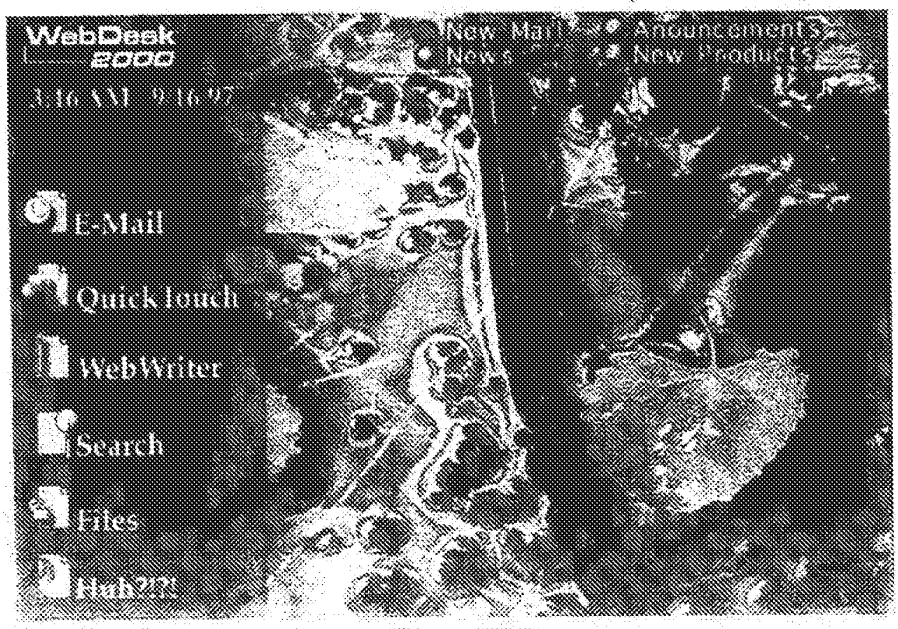


Fig. 55

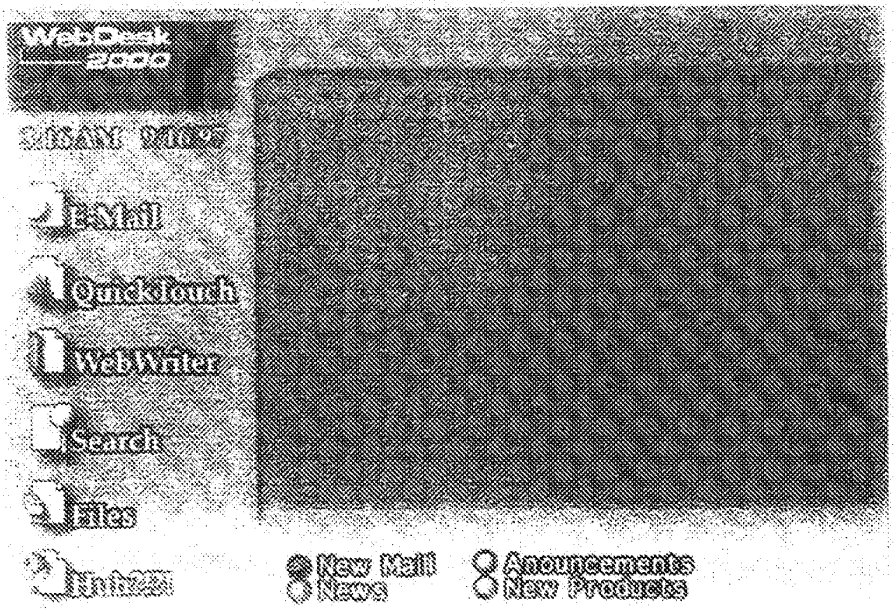


Fig. 56

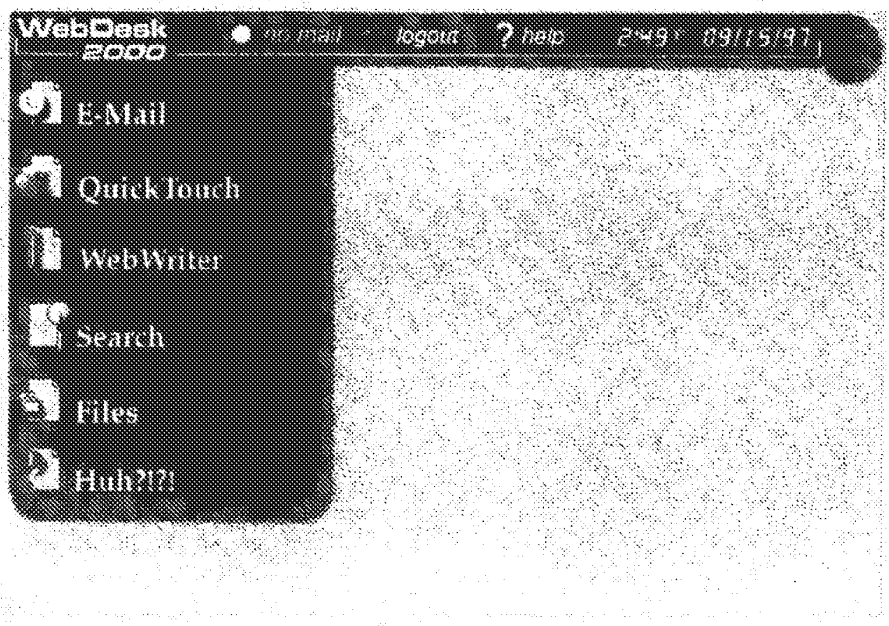


Fig. 57

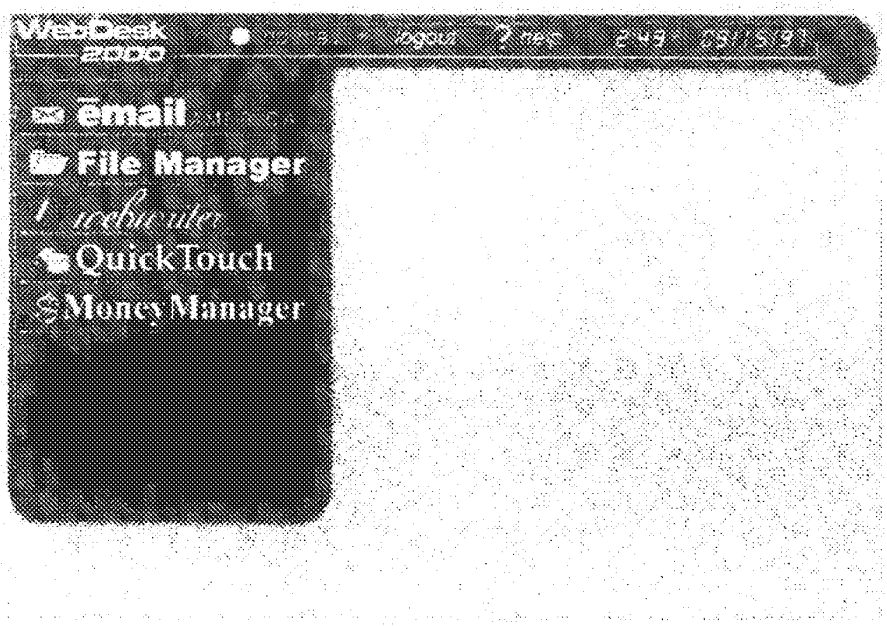


Fig. 58

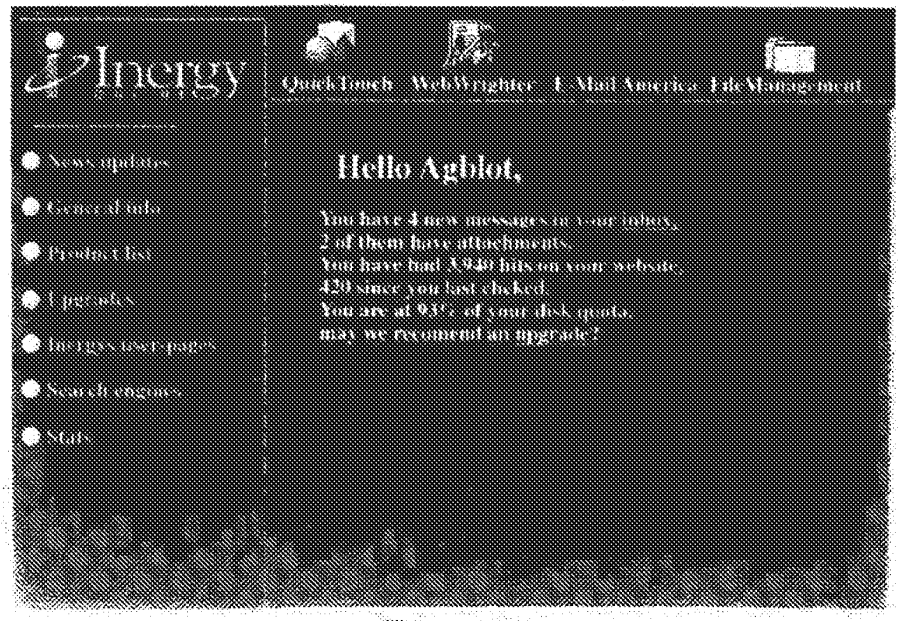


Fig. 59

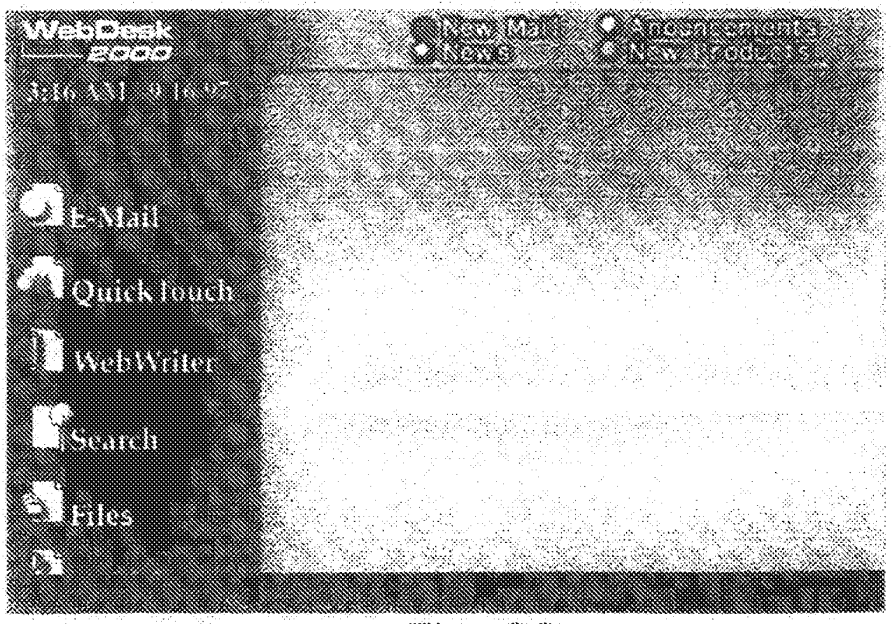


Fig. 60

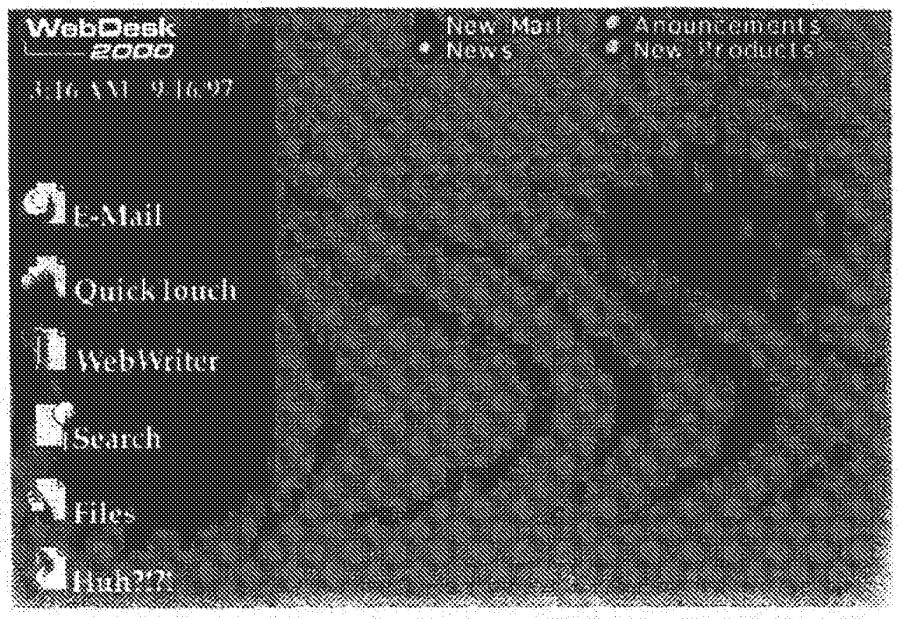
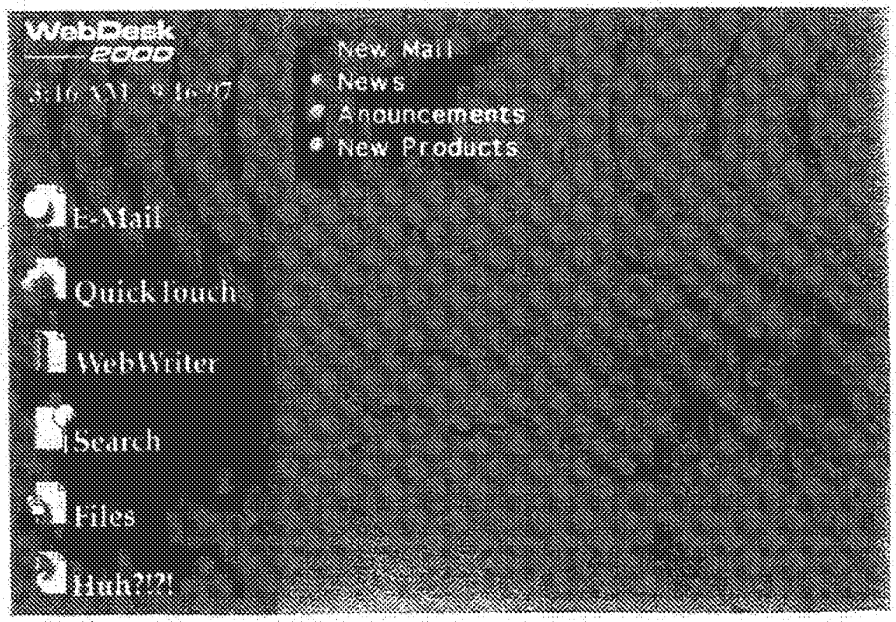


Fig. 61



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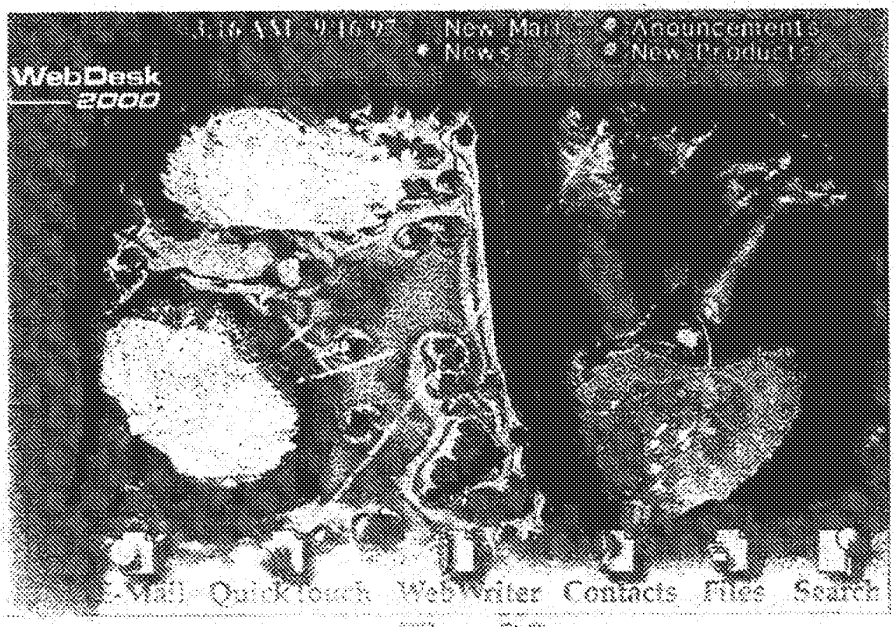
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Fig. 63

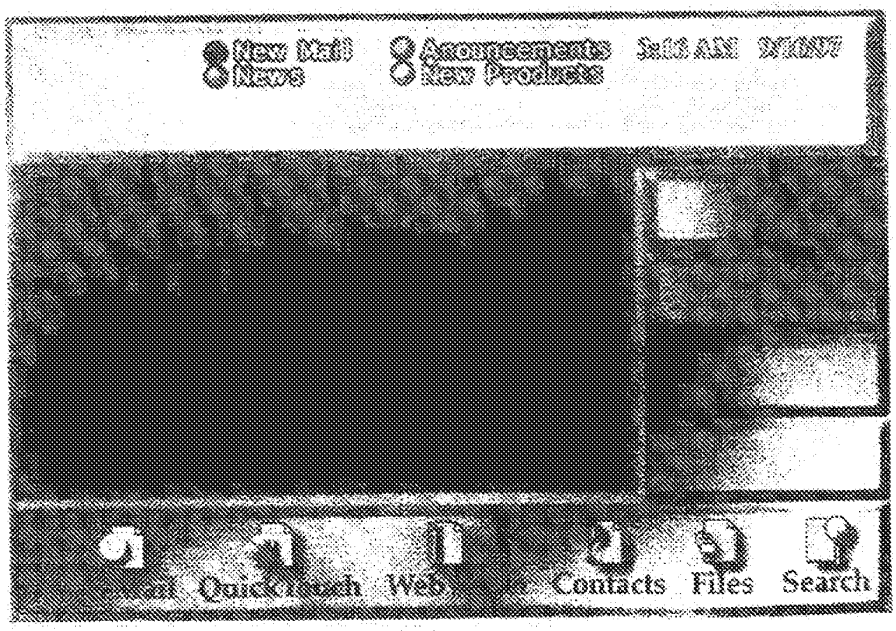
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Fig. 64

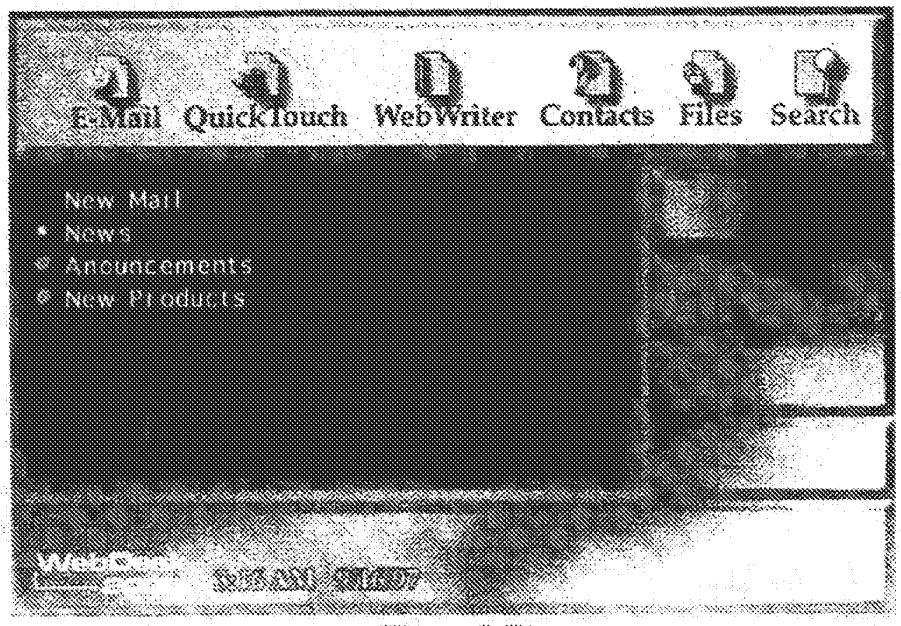
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Fig. 65

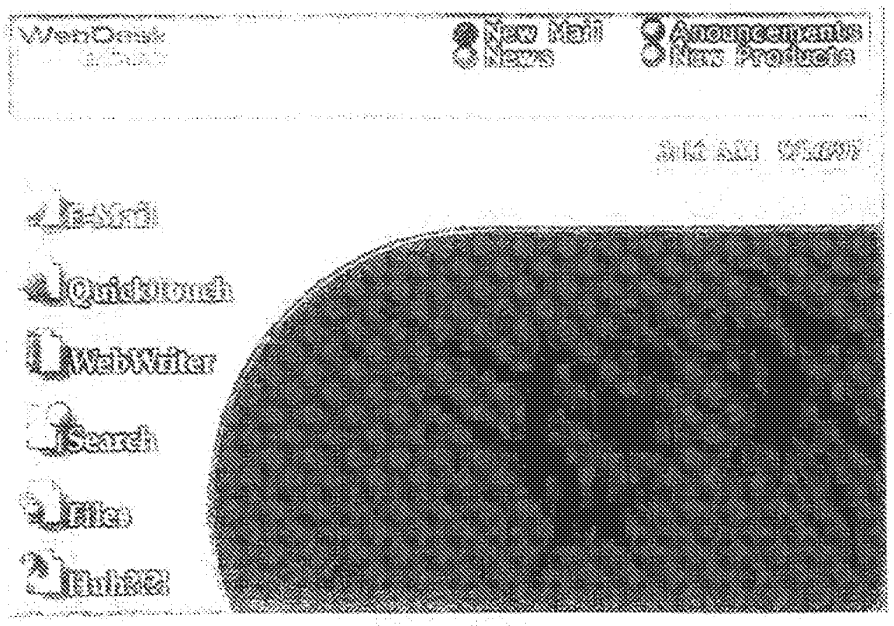
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Fig. 66

Electronic Acknowledgement Receipt

EFS ID:	5470581
Application Number:	12015320
International Application Number:	
Confirmation Number:	2156
Title of Invention:	Method for Managing Media
First Named Inventor/Applicant Name:	Russell W. White
Customer Number:	21906
Filer:	Mark J. Rozman/Stephanie Petreas
Filer Authorized By:	Mark J. Rozman
Attorney Docket Number:	AFF.0004C5US
Receipt Date:	08-JUN-2009
Filing Date:	16-JAN-2008
Time Stamp:	12:37:21
Application Type:	Utility under 35 USC 111(a)

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1	Information Disclosure Statement (IDS) Filed (SB/08)	AFF004C5IDS1449Form2.pdf	405157 6750040845808ef4436c969b8111e0fc3e3f422c	no	12

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Doc code: IDS
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INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Not for submission under 37 CFR 1.99)

Application Number	12015320
Filing Date	2008-01-16
First Named Inventor	Russell W. White, et al.
Art Unit	2617
Examiner Name	Erika A. Gary
Attorney Docket Number	AFF.004C5US

U.S.PATENTS

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	1	2000-66974	JP		2000-03-03			☐
	2	11-68685	JP		1999-03-09			☐
	3	CN 1218258A	CN		1999-06-02			☐

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	Filing Date	2008-01-16
	First Named Inventor	Russell W. White, et al.
	Art Unit	2617
	Examiner Name	Erika A. Gary
	Attorney Docket Number	AFF.004C5US

	4	H11-242686	JP		1999-09-07	Sony Corporation		☐
	5	DE 44 31 070 B4	DE		2004-07-22	DaimlerChrysler AG		☐
	6	0 569 343 A1	EP		1993-10-11	Pioneer Electronic Corporation		☐
	7	0 675 341 A1	EP		1995-04-10	Honda Giken Kogyo		☐
	8	0 771 686 A2	EP		1997-07-05	Toyota Jidosha Kabushiki Kaisha Toyota-shi, Aichi-		☐
	9	H4-261576	JP		1992-09-17	Mitsubishi Electric Corporation		☐
	10	2-301330	JP		1990-12-13			☐
	11	5-294250	JP		1993-11-09			☐
	12	6-187597	JP		1994-07-08			☐
	13	JP6289118	JP		1994-10-18	Sega Enterprises KK		☐
	14	JP6294659	JP		1994-10-21	Dainippon Printing Co. LTD.		☐

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	First Named Inventor	Russell W. White, et al.
	Art Unit	2617
	Examiner Name	Erika A. Gary
	Attorney Docket Number	AFF.004C5US

	15	07-129895	JP		1995-05-19	Honda Motor Co Ltd		☐
	16	07-146155	JP		1995-06-06	Honda Motor Co Ltd		☐
	17	7-262493	JP		1995-10-13	CSK Corporation		☐
	18	7-262493	JP		1995-10-13			☐
	19	JP7270171	JP		1995-10-20	Sumitomo Electronic Industries		☐
	20	JP7036382	JP		1995-02-07	Mitsubishi Electric Corp.		☐
	21	8-110231	JP		1996-04-30			☐
	22	9-61514	JP		1997-03-07			☐
	23	10-103966	JP		1998-04-24			☐
	24	10-143349	JP		1998-05-29	Compaq Computer Corporation		☐
	25	JP1018712	JP		1989-01-23	Mazda Motor		☐

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	Application Number	12015320
	Filing Date	2008-01-16
	First Named Inventor	Russell W. White, et al.
	Art Unit	2617
	Examiner Name	Erika A. Gary
	Attorney Docket Number	AFF.004C5US

	26	JP5077679	JP		1993-03-30	Nissan Motor		☐
	27	JP59085599	JP		1984-05-17	Nissan Motor		☐
	28	JP63136828	JP		1988-06-09	Pioneer Electronic Corp.		☐
	29	63-136828	JP		1988-06-09			☐
	30	WO 96/04724	WO		1996-02-15	Emerson, Harry		☐
	31	WO 96/07110	WO		1996-03-07	British Telecommunications Public Limited Company		☐
	32	WO 97/13657	WO		1997-04-17	United Technologies Automotive, Inc.		☐
	33	H11-317061	JP		1999-11-16	Victor Company of Japan, LTD.		☒
	34	2901445	JP		1999-03-19	Kenwood Corporation		☒
	35	WO 99/35009	WO		1999-07-15	Microsoft Corporation		☐
	36	11-219580	JP		1999-08-10			☐

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	Filing Date	2008-01-16
	First Named Inventor	Russell W. White, et al.
	Art Unit	2617
	Examiner Name	Erika A. Gary
	Attorney Docket Number	AFF.004C5US

	37	11219580 A	JP		1999-10-08	Sony Corp		☐
	38	1168685	JP		1999-03-09			☐
	39	11-068685	JP		1999-09-03	Sony Corp		☐
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	42	1999-0073234	KR		1999-10-05	Young-Man Lee		☐
	43	1999-0048723	KR		1999-07-05			☐
	44	KR2019990022030U	KR		1999-06-25	Young-Shik Cheon		☐
	45	2000-0001465	KR		2000-01-25	Samsung Motors		☐
	46	0142256	KR		1998-03-30			☐
	47	WO 98/21672	WO		1998-05-22	Inergy Online, Inc.		☐

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	Application Number	12015320
	Filing Date	2008-01-16
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	Art Unit	2617
	Examiner Name	Erika A. Gary
	Attorney Docket Number	AFF.004C5US

	48	WO 98/47252	WO		1998-10-22	Stern, Geoffrey		☐
	49	WO 00/54187	WO		2000-09-14	Rock.Com, Inc.		☐
	50	WO 00/60450	WO		2000-10-12	Khyber Technologies Corporation		☐

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	1	MARK MOELLER, Computing Unplugged Magazine, "Product Preview, A Survey of Auto PC 2.0 for software developers," 1999-2009, Zatz Publishing, pages 1-7.	☐
	2	MARK MOELLER, Computing Unplugged Magazine, "AutoPC Update, Auto PC/Windows CE for Automotive news bites," 1999-2009, Zatz Publishing, pages 1-4.	☐
	3	Claim Chart for KR19990033393, Claim 17 of U.S. Patent No. 7,324,833, pages 1-3.	☐
	4	RIO500, Getting Started Guide for Windows 98 and Macintosh OS 8.6, pages 1-2.	☐
	5	NORBERT A. STREITZ, et al., "DOLPHIN: Integrated Meeting Support Across Local And Remote Desktop Environments And LiveBoards," Integrated Publication and Information Systems Institute, 1994, pages 345-358.	☐
	6	LEO DEGEN, et al., "Working with Audio: Integrating Personal Tape Recorders and Desktop Computers," May 3-7, 1992, pages 413-418.	☐

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	Application Number	12015320
	Filing Date	2008-01-16
	First Named Inventor	Russell W. White, et al.
	Art Unit	2617
	Examiner Name	Erika A. Gary
	Attorney Docket Number	AFF.004C5US

	7	H.S. JUN GIBEE, "A Virtual Information Desk On The Internet," University of Ulsan, September 1999, pages 265-268.	☐
	8	STEVE WHITTAKER, et al., "TeleNotes: Managing Lightweight Interactions in the Desktop," Lotus Development Corporation, June 1997, pages 137-168.	☐
	9	R.M. CROWDER, et al., "Integration of Manufacturing Information Using Open Hypermedia," Computer in Industry, 1999, pages 31-42.	☐
	10	TOMAS BOSTROM, et al., "Mobile Audio Distribution," Royal Institute of Technology, 1999, pages 166-172.	☐
	11	ALEX POON, et al., Xerox Disclosure Journal, Vol. 19, No. 2, "Gestural User Interface Technique for Controlling the Playback of Sequential Media," March/April 1994, pages 187-190.	☐
	12	DEB KUMAR ROY, "NewsComm: A Hand-Held Device For Interactive Access to Structured Audio," Massachusetts Institute of Technology, June 1995, pages 1-12.	☐
	13	VICTORIA BELLOTTI, et al., "Walking Away from the Desktop Computer: Distributed Collaboration and Mobility in a Product Design Team," 1996, pages 209-218.	☐
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(54) Title: PERSONAL AUDIO MESSAGE PROCESSOR AND METHOD

(57) Abstract

A portable device is disclosed which permits the user to record, edit, play and review voice messages and other audio material which may be received from, and subsequently transmitted to, a remote voice processing or interactive voice response (IVR) host computer over a communication link. A preferred device contains its own power source, integrated circuitry and control buttons to permit the localized recording, editing, storage and playback of audio signals through a built-in speaker, microphone and removable memory card. The device also contains a standard RJ-11 telephone jack, modem chip set and DTMF tone decoder to permit the transmission and control of audio signals to and from a host computer. The device contains circuitry which permits it to transmit and receive audio signals at a rate substantially faster than originally recorded.

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PERSONAL AUDIO MESSAGE PROCESSOR AND METHOD

Field of the Invention

The present invention relates generally to dictation and audio communication devices and, more particularly, concerns a method and portable apparatus for audio communication, including the recording and editing of voice mail and audio content and its transmission and reception over a private or public network, such as the Internet, using common electrical communication media or data links.

Background of the Invention

All electronic message systems, with the exception of voice-mail, have intermediate devices or storage media whereby data may be transferred, preferably at a high transmission rate, over a standard communication link and stored in a storage medium or onto an unattended device for later off-line access, review and editing by the intended user.

In the case of a facsimile transmission, an image is scanned by the transmitter and then transmitted and ultimately printed at a remote site for off-line utilization by the intended receiver. In the case of electronic mail, data is generated on a computer and then transmitted and stored either directly on the intended user's unattended computer or on a central host computer linked to a network of computers for subsequent retrieval by the intended user. The most common networks are Local Area Networks (LAN), a Wide Area Networks (WAN), and public networks, such as the Internet, or private networks. When the intended user accesses his computer, either the E-mail is already resident, or he finds a message displayed

in a graphic editor indicating that he has mail and how he can retrieve it. Once the E-mail is retrieved, it likewise may be read, reviewed and manipulated by the intended user off-line on the users' computer. Alternately, it may be outputted to a printer, providing the user a hard copy for review at his convenience.

When a facsimile machine is unavailable, a facsimile may be transmitted to a computer or handheld, paperless fax machine for off-line and independent review by the recipient, such as Reflection Technology, Inc.'s FaxView personal fax reader.

Utilities exist for both facsimile and E-mail messages, whereby messages may be selected from a host by an authorized user for subsequent transmission to the user's E-mail address or unattended facsimile machine. See, for example, Duehren et al., U.S. Patent No. 4,918,722.

Recently, with the widespread and growing usage of the Internet and, more particularly, with the growing popularity of WEB sites offering published material in the form of HTML (Hyper Text Markup Language) documents, utilities have been created which permit such files to be selected for subsequent off-line access and independent review by fax. See, for example, FactsLine for the Web, by Ibex Technologies, Inc. Such a utility makes the large volume of information and graphics offered over the Internet, available to users who either do not have access to a computer connected to the Internet, or wish to limit the amount of time spent on-line.

A large percentage of potential users do not have access to the Internet, or even if they do; may be traveling; may not have access to their computers; or may not wish to spend time booting their computer and waiting for Web site graphics (utilities such as Web-On Call Voice Browser by Netphonic Communications, Inc. have been introduced which permit users to access the Internet, in response to voice prompts), to navigate to a document or E-mail of interest, to identify a document by number and to have a selected document read in real-time over the phone using text synthesizing voice and faxed back or sent as an e-mail attachment.

Similarly the widespread use of the Internet and heavy traffic to particularly popular Web sites or during

particular peak usage times has created a demand for utilities called off-line browsers which permit Internet users to "subscribe" to particular Web sites from which their computer then automatically retrieves material during off-peak hours, categorizes and organizes new and updated information and permits the user to review it off-line using his browser of choice (e.g. FreeLoader by FreeLoader, Inc.).

Similarly, subscription services have been introduced which permit voice mail to be sent to an e-mail address and also permit audio content offered on a Web site to be updated both by
way of a standard phone call to an interactive voice response (IVR) system (e.g. "Amail" and "Dialweb" by Telet Communications).

Recently, voice processor system manufacturers have established a work group consisting of more than 60% of the world's voice mail system market to develop an Interoperability standard for a Voice Profile for Internet Mail (VPIM). TCP/IP (Transmission Control Protocol/Internet Protocol) has been selected as the vehicle of conductivity, because of its globally accessible points of contact, primarily on the Internet, and because of its use of commonly recognized transmission protocols, specifically simple message transfer protocol (SMTP) and Multipurpose Internet Messaging Extension (MIME) as the core of VPIM. (see April 29 1996 issue of Business Wire). Once implemented, interoperable standards such as VPIM will permit voice mail users to send and receive their voice messages over the Internet or an Intranet as easily as they can now do so over the telephone.

In addition to voice messaging and audio e-mail over the Internet, the recent introduction of proprietary client server software systems permits users with conventional multimedia personal computers and voice grade telephone lines to browse, select, and play back audio or audio-based multimedia content in real-time streams (RE) or download on-demand (REM). An interested user need only download software from the content provider's Web site to access such audio content (e.g. Progressive Network's RealAudio Player and

Server). Systems such as this represent a real breakthrough, since in the past, delivery of audio by conventional on-line methods downloaded it at such low rates that acquiring the information took five times as long as the actual program. This required the listener to wait 25 minutes before listening to 5 minutes of audio.

As a result of the availability of streaming audio over the Internet, a number of companies have introduced Internet telephone products which permit users having multimedia computers programmed with proprietary software to talk in real time over the Internet (see Voclatec). Such a system is useful over long distances when users can access a local Internet access point or point of presence, making a long distance call into a local call.

Similarly, as a result of streaming audio over the Internet, content providers are able to broadcast live audio from a Web site (e.g. AudioNet by Cameron Audio Networks).

Recently a standard-based implementation for communication over the Internet has been introduced, and supported by Intel and Microsoft, which makes use of the DSP Group's TrueSpeech G.723 compression technology. This uses an advanced algorithm that results in excellent voice quality, despite a high compression ratio, and operates at 6.3 kilo bits per second (kbps)and 5.3 kbps with compression ratios of 20:1 and 24:1, respectively. It also includes silence compression which can bring the effective rate down to less than 3.7 kbps at 28.8 kbps modem speed. This would permit the transmission of audio at a rate of 1:7.78 or 10 minutes of audio in 1.3 minutes.

Using Texas Instrument's C80 DSP chip using a V.34 modem running at 28.8 kbps, a transmission rate of audio at a rate of 10:1 (ten minutes of speech in 1 minute of transmission) can be achieved with telephone grade sound quality.

From the above, it is apparent that while the transfer of data, graphics and audio messaging and content over a network has become more widespread and convenient, this growth has also highlighted certain historic shortcomings associated with the transfer and input/output of voice messaging and audio content. As voice messaging and audio content become more available, the deficiency created by the lack of an intermediate device or storage medium for such audio will become more pronounced.

For both E-mail and facsimile, use of a telephone link
is limited to the transmission of the data and the transmission of control codes for that data. With the growth and widespread usage of network computing, the telephone link for e-mail and facsimile (e.g. PASSaFAX from RADLinx) is further limited to a hook-up to a local point of presence to access the network. Both e-mail and facsimile contain content which may be outputted by the intended user to a printer, which permits the user to take a hard copy of the material with him for review at his convenience, while he is away from his office or traveling.

In sharp contrast, voice messages and voice-text are currently recorded by the sender and retrieved by the intended recipient primarily in real-time and on-line. At best, a user can use his multimedia notebook computer to record and access a stored audio file or streaming voice file. Off-line access to audio is limited to downloading audio files onto a multimedia computer and having the sound card equipped computer play the audio. However, a multimedia computer, with its screen, keyboard and multipurpose processing capability, is hardly the size of a traditional dictation device or voice recorder. This dependence on a telephone hand set or multimedia computer to create and access audio is analogous to requiring a recipient of a facsimile to view, edit and prepare a facsimile only while in close proximity to a facsimile machine or fax enabled computer. Not being able to prepare, review and access network based voice mail other than in real-time from a telephone hand set or off-line from a multimedia

computer, severely limits the desirability of integrating voice messaging and audio content into network based messaging. There exist no dedicated and portable devices to store network based voice messaging and likewise there exists no method or utility to scan and select personal voice messages or public announcements from a host connected to a network for subsequent high speed transmission to a device for subsequent off-line review by the user.

The only dedicated device which permits the user to review his/her voice messages off-line is the Telephone Answering Device (TAD) which is primarily a residential or small-office, home-office (SOHO) appliance which uses digital recording technologies to replace the standard functions of a traditional tape-based answering machine. The TAD, plugged into both an electrical outlet and phone jack is not portable, so the user must either be within hearing distance of the TAD's speaker or, using a telephone, may call in to retrieve his/her messages on-line and in real-time. While traditionally, TAD's have offered very limited outbound messaging capabilities, whatever outbound messaging was offered required that the owner record any outbound message (e.g. a general greeting or caller-specific/mail box-specific message) either from within range of the microphone on the TAD or from a real-time telephone call.

Voice messaging, whether network based or TAD based, limited to on-line and real-time transmission and physically requiring access to a telephone set, TAD or multimedia computer is unfortunate, particularly because voice communication inherently does not require any external hardware or instrumentation other than the mouth and ear for a human being to create or access it. Speech is the most natural and self-sufficient form of communication. Speech is hands-free requiring neither writing instrument, keyboard, screen, dedicated vision or hand-to-eye coordination on the part of the user to input or retrieve. That voice mail is nonetheless so widely used is more a function of speech's unique characteristics than a vote of approval on the adequacy of the current technology. Similarly, that so many innovative

utilities have been introduced which make audio and voice available over public and private networks is a commentary on the compelling nature of audio and voice for content, messaging and issuing commands and only underscores the need to make audio and voice more easily available. Until such time that voice messaging and audio content are made more accessible, many of the network based audio utilities mentioned above will remain novelties for technophiles.

Much has been said about Computer Telephone Integration (CTI) and the Universal Mail Box, where network based messages and content may originate in any medium and by any input device of choice and, likewise, may be retrieved in any medium or by any output device of choice. Faxes can be accessed as data on a computer screen, data can be accessed as a fax or text-to-speech audio-text and, as automatic speech transcription utilities become more capable, audio will be accessed as printed text in email or fax. However, as long as audio does not have an input/output device of choice other than a telephone handset or screen/keyboard based multimedia computer, its desirability as a medium of choice will likewise be severely limited.

Since speech is a direct record of the user's voice, the urgency, meaning and emotional content is never lost. Similarly, since so much data is first generated in voice and is only later transcribed to text or data, info-text should be the preferred medium for timely data on meetings, speeches and radio broadcasts. Ideally, voice mail should be the preferred mode of communications when traveling, when communicating through time-zones and when accessing timely information which originated in the spoken word (e.g. minutes of a meeting or lecture). Voice text (i.e. data or text which is spoken by a computer or pre-recorded by a human) should be the preferred format for messaging information to be accessed where use of motor skills and vision are not convenient or are impaired such as when driving, operating equipment or engaged in a leisure activity.

The current use of a telephone to access voice messages directly has significantly limited the potential utilization of voice messaging. Real-time transmission of voice messages and info-text makes the recording and retrieval of voice mail, especially from long distances, very costly. The cost and inconvenience involved means that one cannot compose and review voice mail and info-text in a cost efficient manner and at one's own pace. One is limited to a location and situation in which a telephone is accessible and, in the case of a wireless communication link, to a place where wireless transmission is both possible and desirable.

The application of multimedia computers to compose and review voice mail has had little effect on making voice messaging more convenient since the use of keyboards, pointing devices and screens is hardly hands-free, nor is the size and expense of a multimedia computer conducive to widespread use and transportability. In its present state, voice mail is limited to short messages between individuals wishing to communicate in a more substantive fashion at another time (telephone tag). Voice "mail" becomes limited to voice "messaging" because of the cost and inconvenience to both the sender and receiver of listening to lengthy, content-rich "mail" over the phone or at a multimedia computer". Furthermore, the cost of transmitting audio signals in real-time, through a direct communication link to the user's voice processor or TAD, and only when the user has access to a telephone (as opposed to un-attended recording at off-peak hours) make more commercial use of info text (recorded instructions, recorded travelogues, speech transcripts, article or books on "tape" etc.) and other innovative advertiser/subscriber supported uses of voice-text unfeasible.

Recently, U.S. Pat. No. 5,444,768, issued to Charles Lamer et al., and assigned to International Business Machines Corp., and U.S. Pat. No. 5,359,698, issued to Shmuel Goldberg et al. and assigned to Espro Engineering both disclose a portable computer device for audible processing of audio messages stored at one or more remote central message facilities. The Lamer et al. system permits the user to record and playback, transmit (upload) and receive (download) voice messages from a central message facility and over a communication link and onto a portable device; however, the Lamer et al. system requires that a direct telephonic link be established between the portable device and one or more remote central message facilities. The Lamer et al. and Goldberg et al. systems enable the portable device to individually access a traditional, closed, expensive, proprietary voice processing system through a direct communication link. The Lamer et al. and Goldberg et al. systems do not provide a commercially feasible solution for accessing voice mail other than by way of a long distance call to a central message facility. The expense associated with such a long distance toll charge would make extended usage of the Lamer et al. system prohibitive. In addition, the Lamer et al. system requires that a user contact one or more remote central message facilities to retrieve and transmit selected audio files. The inconvenience associated with such a polling procedure nullifies the convenience provided by the system.

Similarly, the Lamer et al. system does not provide for a method by which the user may browse available audio content nor for a method to select audio files from a menu for subsequent retrieval by the portable computer device. Similarly, the Lamer et al. system does not provide for a utility whereby the user may remotely access a central server linked to a network of servers to download control code, search a personal user group or public database for an address other than by way of initiating a dedicated "training" mode by either coupling the portable computer device directly to a computer or by way of detecting and recording DTMF tones generated locally by a standard touch-tone telephone device. Since a

typical user's mail box utilities are handled on his network e-mail server and modified regularly in the course of his sending and receiving e-mail, such a dedicated training session for the portable computer device is impractical. Similarly, since new audio server platforms, utilities and compression schemes are being introduced regularly, there is a need for a dynamic and transparent method for updating both control codes and address books without the need for a dedicated training session.

Broadly, it is an object of the present invention to provide an Internet-ready dictation and voice message recording/reviewing device and method which enable a user to compose and review voice mail off-line, from any location, while engaged in any activity, at a leisurely pace, without incurring telephone toll charges and whether a communication link is presently accessible or not.

It is also an object of the present invention to use a telephone link preferably to a local network access point primarily as a communications link for high speed transmission of pre-recorded material and control codes to facilitate that transmission, thereby limiting the use of a telephone or a multimedia computer and telephone line for voice messaging as a recording or playback device.

It is also an object of the present invention to provide a protocol whereby pre-message handshaking occurs between a dictation and voice message recording/reviewing device and a network server to conform the digitized voice signal to one of the standard voice compression protocols and TCP/IP protocol stacks to facilitate a high speed transmission of voice messages over the network.

It is another object of the present invention to provide a portable and dedicated voice capable network (Internet) access device which enables the user to record, edit and play audio files which may be transmitted and/or received over a public or private network.

It is also an object of the present invention to provide a portable access device and method which permit the

owner of a specially modem-configured Telephone Answering Device (M-TAD) to access and download compressed voice message files directly from the TAD's digital memory onto a portable voice message record/playback device either by way of a direct cable connection to the TAD or by a telephone link.

Providing such a portable access device and method would permit TAD owners to encourage inbound callers to leave more robust and data-rich audio messages on their TAD as well as permit TAD owners to subscribe to audio content which could be regularly delivered to their TAD in compressed digital form and downloaded onto the present invention for play-back and review at a convenient time and place. This would also permit TAD owners, while away from their home or office to have their portable dictation and voice message recording/reviewing device establish a telephone link with their TAD and economically and automatically retrieve all stored messages and update all outgoing messages (e.g. general and caller specific greetings), with all stored messages and outbound greetings being transmitted in digitized and compressed format.

The invention provides a low cost, portable recording and playback dictation and voice message recording/reviewing device which permits the user to record, edit, play and review voice messages including audio-text, text-to-speech and other audio material which may be received from and subsequently transmitted to a remote host computer located on a public or private network over a communication link such as the public switched telephone system.

A preferred device contains its own rechargeable power source, integrated circuitry and control buttons to permit the localized recording, editing, storage, playback and transcription of audio signals through a built-in speaker, microphone or plug-in headset, foot pedal and removable memory card. The device also contains a standard RJ-11 telephone jack, modem chip set (or software), or a removable PCMCIA connector to which a standard or wireless modem card could be connected; and a DTMF tone decoder to permit the transmission and control of audio signals to and from a host computer connected to a public or private network. The device contains

circuitry which permits it to transmit and receive audio signals at a rate substantially faster than originally recorded.

A preferred device also contains a processor which includes the necessary terminal emulation to permit a network user to access a network directly from a local point of access, such as an Internet service provider's (ISP) point of access and shell account, using a standard protocol such as SMTP (Simple Mail Transfer Protocol), Post Office Protocol (POP3) and MIME (Multipurpose Internet Mail Extensions) in the TCP/IP suite to review, select and retrieve audio files that have been sent to the user's e-mail address (or similarly, data/text files which can be translated into voice), and to download and transmit such files.

A preferred device also contains a standard or touchscreen display and software which permits the user to display a similar graphical editor for composing and reading e-mail messages as is displayed on his computer screen when accessing his e-mail, so that the user can scroll through his e-mail messages, selecting those audio files he wishes to download and selecting text messages he wishes to have converted, either by the network server or at the device, into an audio format (text-to-speech).

A preferred device also contains: a cradle into which the device may be placed, the cradle having ports which enable it to be connected to a power source to recharge the device's batteries; a phone jack to enable it to establish a communication link; and a serial or parallel port on a computer for downloading and uploading files directly to the computer or for receiving "redirected" files.

A preferred device also contains a language user interface capable of recognizing and responding to speech with speech. Such an interface includes speaker independent functions but also permits speaker adaptation which allows the personal device to adjust to the peculiarities of the user's voice or pronunciations and thus improve accuracy. This speaker adaptation is achieved through a protocol which allows the system to adapt to the users voice through the repetition

of a set of sentences prior to first use of the device (See Lernout & Hauspie Speech Product's (LHSP) asr1000 product line). The language interface includes a vocabulary builder which permits the user to extend the vocabulary including special terms and proper nouns to the speech recognition application (see LHSP Lextool™), a user template which enables the user to create words which the device will associate with user defined commands e.g. "home" could be associated with an e-mail address (LHSP asr 200 product line), alphabet recognition for spelling an e-mail address as well as background noise tolerance and speech at a distance software which improve the accuracy of the language user interface even in an automobile, airplane or public place and even if the user is not wearing a headset. (see LHSP)

A preferred device also contains public-key encryption technology designed to ensure reliable and secure transmission of sensitive information by encrypting and decrypting the message data and by authenticating the sender's identity by using a secure digital or voice signature.

A preferred device also contains a text-to-speech utility which permits the user to download data not already converted to speech by a network server and to do so at the device.

A preferred device also contains a bar code reader which permits the user to scan a printed bar code associated with printed matter such as a news article, a map, a menu of available audio files or in a travel guide which would give the device all the information it needs including network server address, file location and file ID so that the audio file associated with the printed matter could be automatically retrieved from a network such as the Internet.

A preferred device also contains a bar code reader which permits the user to scan a printed bar code associated with printed matter such as a news article, a map, a menu of available audio files or in a travel guide which would give the device all the information it needs to play a file from a previously retrieved group of audio files (such as described in Goldberg et al.).

A preferred device also contains an Infrared interface using a standard such as the Infrared Data Association (IrDA) for high speed local wireless transmission (e.g. 1.2 Mbps and 4Mbps) of audio files and control codes between the device and a public phone, kiosk or the users' computer.

A preferred device also includes a software utility called an off-line browser which programs the device to automatically retrieve audio files from the network during off-peak hours to which the user has subscribed, or from selected Web sites which have new audio material available, or from e-mail addresses that the user has programmed the off-line browser to retrieve.

A preferred device also includes a software utility which enables the user, by way of a graphical screen based interface or by way of audio prompts, to browse either network databases such as those located on the Internet for addresses and/or sites from which to receive and send audio files.

A preferred device also includes a software utility which creates a graphic interface and memory for the user to access, refresh and/or download his E-mail address book containing the E-mail addresses of individuals and groups for which he may wish to prepare and to which he may wish to send audio files. Such a utility would automatically synchronize the data in the dictation and voice message recording/reviewing device to the data contained in the user's E-mail server account.

A preferred device also includes a software utility which creates a graphic interface and memory for the user to organize his/her telephone numbers, E-mail addresses, calendar, reminders and appointments including a clock and alarm function with an option to choose between a simple audible sound alarm or a programmed voice message alarm (e.g. "call home").

A preferred device also includes a software utility which enables the user to download proprietary client server software systems and upgrades and newly introduced standards for low bit rate speech compression made available over a

public or private network such as the Internet to insure that the device may use the latest state-of-the-art audio compression software.

A preferred device also includes a software utility which enables the user to download proprietary client server software systems and upgrades and newly introduced standards which enable the device to receive highly compressed and/or streaming audio files containing voice content including, but not limited to application program interfaces (APIs) which enable the device to be used as a portable Internet Phone appliance to conduct a real-time, two-way, full-duplex voice conversation using a local connection to the Internet.

A preferred device also includes a software utility which extends the functionality of a Web program run from a Web browser and operate on data such as audio data as it flows in the user's PC, permitting the user to redirect audio files by the communication port directly to the device seated in a cradle and connected to the serial or parallel port. Alternatively, this could be achieved though OLE (Object Linking and Embedding) enabled Web software which when activated by the user by pressing a designated key such as print, redirects audio files directly to a special "printer" driver dedicated for the device. The utility permits users who are browsing the Web on their computers to download audio files directly to their personal audio servers for later access, without having to transfer from their hard disc.

A preferred device also includes a software utility which enables the user to select E-mail messages and request that the messages be converted from text-to-speech by an appropriate text-to-speech conversion application available to the network, and only subsequently digitized and transmitted as digitized and compressed audio file.

The invention also relates to a method and software utility using DSVD (Digital Simultaneous Voice/Data) and/or the VoiceView protocols (Radish Communications Systems, Inc.) which would enable the user, once connected to a communication link to be able to transfer and receive audio files directly into a dictation and voice message recorder Device simultaneously

or, alternatively, with the user processing, and/or receiving and transmitting other related or unrelated data to and from the network or conversely, while the user is talking on the phone. The use of these voice/data protocols would permit the dictation and voice message recording/reviewing device user to request audio files in response to voice prompts spoken in digitized streaming or analog voice, to respond by spoken responses, keypad entries or DTMF tones and to transfer those files in high speed data mode during the same phone connection.

The invention also relates to a method and software utility which permit the scalability of digitized audio files in order to conform with network server requirements and or user preferences. This would enable the server to demand or the user to request a lower compression rate or slower transmission speed in order to have higher fidelity for the audio file requested, and vice versa.

It is a feature of the present invention that a recording device may be left connected to a communication link and programmed to dial into and to connect to a local network access point at off-peak hours when telephone rates are lowest and when excess capacity on incoming lines is available. The recording device is programmed to search the network for audio files to which the user has a subscription, new audio files available from Web sites to which the user has programmed the device to look, and for audio mail sent to the user from selected E-mail addresses.

It is a feature of the present invention that an interface port, such as a standard RJ-11 telephone jack, is provided so that the recording device may be connected between a telephone set, computer, cellular phone or personal digital assistant and a communication link to enable the user to select and retrieve voice files while using any of the above devices.

It is also a feature of the present invention that circuitry is provided for the digital conversion and compression of the analog voice signals recorded in the memory of a dictation and voice message recording/reviewing device to permit high density storage and high speed transmission of digitized voice. Similarly, circuitry is provided for the

analog conversion and natural sounding playback of previously stored or received digitized voice.

It is also a feature of the present invention that there may be provided a public terminal e.g. in a manner similar to an automated teller machine and located at places such as airports and tourist sites where a user could connect his recording/reviewing device and select voice messages and audio-text to be retrieved and transmitted directly by the recording/reviewing device.

Brief Description of the Drawing

The foregoing, as well as the other objects, features and advantages of the present invention will be understood more completely from the following detailed description of a preferred embodiment, with reference being had to the accompanying drawing, in which:

Figure 1 is a schematic block diagram of a preferred personal audio message processor embodying the present invention; and

Figures 2-7 (Figure 2 comprises Figures 2a and 2b) are flow charts illustrating how certain processing is performed in the apparatus of Fig. 1.

Detailed Description

Figure 1 is a schematic block diagram of a presently preferred Personal Voice Server (PVS) system 10 embodying the present invention. PVS system 10 broadly comprises five main parts: a highly integrated DSP/RISC integrated chip 11 (DSP stands for Digital Signal Processor and RISC stands for Reduced Instruction Set Computer); a Telecom/Audio Codec 17; a memory such as SDRAM 12 and/or Flash Memory 13 coupled to the DSP chip; peripherals such as a microphone 26, a speaker 18, a touchscreen/display LCD 19, an infrared I/O 21 and a Barcode reader 15. Operating system software is also provided to

manage the DSP to handle modem routines such as V32bis, V34 etc., voice recognition, echo cancellation and speech synthesis; software also controls the system via the RISC part of chip 11. Although the embodying device 10 is referred to as a voice server, it should be clear that it is equally useful for other types of audio, including music.

The DSP chip is preferably a Philips Semiconductor PR31100 chip, which contains a MIPS R3000 RISC CPU core with 4 Kbytes of instruction cache and 1 Kyte of data cache, plus various integrated functions for interfacing to numerous system components and external i/o modules. The chip also has a hardware multiply/accumulate unit to perform DSP functions, such as a software fax/modem which eliminates the need for an external modem chip set. However the chip also has a UART (Universal Asynchronous Receive Transmit) interface 22 (shown separately), which permits the device to be connected to an external modem or other device (such as a modem equipped Telephone Answering Device) through a conventional RS232 serial connector 23.

The PR31100 also contains multiple DMA (direct memory access) channels and a high-performance, flexible Bus Interface Unit (BIU) for providing an efficient means for transferring data between external system memory, cache memory, the CPU core, and external I/O modules. The PR31100 also contains a System Interface Module (SIM), which provides integrated functions for interfacing to various external I/O modules, such as a liquid crystal display (LCD) 19, an infrared I/O module 21, and the Codec 17.

Codec 17 is preferably a Philips UCB 1100 single chip integrated mixed signal audio and telecom codec, which handles most of the analog functions of the system, including the sound and telecommunications codec (analog/digital coding and decoding) functions and touchscreen analog-to-digital conversion, ISDN/high-speed serial, infrared, and wireless peripherals. The high-speed serial interface 14, although shown separately in Fig. 1, is actually part of the UCB1100. The chip has a single channel audio codec which is designed for direct connection of a microphone and speaker (i.e. components

16 and 28 are actually part of the UCB1100). The built-in telecommunications codec can be connected directly to a conventional RJ-11 jack 20 for connections to a telephone line.

For a more complete understanding of the embodiment of Fig. 1, data sheets for the PR31100 and UCB1100 are attached and are incorporated in this description by reference.

The operating systems software for the PR31100 is preferably Eden OS version 2.0, commercially available from the Eden Group Limited of Cheshire, England. This operating system is specifically designed to support the PR31100 (also known as DINO) and the UCB1100 (also known as BETTY). A data sheet for the Eden OS is attached, which describes the software support and the drivers provided by the operating system. This data sheet is incorporated in the present description by reference.

Memory 12, 13 is used to store messages and to hold temporary data. The flash memory is configured according to the amount of permanent programs required, including operating system (O/S) and application software and also to store some of the recorded messages. Typically, audio compression provided in the PR31100 will result in a data bandwidth of less than half a Kbyte per second (i.e. 1Mbyte of memory will provide an hour of audio.)

A microphone 26 and speaker 18 are selected based on quality and size.

Flow diagrams are presented in Figs. 2 - 7 to describe the operation of retrieving messages over the Internet and transmitting them to and from the PVS as well as the various operational options for dialing, receiving data from a given server address in the Internet, storing, screening, retrieving, transmitting and playing messages to/from the PVS. These operations include receiving compressed messages in digital form and audio signals in analog form bi-directionally from speaker/microphone and phone connection.

Figures 2a and 2b comprise a flow chart illustrating how the PVS connects to a location on the Internet by Transport Protocol and how the PVS gets all data relating to its Web/e-mail site (e.g. HTML language displaying information) and receives/stores messages (audio, data etc.) that were sent

using either a proprietary or de-facto standard (e.g. highly compressed audio at 2.5 kbps).

The operation depicted in Figs. 2a and 2b is run concurrently by the real-time kernel of the DSP/RISC (discussed further below with reference to Fig. 3). It enables multiple tasks to be run and executed in Parallel. Operation of the main task begins at block 200. Accessing a site and storing or receiving stored messages is run concurrently with other tasks. These tasks can be local to operate the PVS, or other tasks such as the operation of the bar-code reader, voice synthesizer, voice recognition, or to access other Web sites by PPP at the same time.

At block 202, a test is performed to determine whether the desired operation is connection to a network access provider via an out-bound call (at block 210). If not, the modem, in response to a ring, answers the call, completes its handshake procedure, and begins receiving information (block 204). Data bits from the modem are received by DSP chip 11 at block 220. The DSP chip decodes the incoming data at block 230.

At block 240, a test is performed to determine whether the desired operation is to decode an HTML site. If not, control transfers to block 340. Otherwise operation continues at block 250, where the display of the site page begins. A test is performed at block 260 to determine whether the mode of operation is interactive or automatic. In the interactive mode, the user of the PVS has to browse and select the desired operation to be completed. In automatic mode, the keyword(s) to retrieve audio or other messages are searched for and activated automatically to get the compressed data. If the test at block 260 senses the interactive mode, control is transferred to block 110 in Fig. 2b. If not, automatic browsing is done starting at block 270 to search for a highlighted keyword symbol. At block 280, a test is performed to determine whether the keyword constitutes a request for a previously digitized message and if so, the data compressed by FTP protocol is received by the PVS at block 290. If the test

at block 280 results in a "no", control transfers to the block 310.

At block 310 a test is performed to determine whether no more messages exist, and, if so, control returns to block 100. Otherwise, a test occurs at block 320 to determine if the keyword constitutes a request for a place to store local messages at the web server. If so, this data, such as a compressed audio messages, is transmitted from the PVS to the web site (block 330). If not, control returns to the start (block 100). The process is continued until there are no other stored messages for the PVS owner at this Web site.

At block 340, a test is performed to determine whether this cite is utilizing the FTP protocol language. If so, a message is retrieved utilizing FTP (block 360), and it is stored at block 380 and control is transferred to block 120 in Fig. 2b. If it is determined at block 340 that FTP protocol is not being used, a test is performed at block 340 to determine whether or not a recognized access language is being received. If so, a message is retrieved at block 360 utilizing the recognized access language and is then stored at block 380. Control is then transferred to block 120 in Fig. 2b. If a recognized access language is not found at block 350, the user is notified at block 370 and control returns to block 100.

If it was determined at block 260 that the mode is interactive, control is transferred to block 110 in Fig. 2b. At block 112, the keywords in the web page are selected and, at block 114 HTML interpretation is activated to locate the messages in the pool. At block 116, messages are then sent and/or received and control is returned to block 100 in Fig. 2a.

Following block 380, where data was stored, preferably in compressed form, control is transferred to block 120 in Fig. 2b. Any data which is stored causes the creation of data in a flat database (block 120), which may be searched to locate the data at a later time. In case the message is an audio message, it is decompressed and played at the same time that it is transmitted by FTP protocol. The test at block 122 determines whether such action is necessary for the current

message and, if so, decompression and the audio synthesizer are activated (block 124), the database is updated to reflect that the message is ready to be synthesized, and control is returned to block 100. If the message is not to be decompressed and played, block 122 transfers control to block 128, where a test is performed to determine if the message is to be sent to the web server and, if not, control is returned to block 100. If the message is to be sent to the web server, it is sent by FTP at block 130, and the user is notified upon completion of the transfer (block 132), after which control returns to block 100.

Figure 3 describes the overall operation of the Kernel of the Eden OS as run on the RISC core CPU of the DSP 11 for the present application. The kernel is multitasking, in that it can run multiple programs or tasks concurrently, with each one having its own priority and being capable of initiating other (child) tasks. After the Kernel initializes via blocks 400-420, operation starts at the idle mode at block 480, where the PVS waits for events to occur, and when one occurs it is handled at block 430. Every program interacts with the operating system this way, by having its tasks attended to at block 430. The type of events that arise are either synchronous or asynchronous. At block 440, if a synchronous event is detected, processing of the synchronous events is initiated via connector 5. Otherwise, a test is performed at block 450 to detect an asynchronous event, in which case processing of the asynchronous events is initiated via connector 6. In each case, after processing is initiated the operating system returns to the idle mode to process other events. Another special event to occur is error handling at block 460. In the event that an asynchronous event is not detected at block 450, a test is performed at block 460 to detect a failure event and if there is none, the program returns to the idle mode. In the event of a hardware failure, a communications failure or a software failure, an error event is detected at block 460 and a run time handler is issued (block 470) and handles the event. Control then returns to the idle mode. The synchronous and asynchronous events identified

in Fig. 3 are only exemplary and it is contemplated that there may be others of each type.

Figure 4 is a block diagram illustrating the routine performed by the controller of DSP/RISC Chip 11 when an analog audio message is to be recorded. At block 710, a test is performed to determine whether the incoming messages are from the built-in microphone. If not, control is transferred to the routine of Fig. 5. If so, the audio message is digitized and compressed (block 720) and placed in the working pool of data (block 730). At block 740, a test is performed to determine whether memory was filled before an entire message was stored. If not, the routine is terminated, and control returns to the idle mode. If so, recording is disable (block 750), and the operator is notified, as by warning light, that the memory is full (block 760). Control reverts to the idle mode.

Figure 5 is a block diagram illustrating the routine performed to record analog audio from the telephone line. At block 800, a test is performed to determine whether an audio message being received is from the communications link (telephone line). If not control is transferred to the routine of Fig. 6. If so , the message is passed through the Telecom/Audio Codec 17 as audio (block 810), and a test is performed at block 820 to determine whether compression is to be performed by the DSP/RISC Chip. If so, the message is stored in local memory (block 830), recording is stopped, and control is returned to the idle mode. If compression is not to be performed by the DSP/RISC Chip, the message is sent to the Telecom/Audio Codec, which compresses it by a standard (ADPCM) algorithm (block 840). The message is then sent back to the DSP/RISC 11 through its UART (block 850), and the DSP/RISC chip control that causes the message to be stored I flash memory 13 (block 860). Control is then returned to the idle mode.

Figure 6 is a block diagram of the routine performed by the Audio/Telecom Codec controller to play stored audio through the built-in speaker. At block 900, the operator selects a message from the pool of messages stored in the device. At block 910, a test is performed to determine whether

stored message to be read was originally compressed by the audio/telecom codec. If not, control is transferred to block 920. If so, the message is read and decompressed using the audio/telecom codec (block 930), and the decompressed message is applied to the digital-to-analog converter (DAC) in the audio/telecom codec (block 940). The message is the played via the built-in speaker 18 through the D/A converter and amplifier 28 (block 950), and control is returned to the idle mode.

If the stored message was not originally compressed by the audio/telecom codec, a test is performed at block 920 to determine whether the stored message was originally compressed by the audio/telecom codec. If not, the user is notified (block 960), and control is returned to the idle mode. If so, the message is read by the controller (block 970), and it is then sent to the modem to be decompressed and then returned from the modem to memory 13 through the UART port of the audio/telecom codec 17 (block 980). Control is transferred to block 940, and playback is handled in the same manner as a message originally compressed by the Audio/telecom codec.

Figure 7 is a schematic illustration of how the PVS, connected to its cradle may be connected to a PC (whether multimedia or not) or to a specially configured TAD with a built-in modem in order to permit a PC or TAD user (A) to send or receive a voice file from or to the PVS through a modem other than the telecom/audio codec of the PVS. This would permit a PC user to send or attach a voice file resident in the PVS over the PC's modem and would likewise permit the PC user to download a voice file received over the PC's modem directly to the PVS. The same configuration would permit a non-multimedia PC user (B) to play audio files by using the PVS's multimedia capabilities to play audio files received over the non-multimedia PC's modem. This configuration would likewise permit the PC user (C) to record audio through the PVS's built-in microphone and transmit it through the PC's modem as files or streaming audio. Such a configuration would also permit the user of a PC (D) to redirect audio files directly to the PVS while using a standard Web browser program. Finally, a similar

configuration with a modem configured TAD would permit the TAD user to download audio messages to and from the TAD to the PVS.

Bi-directional communication from the PC to the PVS is handled by a communication cable (e.g. 9 pin connector) at the PC and the serial RS232 port on the PVS and controlled by the asynchronous event software controlling input/output from the UART communication interface.

The software at the PC handles the driver for sending/receiving data to/from the PC to the PVS. For sending data, this would be similar to a PC sending data to a fax or printer, and for receiving data, this is similar to a PC receiving data from a scanner. This driver sets all required parameters for the PVS such as type of operation, length and wait for acknowledgment and "End of Transmission". The PC also handles the software to use the PVS as an attachment (peripheral) for receiving multimedia audio messages so that the speaker on the PVS will operate. The PC also handles the software to manage the microphone input of the PVS, and software to integrate with a standard Web Browsers (e.g. Netscape Navigator) to be fully integrated with the software and invoke commands to the PVS accordingly.

The software in the PVS is part of the multitasking operating functions to handle Remote activation of Procedural Calls (RPC) controlled under the asynchronous events software of the PVS.

Although preferred embodiments of the invention have been disclosed for illustrative purposes, those skilled in the art will appreciate that many additions, modifications and substitutions are possible without departing from the scope and spirit of the invention as defined in the accompanying claims.

Highly integrated embedded processor

MIPS
PR31100

Version 1.2

GENERAL DESCRIPTION

PR31100 Processor is a single-chip, low-cost, integrated embedded processor consisting of MIPS R3000 core and system support logic to interface with various types of devices.

PR31100 consists of a MIPS R3000 RISC CPU with 4 KBytes of instruction cache memory and 1 KByte of data cache memory, plus integrated functions for interfacing to numerous system components and external I/O modules. The R3000 RISC CPU is also augmented with a multiply/accumulate module to allow integrated DSP functions, such as a software modem for high-performance standard data and fax protocols. PR31100 also contains multiple DMA channels and a high-performance and flexible Bus Interface Unit (BIU) for providing an efficient means for transferring data between external system memory, cache memory, the CPU core, and external I/O modules. The types of external memory devices supported include dynamic random access memory (DRAM), synchronous dynamic random access memory (SDRAM), static random access memory (SRAM), Flash memory, read-only memory (ROM), and expansion cards (PCMCIA and/or MagicCard). PR31100 also contains a System Interface Module (SIM) containing integrated functions for interfacing to numerous external I/O modules such as liquid crystal displays (LCDs), the UCB1100 (which handles most of the analog functions of the system, including sound and telecom codecs and touchscreen ADC), ISDN/high-speed serial, infrared, wireless peripherals, Magicbus, etc. Lastly, PR31100 contains support for implementation of power management, whereby various PR31100 internal modules and external subsystems can be individually (under software control) powered up and down.

Figure 1 shows an External Block Diagram of PR31100.

FEATURES

* 32-bit R3000 RISC static CMOS CPU
* 4 KByte instruction cache
* 1 KByte data cache
* Multiply/accumulator
* On-chip peripherals with individual power-down
  - Multi-channel DMA controller
  - Bus interface unit
  - Memory controller for ROM, Flash, RAM, DRAM, SDRAM, SRAM, and PCMCIA and/or MagicCard
  - Power management module
  - Video module
  - Real-time clock 32.768KHz reference
  - High-speed serial interface
  - Infrared module
  - Dual-UART
  - SPI bus
* 3.3V supply voltage
* 208-pin LQFP (Low profile quad flat pack)
* 40MHz operation frequency

ORDERING INFORMATION

PART NUMBER	TEMPERATURE RANGE (°C) AND PACKAGE	FREQUENCY (MHz)	DRAWING NUMBER
PR31100ABC	0 to +70, 208-pin Low Profile Quad Flat Pack	40	LQFP208

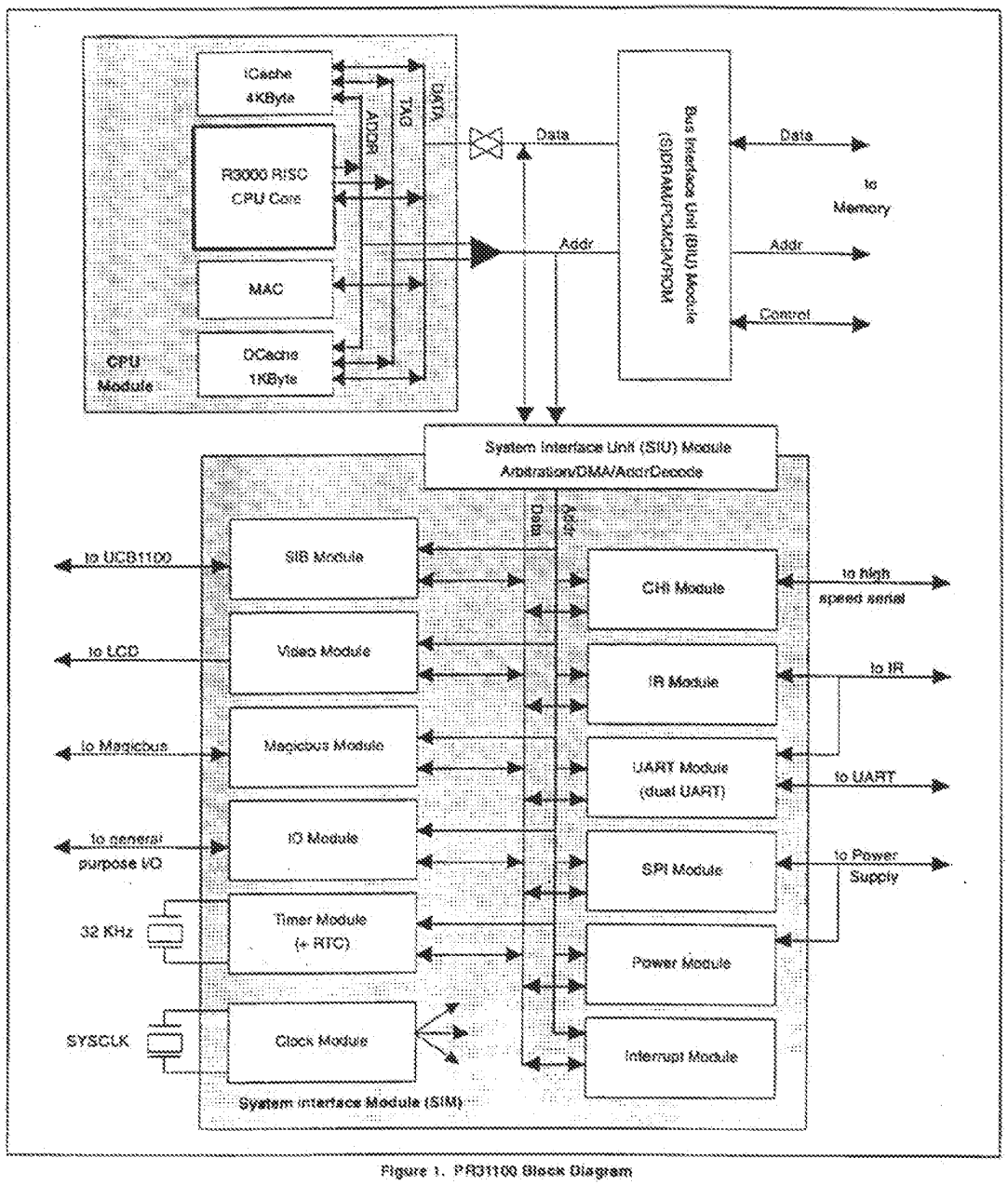

Figure 1. PR31100 Block Diagram

OVERVIEW

Each of the on-chip peripherals consist of:

BIU Module

* System memory and PR31100 Bus Interface Unit (BIU)
  - supports up to 2 banks of physical memory
  - supports self-refreshing DRAM and SDRAM
  - programmable parameters for each bank of DRAM or SDRAM (row/column address configuration, refresh, burst modes, etc.)
* programmable chip select memory access
  - 4 programmable (size, wait states, burst mode control) memory device and general purpose chip selects
    available for system ROM, SRAM, Flash
    available for external port expansion registers
  - 4 programmable (wait states, burst mode control) MagicCard or general purpose chip selects
    available for (future) MagicCard expansion memory
    PR31100 provides the chip select and card detect signals
    supports card insertion/removal timeouts
    MagicCard requires minimal number of unique control/status signals per port
* supports up to 2 identical full PCMCIA ports
  - PR31100 and UCB1100 provide the control signals and accepts the status signals which conform to the PCMCIA version 2.01 standard
  - appropriate connector keying and level-shifting buffers required for 3.3V versus 5V PCMCIA interface implementations

SIU Module

* multi-channel 32-bit DMA controller and System Interface Unit (SIU)
* independent DMA channels for video, Magicbus, SIB to/from UCB1100 audio/telecom codecs, high-speed serial port, IR UART, and general purpose UART
* address decoding for submodules within System Interface Module (SIM)

CPU Module

* R3000 RISC central processing unit core
  - full 32-bit operation (registers, instructions, addresses)
  - 32 general purpose 32-bit registers; 32-bit program counter
  - MIPS RISC Instruction Set Architecture (ISA) supported
* on-chip cache
  - 4 KByte direct-mapped instruction cache (I-cache)
    physical address tag and valid bit per cache line
    programmable burst size
    instruction streaming mode supported
  - 1 KByte data cache (D-cache)
    physical address tag and valid bit per cache line
    programmable burst size
    write-through
  - cache address snoop mode supported for DMA
  - 4-level deep write buffer
* programmable memory protection
  - separate read and write protection control for kernel and user space
  - 8 total protectable regions available, each individually programmable, using breakpoint address, mask, control, and status registers
  - causes address exception on illegal reads or writes
* high-speed multiplier/accumulator
  - on-chip hardware multiplier
  - supports 16x16 or 32x32 multiplier operations, with 64-bit accumulator
  - existing multiply instructions are enhanced and new multiply and add instructions are added to R3000 instruction set to improve the performance of DSP applications
* CPU interface
  - handles data bus, address bus, and control interface between CPU core and rest of PR31100 logic

Clock Module

* PR31100 supports system-wide single crystal configuration, besides the 32 KHz RTC XTAL (reduces cost, power, and board space)
* common crystal rate divided to generate clock for CPU, video, sound, telecom, UARTs, etc.
* external system crystal rate is vendor-dependent
* independent enabling or disabling of individual clocks under software control, for power management

CHI Module

* high-speed serial Concentration Highway Interface (CHI) contains logic for interfacing to external full-duplex serial time-division-multiplexed (TDM) communication peripherals
* supports ISDN line interface chips and other PCM/TDM serial devices
* CHI interface is programmable (number of channels, frame rate, bit rate, etc.) to provide support for a variety of formats
* supports data rates up to 4.096 Mbps
* independent DMA support for CHI receive and transmit

Interrupt Module

* contains logic for individually enabling, reading, and clearing all PR31100 interrupt sources
* interrupts generated from internal PR31100 modules or from edge transitions on external signal pins

IO Module

* contains support for reading and writing the 7 bi-directional general purpose IO pins and the 32 bi-directional multi-function IO pins
* each IO port can generate a separate positive and negative edge interrupt
* independently configurable IO ports allow PR31100 to support a flexible and wide range of system applications and configurations

IR Module

* IR consumer mode
  - allows control of consumer electronic devices such as stereos, TVs, VCRs, etc.
  - programmable pulse parameters
  - external analog LED circuitry
* IRDA communication mode
  - allows communication with other IRDA devices such as FAX machines, copiers, printers, etc.
  - supported by UART module within PR31100
  - external analog receiver preamp and LED circuitry
  - data rate = up to 115 Kbps at 1 meter
* IR FSK communication mode
  - supported by UART module within PR31100
  - external analog IR chip(s) perform frequency modulation to generate the desired IR communication mode protocol
  - data rate = up to 36000 bps at 3 meters
* carrier detect state machine
  - periodically enables IR receiver to check if a valid carrier is present

Magicbus Module

* synchronous, serial 2-wire (clock and data), half-duplex communications protocol
* supports low-cost, low-power peripherals
* supports maximum data rate of 14.75 Mbps
* DMA support for Magicbus receive and transmit

Power Module

* power-down modes for individual internal peripheral modules
* serial (SPI port) power supply control interface supported
* power management state machine has 4 states: RUNNING, DOZING, SLEEP, and COMA

Serial Interconnect Bus (SIB) Module

* PR31100 contains holding and shift registers to support the serial interface to the UCB1100 and/or other optional codec devices
* interface compatible with slave mode 3 of Crystal CS4216 codec
* synchronous, frame-based protocol
* PR31100 always master source of clock and frame frequency and phase; programmable clock frequency
* each SIB frame consists of 128 clock cycles, further divided into 2 subframes or words of 64 bits each (supports up to 2 devices simultaneously)
* independent DMA support for audio receive and transmit, telecom receive and transmit
* supports 8-bit or 16-bit mono telecom formats
* supports 8-bit or 16-bit mono or stereo audio formats
* independently programmable audio and telecom sample rates
* CPU read/write registers for subframe control and status

System Peripheral Interface (SPI) Module

* provides interface to SPI peripherals and devices
* full-duplex, synchronous serial data transfers (data in, data out, and clock signals)
* PR31100 supplies dedicated chip select and interrupt for an SPI interface serial power supply
* 8-bit or 16-bit data word lengths for the SPI interface
* programmable SPI baud rate

Timer Module

* Real Time Clock (RTC) and Timer
* 40-bit counter (30.517 µsec granularity); maximum uninterrupted time = 388.36 days
* 40-bit alarm register (30.517 µsec granularity)
* 16-bit periodic timer (0.868 µsec granularity); maximum timeout = 56.8 msec
* interrupts on alarm, timer, and prior to RTC roll-over

UART Module

* 2 independent full-duplex UARTs
* programmable baud rate generator
* UART-A port used for serial control interface to external IR module
* UART-B port used for general purpose serial control interface
* UART-A and UART-B DMA support for receive and transmit

Video Module

* bit-mapped graphics
* supports monochrome, grey scale, or color modes
* time-based dithering algorithm for grey scale and color modes
* supports multiple screen sizes
* supports split and non-split displays
* variable size and relocatable video buffer
* DMA support for fetching image data from video buffer

Figure 2 shows a typical system block diagram consisting of PR31100 and UCB1100 for a total system solution.

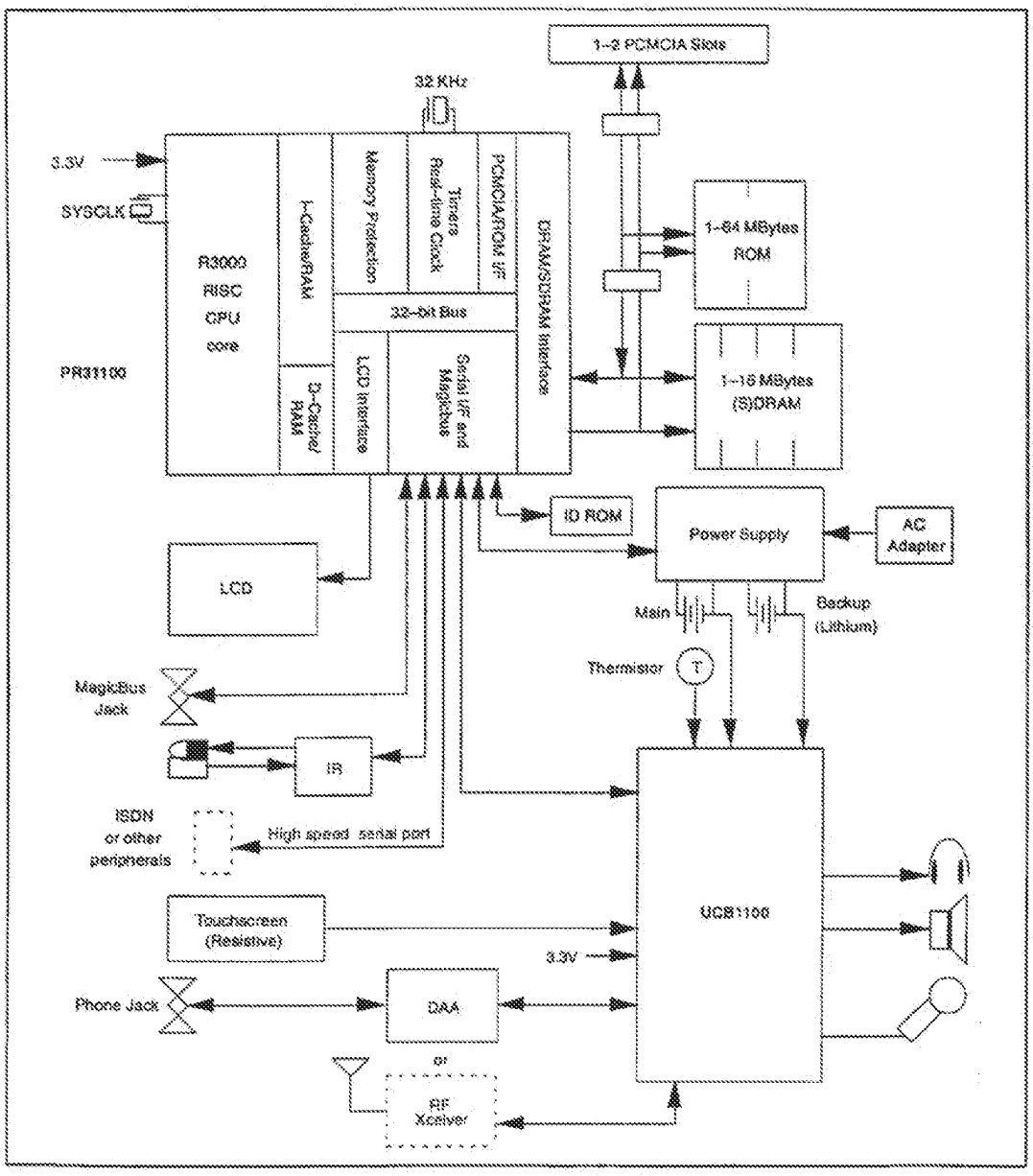

Figure 2. System Block Diagram

1998 Aug 07

Advanced modem/audio analog front-end UCB1100

Version 1.2

GENERAL DESCRIPTION

The UCB1100 is a single chip, integrated mixed signal audio and telecom codec. The single channel audio codec is designed for direct connection of a microphone and speaker. The built-in telecom codec can directly be connected to a DAA and supports high speed modem protocols. The incorporated 10 bit analogue to digital converter and the touch screen interface provides complete control and readout of a connected 4 wire resistive touch screen. The 10 additional general purpose I/O pins provides programmable inputs and/or outputs to the system.

The UCB1100 has a serial interface bus (SIB) intended to communicate to the system controller. Both the codec input and output data and the control register data is multiplexed on this SIB interface.

APPLICATIONS

- Personal Intelligent Communicators (PIC)/ Personal Digital Assistants (PDA)
- Screen phones
- Smart Phone and smart Fax
- Intelligent Communicators

KEY FEATURES

- 48-pin LQFP (SOT313-2) small body SMD package and low external component count result in minimal PCB space requirement.
- A 12-bit sigma delta audio codec with programmable sample rate, input and output voltage levels, capable of connecting directly to speaker and microphone, including digitally controlled mute, loopback and clip detection functions
- A 14-bit sigma delta telecom codec with programmable sample rate, including digitally controlled input voltage level, mute, loopback and clip detection functions. The telecom codec is intended for direct connection to a DAA (digital access arrangement) and includes a built-in sidetone suppression circuit.
- A complete 4 wire resistive touch screen interface circuit supporting position, pressure and plate resistance measurements.
- A 10-bit successive approximation ADC with internal track and hold circuit and analogue multiplier for touch screen readout and monitoring of four external high voltage (7.5V) analogue voltages.
- A high speed, 4 wire serial interface data bus (SIB) for communication to system controller.
- A 3.3V supply voltage and built in power saving modes make the UCB1100 optimal for portable and battery powered applications.

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1.0 FUNCTIONAL BLOCK DIAGRAM

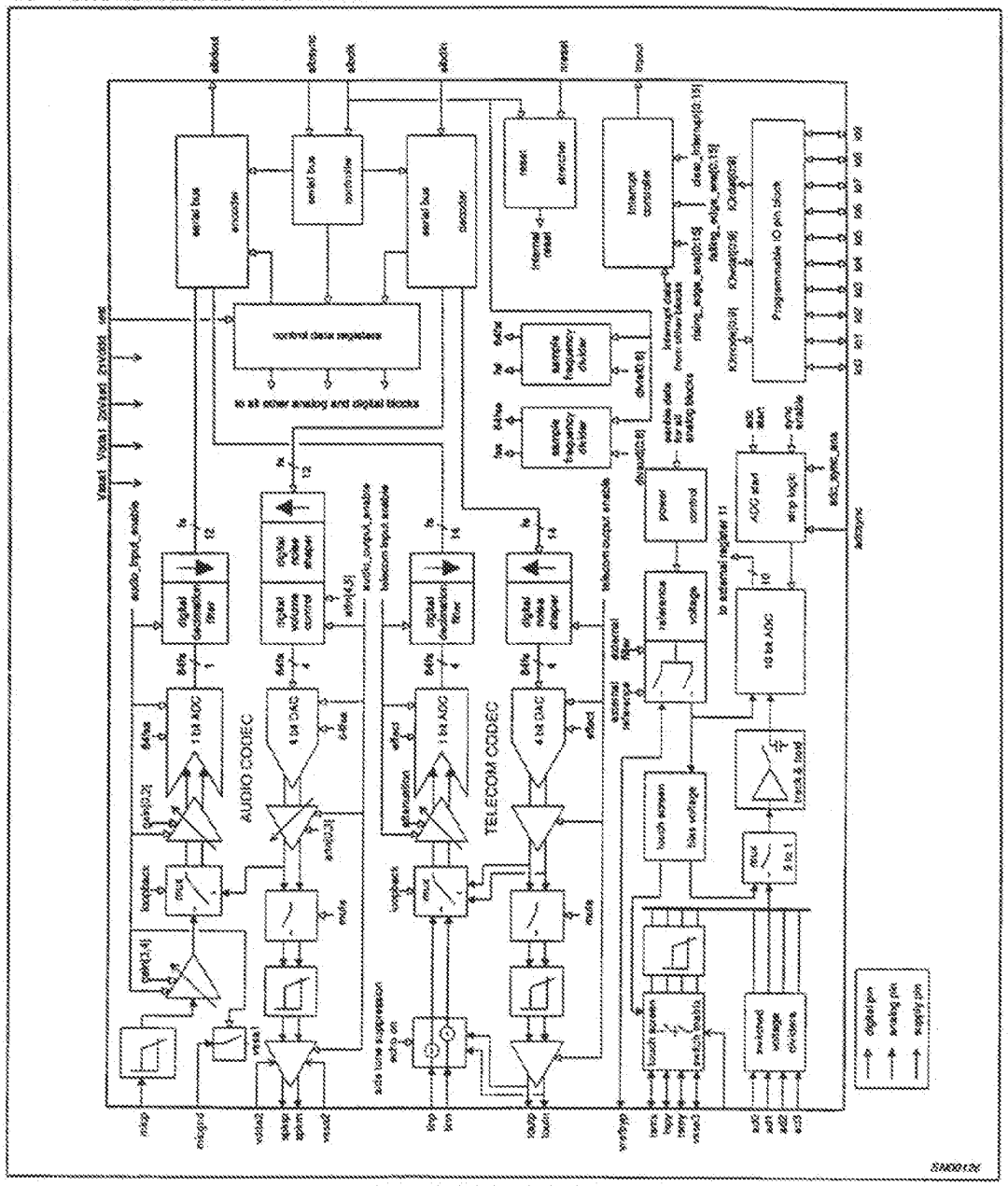


Figure 1. Block Diagram of the UCB1100

Eden OS V2.0 Overview

EROS (Eden Real-time Operating System) is a full-featured operating system designed from scratch to be:

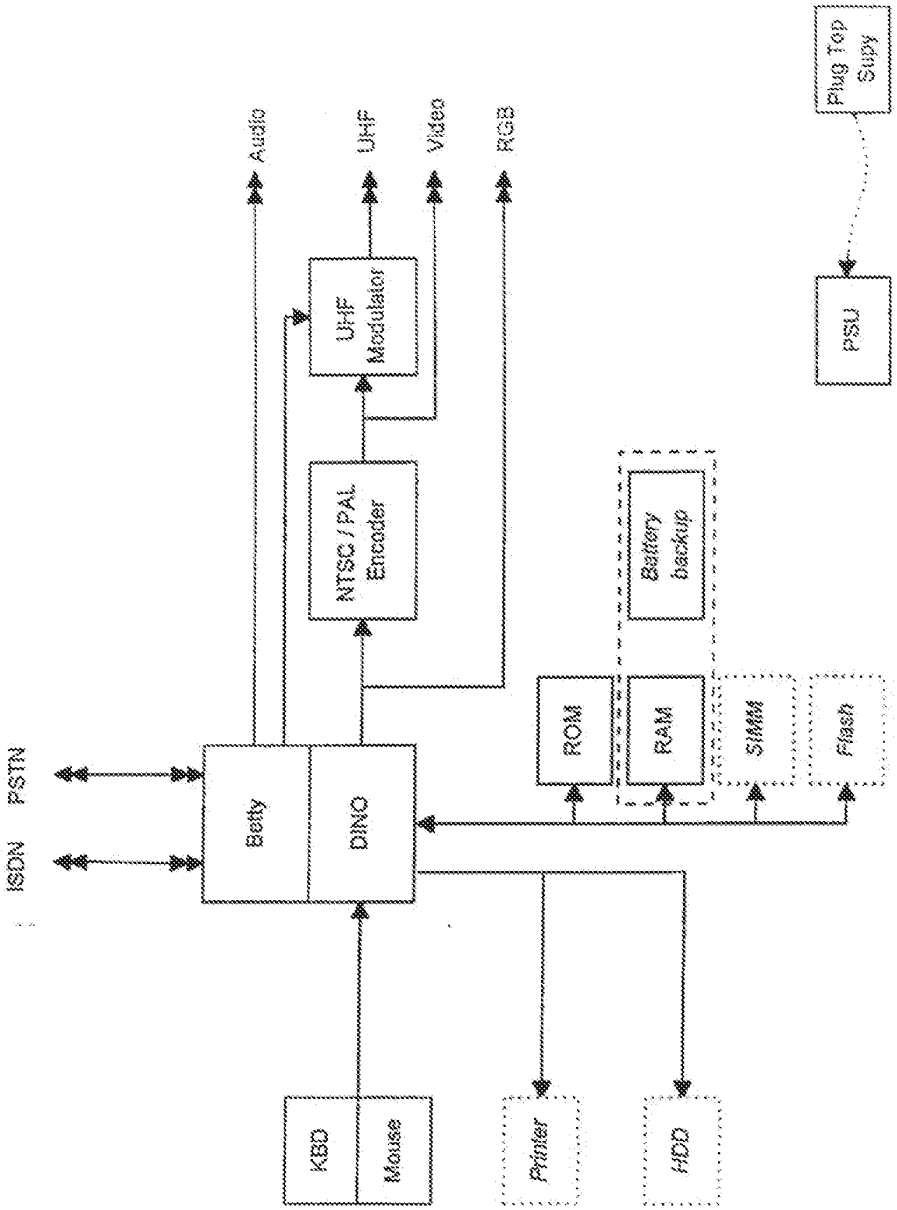
Compact: the operating system consumes resources in the form of ROM and RAM in the product, these resources add to the BOM costs of the product and any space occupied by the OS must be justified. EROS is designed to be small. The modularity is also a feature which supports the compactness of the operating system; where individual products do not need a feature it can be omitted or replaced by some subset, leaving more room for the visible components that add features and thus perceived value.

Open: an open OS will be more likely to attract 3rd party developers looking to design software products for sale, so allowing more value in the form of available features to be added to products based on the OS. EROS has a published API and a PC-based SDK which supports the development of applications in a readily available development platform.

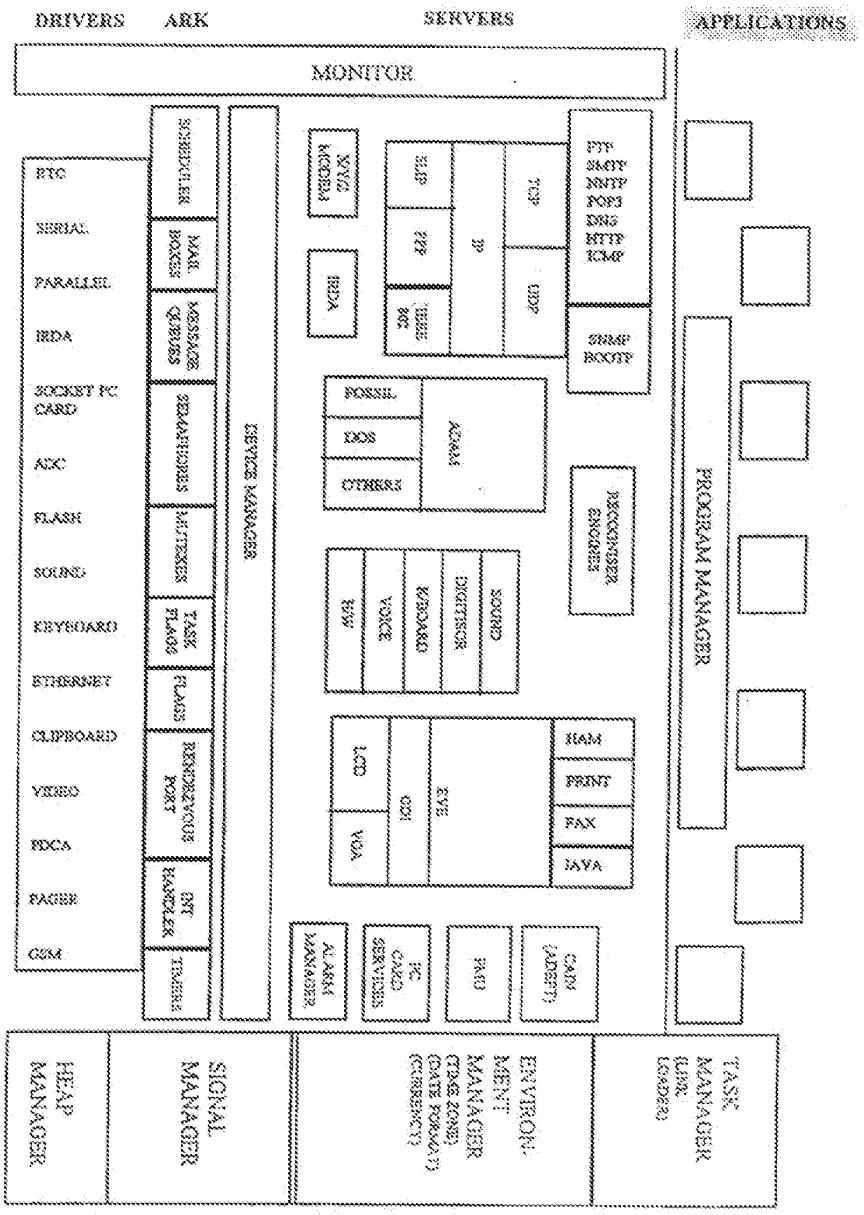
Modular: Each component individually and in many cases sub-components may be omitted or replaced without difficulty where their functionality is not needed or has to be changed for particular products.

Portable: 99% written in ANSI C, porting to a new processor and/or tailoring to a specific product design is sufficiently simple and predictable for this to be completely acceptable within a product development lifecycle. EROS offers the same application interface on each platform, allowing applications to run on any EROS platform. EROS application development is carried out on a PC SDK incorporating a subset of the target OS. In the medium term, Eden will adopt the GNU toolset for the development of EROS itself and support this toolset for all targets.

The overall structure of EROS is shown in the enclosed slide.



SUBSTITUTE SHEET (RULE 26)



SUBSTITUTE SHEET (RULE 26)

The components of EROS are:

Advanced Real-time Kernel (ARK): This is the core of EROS; based on the ITRON 3 specification and extended, this supports pre-emptive, prioritised multitasking, message queues, semaphores, rendezvous ports, event flags and interrupt handling.

Virtual Memory Management (VMM): Depending on the level of support available within the chosen platform, this offers protection against faulty applications, mapping of virtual memory onto real memory and supplies the dynamic memory handling (malloc() and free()).

Eden's Visual Environment (EVE): This offers an object oriented means of building up a GUI. EVE implements a core set of simple objects which do not impose a 'look and feel' on the OEM and application provider. EVE also supports a limited number of compound objects (as the name implies, constructed by joining simple objects together). Application writers can easily generate their own compound objects to implement the GUI they design.

Advanced Database Access Module (ADAM): This is a traditional database implementation, offering a record structure, insert, delete, search, data integrity checks and record locking. It differs from other database implementations by being designed to operate in an embedded environment.

Clipboard Application Interface (CAIN): The EROS clipboard supports copy, cut and paste and drag and drop. It does this by allowing applications to set-up self-describing data items which can then be passed between applications which have no knowledge of each other.

Generic Object Data System (GODS): EROS' file system is built as a number of layers, allowing multiple filing systems to be supported (typically a DOS-compatible filing system on PC-cards and a Flash-oriented for built in non-volatile storage) without the applications being aware of such details.

PC card services: EROS supports SRAM, Flash and ATA drives as storage and data exchange devices. The PC card services offer a key set of facilities allowing support for specific card types to be developed as necessary.

Device Handling: One of the features of embedded systems is that they often have non-standard devices and PC-cards supply loadable devices which may not be known at the time the system is first built. EROS' Device Manager supports the dynamic addition of device drivers and allows handler tasks to establish a connection to whichever is the most appropriate driver.

TCP/IP: EROS supports TCP/IP, SLIP and PPP. A number of higher levels protocols are supported as standard within the OS including UDP, FTP, SMTP,

POP3, and HTTP. Other protocols are supported on a specific product or implementation basis.

Other features supported by EROS include:

Linking and Loading: Embedded systems are typically provided as a single ROM containing the operating system and all the applications. The addition of new applications and the correction of those supplied in ROM is difficult. Flash memory is used, but the mechanisms for upgrade and addition are usually clumsy. EROS makes use of a Dynamic Linker Loader (ELF) to overcome much of this difficulty. EROS itself and built-in applications are installed in ROM but their external linkage symbols are loaded into RAM during start-up. Patches can be installed so that later in the start-up sequence some of these symbols are changed to point to new code, thus avoiding the obselete areas of code in ROM. Similarly, applications which are loaded dynamically are linked to this symbol table and so use the correct built-in and patched code.

Localisation: The OS structure supports OEMs and application developers in providing a framework within which applications can be constructed which are easily ported from language to language and from country to country, with little or ideally no change to software.

Power Management: Embedded applications are often battery powered and hence power use is critical. While the degree of support offered by particular processors and products will vary, EROS supports an API which allows applications to be contructed in a power-sensitive manner and supports the specific attributes of particular platforms in an appropriate manner.

Application Interface: Any application program interacts with EROS through the Application Program Interface (API). At the programming level these appear as function calls. These functions are primarily in the form of 'helpers' which execute as part of the application task and exchange information with one or more EROS tasks before returning to the application code. Responses and other input from EROS are provided by messages sent to the task's input queue or, for so-called 'blocking' calls, by the helper function using a 'rendezvous' for the exchange. Application tasks are usually structured as a single message handling loop which takes messages from a message queue.

Development Tools: EROS includes a set of tools to enable applications to be developed for EROS platforms. Such applications will usually be platform (processor) and product independent, subject to appropriate devices being available to handle the interfaces. The toolset comprises:

- a sub-set of EROS which executes in DOS on a PC and provides an environment in which most applications can be developed and tested. This requires that the developer uses the Borland 4.5 development system.
- cross-compilers, linker and host-target debuggers are specific to the target platform; Eden will recommend these on a platform specific basis but in the medium term will primarily suggest and support the GNU tools.
- a terminal/target monitor program which allows internal details of EROS to be examined
- font and icon editors
- full linking instructions are provided to allow OEMs to build ROM images which include EROS and built-in applications
- full construction details are supplied to allow a patch file to be created
- full instructions are supplied to allow loadable programs to be produced
- EROS for the target platform is supplied in the form of shared libraries making up the 'helper' functions, object code for the EROS tasks and an initial startup sequence to be modified by or on behalf of the OEM.

*

Target hardware and product-specific issues: A very large proportion of EROS is hardware and product independent, requiring simply re-compilation to run on a new platform. Thus the amount of effort required to tailor EROS to a specific processor and product configuration is relatively small.

The areas usually requiring rework on a per-platform (i.e. per-processor) basis are:

* basic serial port driving and monitor production.
* kernel mapping at the lowest level
* core start-up sequence
* memory mapping to use the target architecture

The primary areas where such work is usually necessary on a per-product basis are:

* keyboard, screen and digitiser handling: typically each product uses different hardware in these areas, EROS offers a simple interface to program to and Eden will do this work if required.
* memory configuration and start-up: EROS supplies a skeleton start-up sequence (above) for each target platform; extending this is a product-specific task.
* Non-standard devices: EROS has a device handling architecture which supports the addition of new device handlers.
* PC-card interfacing: Eden generally has to rework the lower levels of PCMCIA card handling to use the particular controller selected.
* The development version of EROS on the PC requires changes to match the screen size of the target product, to support GUI development.

Claims:

1. A portable apparatus for communication of audio signals in analog and digital form and for storage of the same, comprising:

digital storage means;

a communication connection to a communication channel;

a telecommunications interface having a communications input and output coupled to said communication connection and a digital input and output;

an analog-to-digital converter having an output coupled to said storage means; and

a controller coupled to said storage means and said telecommunications interface digital input and output and comprising:

means for detecting whether a signal on said communication connection is an analog or digital audio signal;

routing means controlled by said means for detecting and coupled to said telecommunications interface, said storage means and said analog-to-digital converter, upon said detecting means detecting a digital signal said routing means causing the digital output of said telecommunications interface to be coupled to said storage means, upon said detecting means detecting an analog signal said routing means causing said telecommunications interface to bypass the signal on said connection and coupling the

same to said analog-to-digital converter for subsequent storage in said storage means.

3. The apparatus of Claim 1 further comprising the coupling to said storage means being effected through a device which compresses the signal prior to storage.

4. The apparatus of Claim 1, said controller further comprising:

means for assembling digital messages stored in said storage means into a packetized data stream containing data and control bits; and

means for coupling said packetized data stream to the digital input of said telecommunications interface for transmission over said communication channel.

5. An apparatus as in claim 3, wherein said controller causes said telecommunications interface to transmit said packetized data stream at a rate that is substantially higher than the transmission rate of digitized voice.

6. The apparatus of claim 1 further comprising a connection to a digital communications channel and an interface therebetween and said controller.

7. The apparatus of claim 1 wherein said digital communication channel and the corresponding interface are designed to handle infrared communications.

8. The apparatus of claim 1 further comprising a bar code reader coupled to said controller.

9. The apparatus of claim 1 further comprising an LCD touchscreen coupled to said controller.

10. An apparatus for communication of audio signals in analog and digital form and for storage of the same, comprising:

digital storage means;

a connection to a communication channel;

a telecommunications interface having an analog input and output coupled to said connection and a digital input and output; and

a controller coupled to said storage means and said telecommunications interface and comprising;

means for assembling digital messages stored in said storage means into a packetized data stream containing data and control bits; and

means for coupling said packetized data stream to the digital input of said telecommunications interface for transmission over said communication channel.

11. An apparatus as in claim 9 wherein said controller causes said telecommunications interface to transmit said packetized data stream at a rate that is substantially higher than the transmission rate of digitized voice.

12. An apparatus as in claim 9 wherein said controller includes a module for detecting receipt on the communication channel of a message in HTML language and permitting two-way communication in said language.

13. An apparatus as in claim 9 wherein said controller includes a module for detecting receipt on the communication channel of a message in FTP language and permitting two-way communication in said language.

14. An apparatus as in claim 9 wherein said controller further comprises a speech synthesizer responsive to receipt of text information over said communication channel to produce an audible message simulating said text information being spoken by a human voice.

15. An apparatus as in claim 9 wherein said controller further comprises a database management module for receiving information about stored data and permitting selective retrieval of said information.

16. A method for communication of audio signals in analog and digital form over a communication channel and for storage of the same, comprising the steps of:

detecting whether a signal on said channel is an analog or digital audio signal;

upon detecting a digital signal on said channel, storing in a digital storage means the output of a

telecommunications interface of the type having an input coupled to said channel and a digital output;

upon detecting an analog signal on said channel, converting the same from analog to digital form and storing the converted signal in a digital storage means.

17. The method of Claim 15 wherein prior to either of said storing steps said signal is compressed.

18. The method of Claim 15 performed with a telecommunications interface of the type having an analog input and output coupled to said channel and a digital input and output and further comprising the steps of:

assembling digital messages stored in said storage means into a packetized data stream containing data and control bits; and

coupling said packetized data stream to the digital input of said modem for transmission over said communication channel at a rate that is substantially higher than the transmission rate of digitized voice.

19. A method for communication of audio signals in analog and digital form over a communication channel and for storage of the same, said method being performed with a telecommunications interface of the type having an analog input and output coupled to said channel and a digital input and output and comprising the steps of:

assembling digital messages stored in a storage means into a packetized data stream containing data and control bits; and

coupling said packetized data stream to the digital input of said modem for transmission over said communication channel at a rate that is substantially higher than the transmission rate of digitized voice.

20. A portable device which permits the user to record, edit, play and review voice messages and other audio material which may be received from, and subsequently transmitted to, a remote apparatus through a communication link, comprising:

a receptacle for a power source;

integrated circuitry for localized recording, editing, storage and playback of audio signals powered from said receptacle;

non-volatile storage means, access to which is controlled by said integrated circuitry;

a built-in speaker and microphone coupled with said integrated circuitry for audible playback and local input, respectively, of audio;

a telecommunications interface chip set coupled with said integrated circuitry;

a modular telephone jack coupled to said modem chip set;

the integrated circuitry operating the device so as to transmit and receive audio signals at a rate substantially faster than originally recorded.

21. A device in accordance with claim 19 wherein said integrated circuitry includes a module that is operative to permit distinguishing between analog and digital signals received on the communication link, the analog signals being presented to said integrated circuitry without being processed by said telecommunications interface chip.

22. A device in accordance with claim 19 wherein said integrated circuitry includes a module permitting communication via said communication link over the internet utilizing at least one protocol available thereover.

23. A device in accordance with claim 19 wherein said integrated circuitry includes a module that recognizes a signal received over the communication link as text and converts the signal to a signal emulating the sound of a human voice speaking the text.

FIG. 1

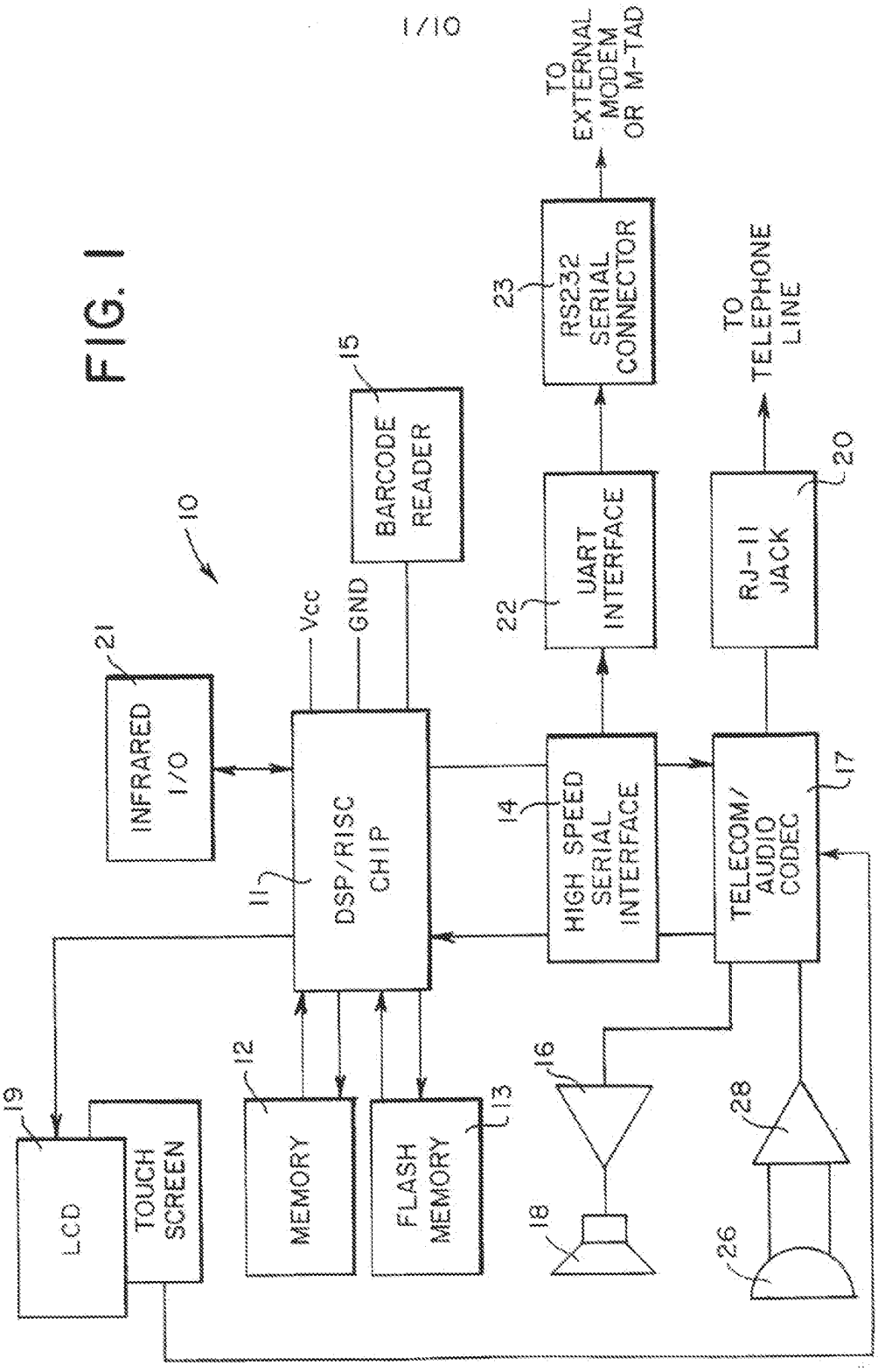


FIG. 2a

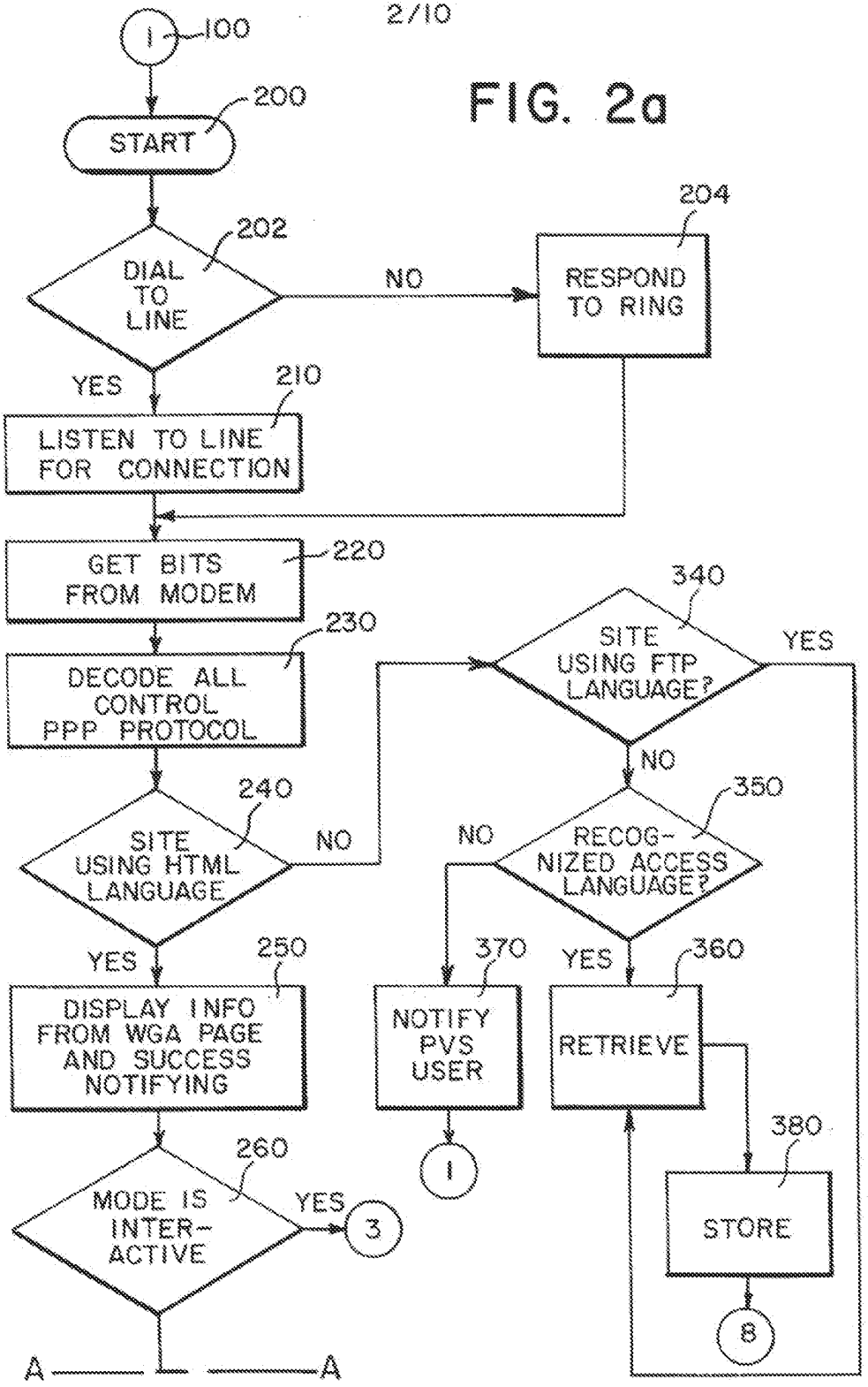

1
100
START
200
DIAL TO LINE
202
NO
RESPOND TO RING
204
YES
LISTEN TO LINE FOR CONNECTION
210
GET BITS FROM MODEM
220
DECODE ALL CONTROL PPP PROTOCOL
230
SITE USING HTML LANGUAGE
240
NO
YES
DISPLAY INFO FROM WGA PAGE AND SUCCESS NOTIFYING
250
MODE IS INTER-ACTIVE
260
YES
3
A
A
SITE USING FTP LANGUAGE?
340
YES
NO
RECOG-NIZED ACCESS LANGUAGE?
350
NO
YES
NOTIFY PVS USER
370
1
RETRIEVE
360
STORE
380
8

FIG. 2b

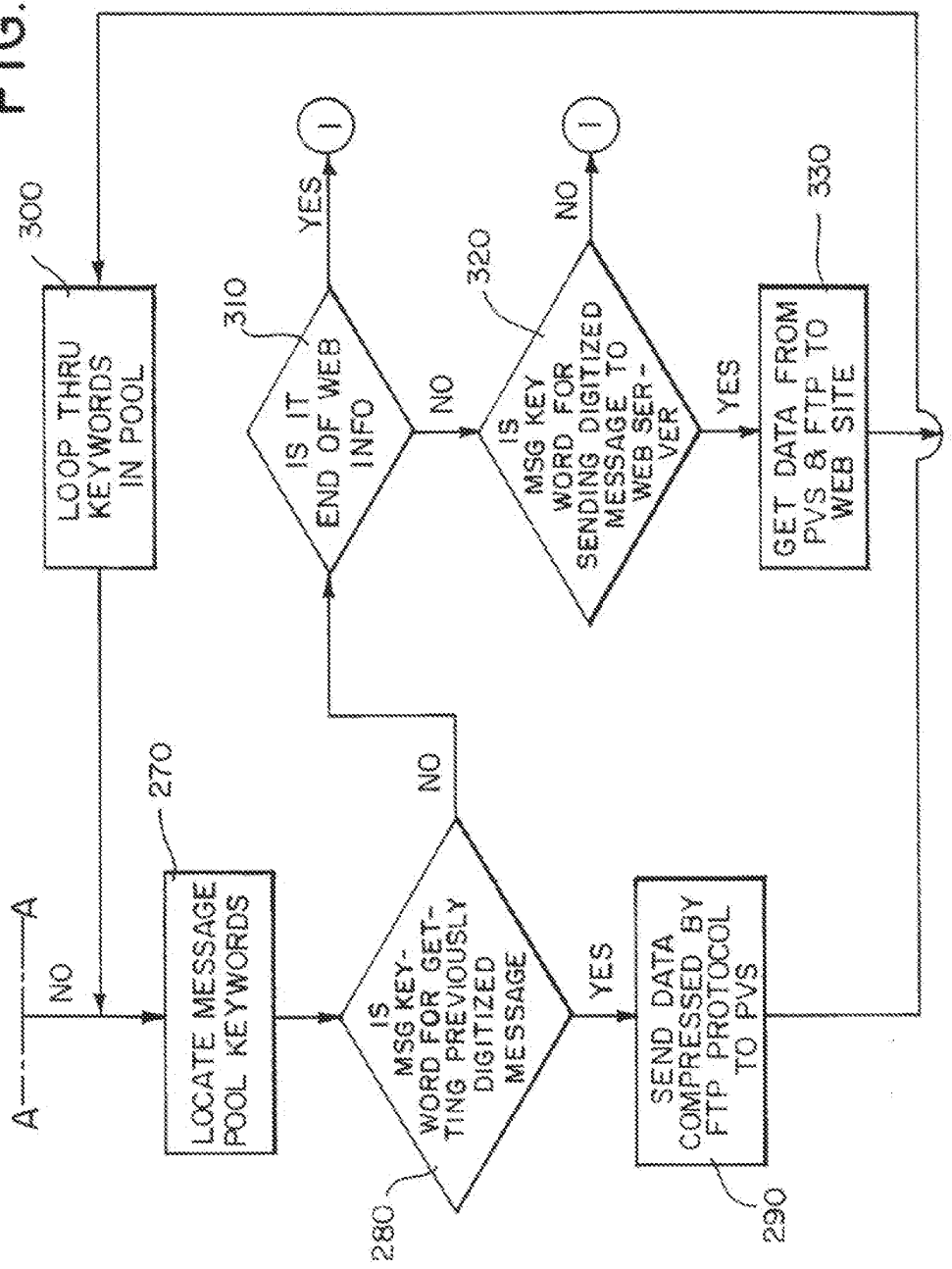


FIG. 2c

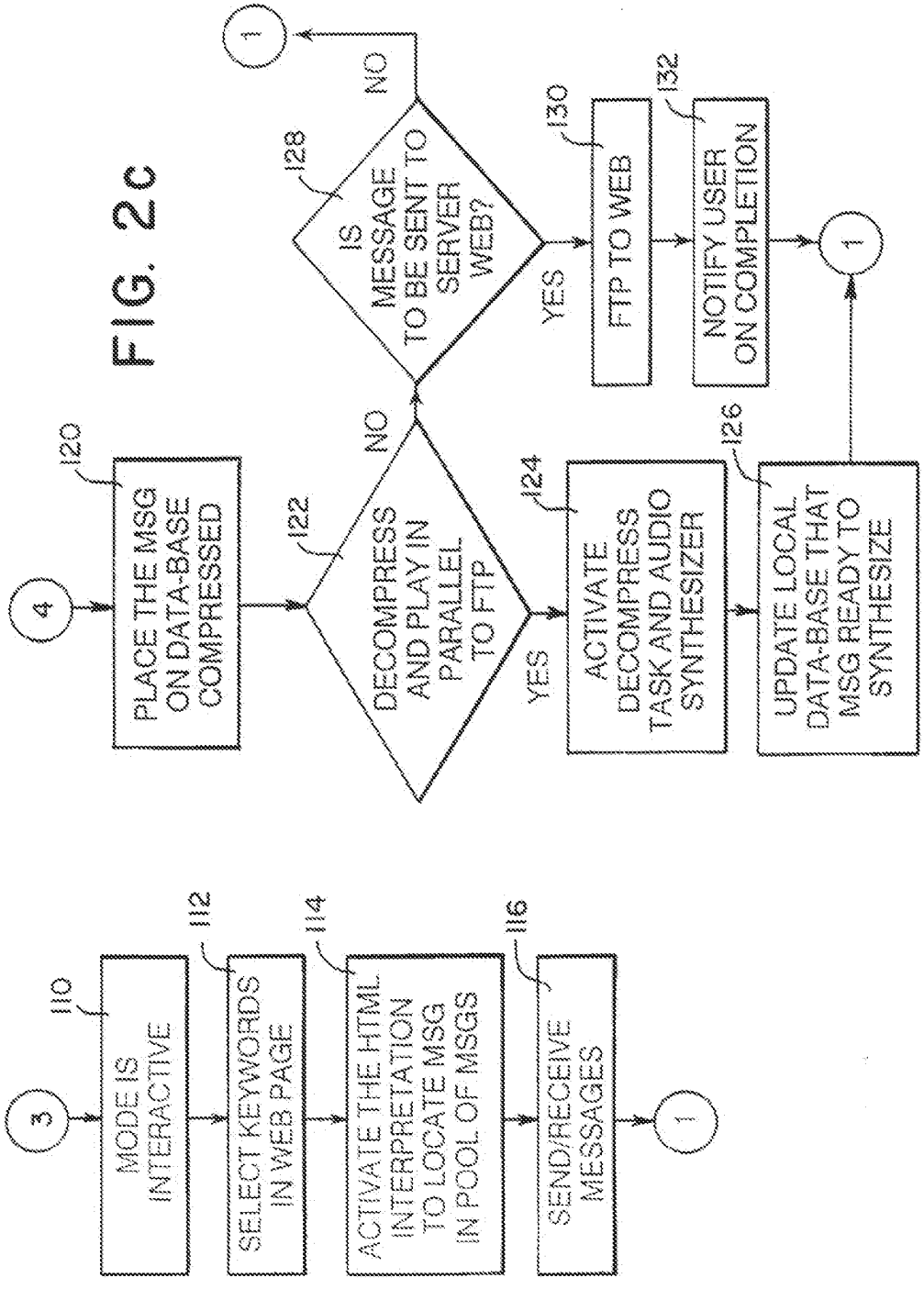


FIG. 3a

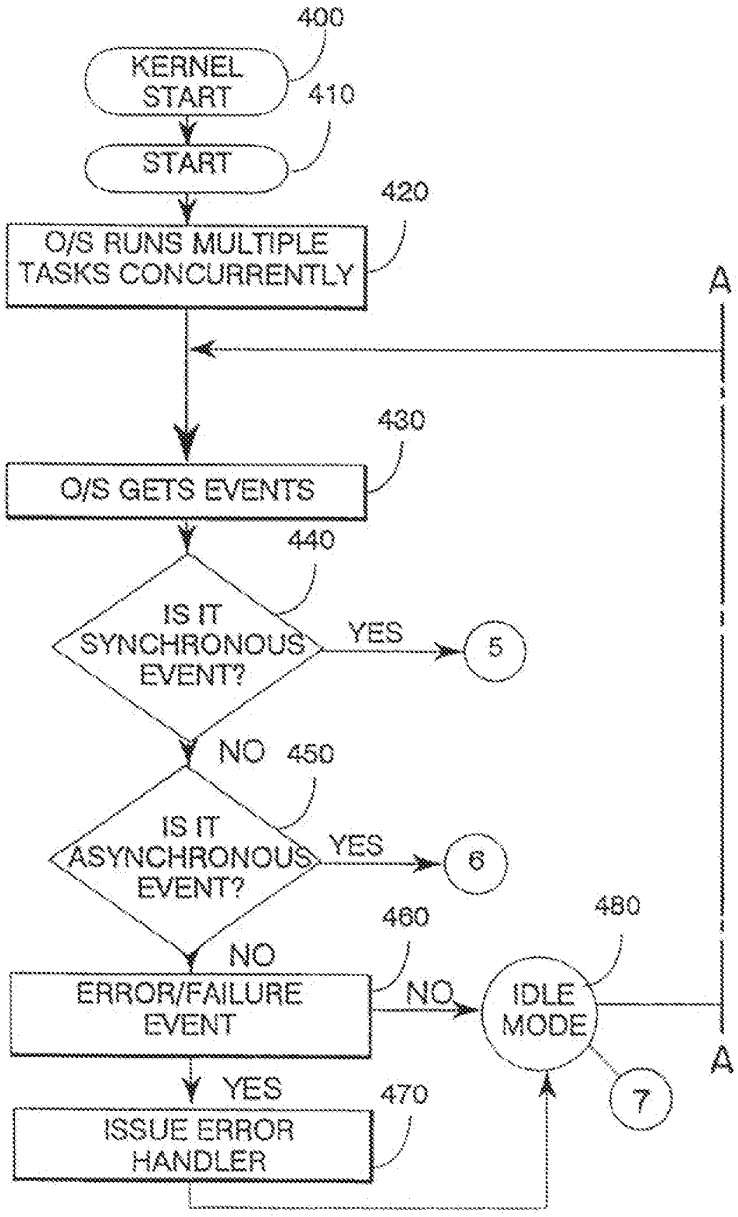


FIG. 3b

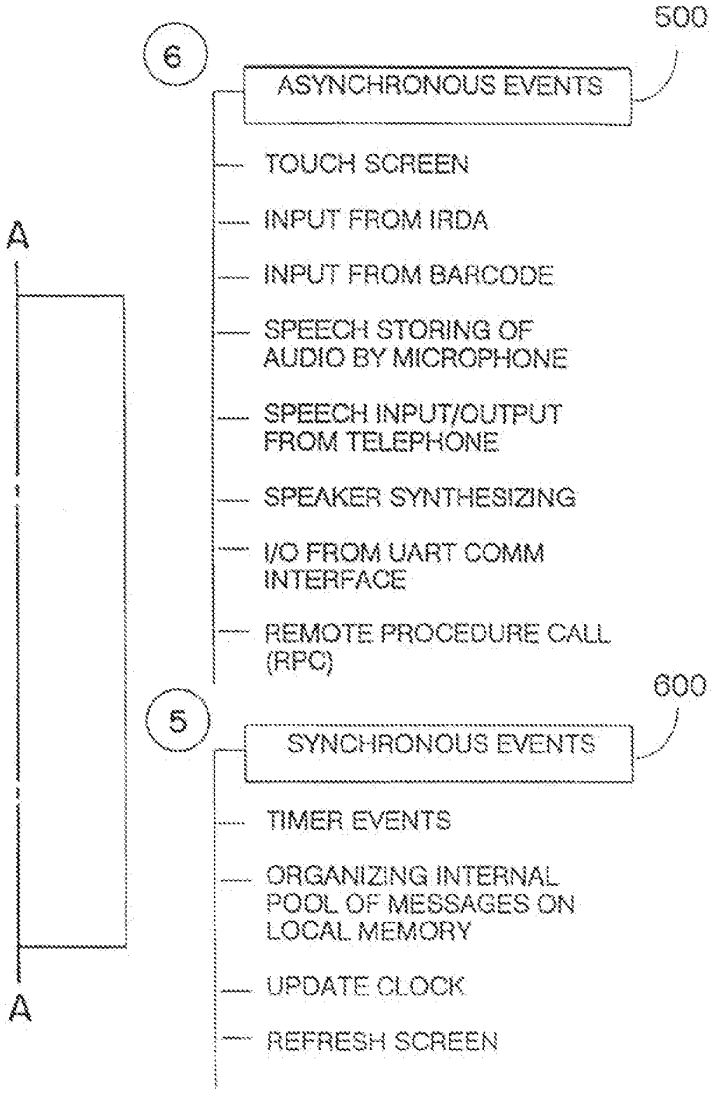


FIG. 4

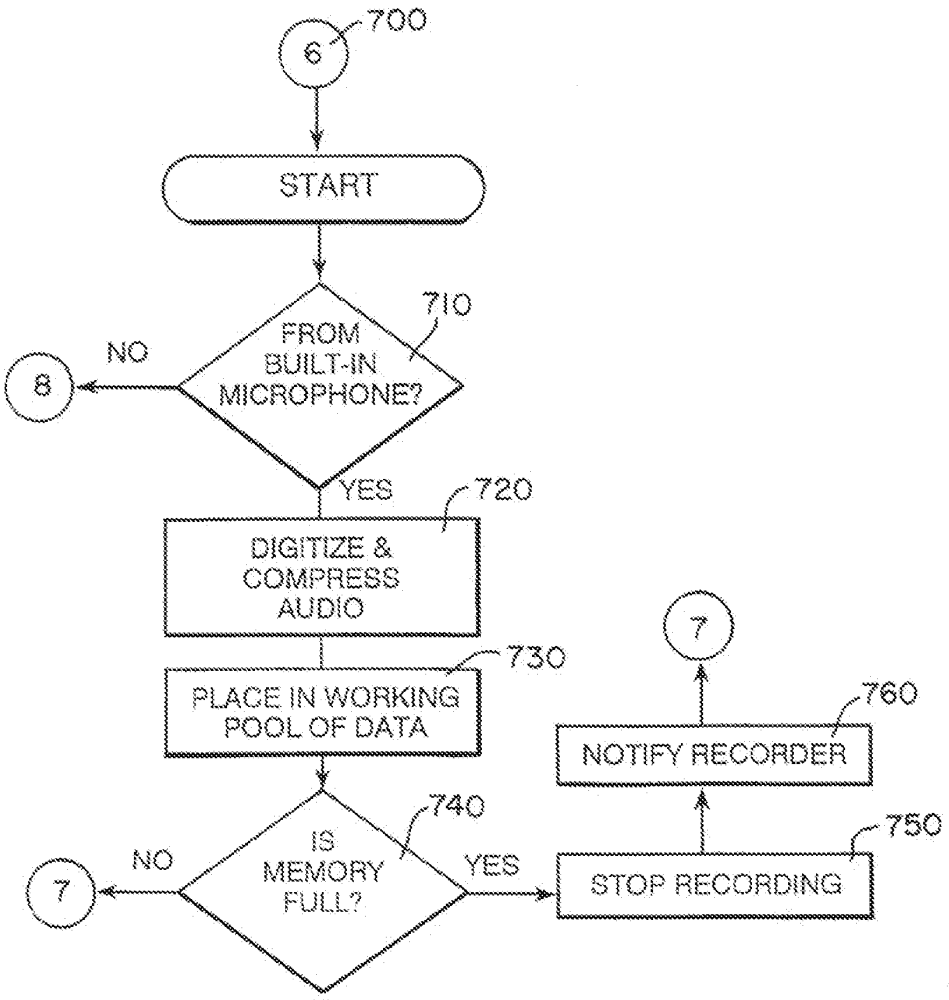

700
6
START
710
FROM BUILT-IN MICROPHONE?
NO
8
YES
720
DIGITIZE & COMPRESS AUDIO
730
PLACE IN WORKING POOL OF DATA
740
IS MEMORY FULL?
NO
7
YES
7
760
NOTIFY RECORDER
750
STOP RECORDING

FIG. 5

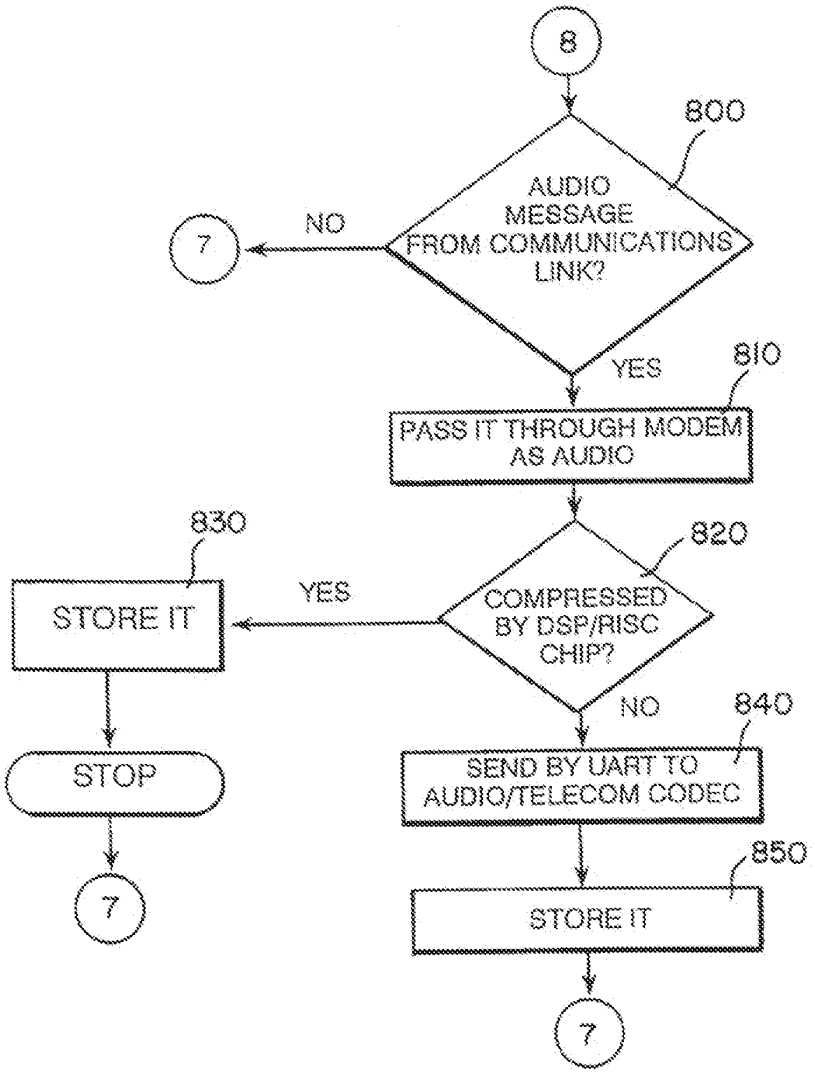


FIG. 6

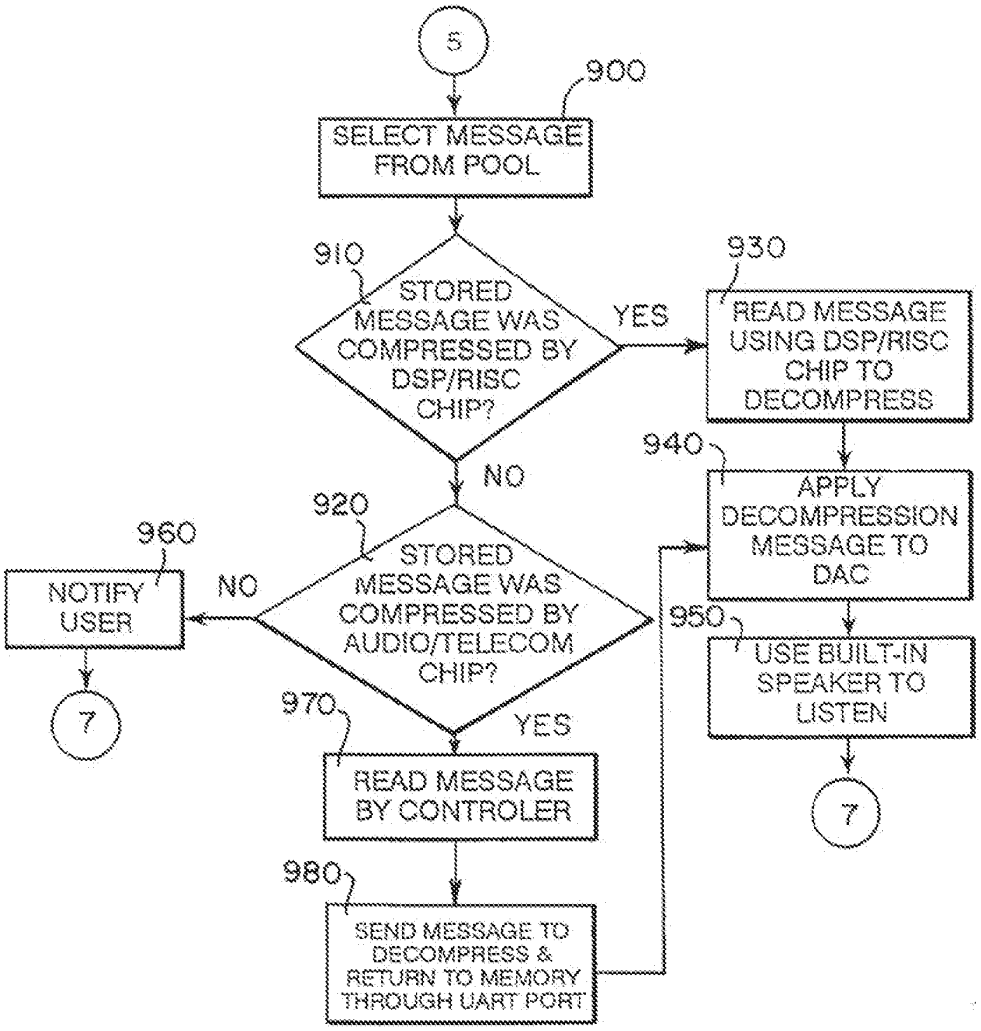
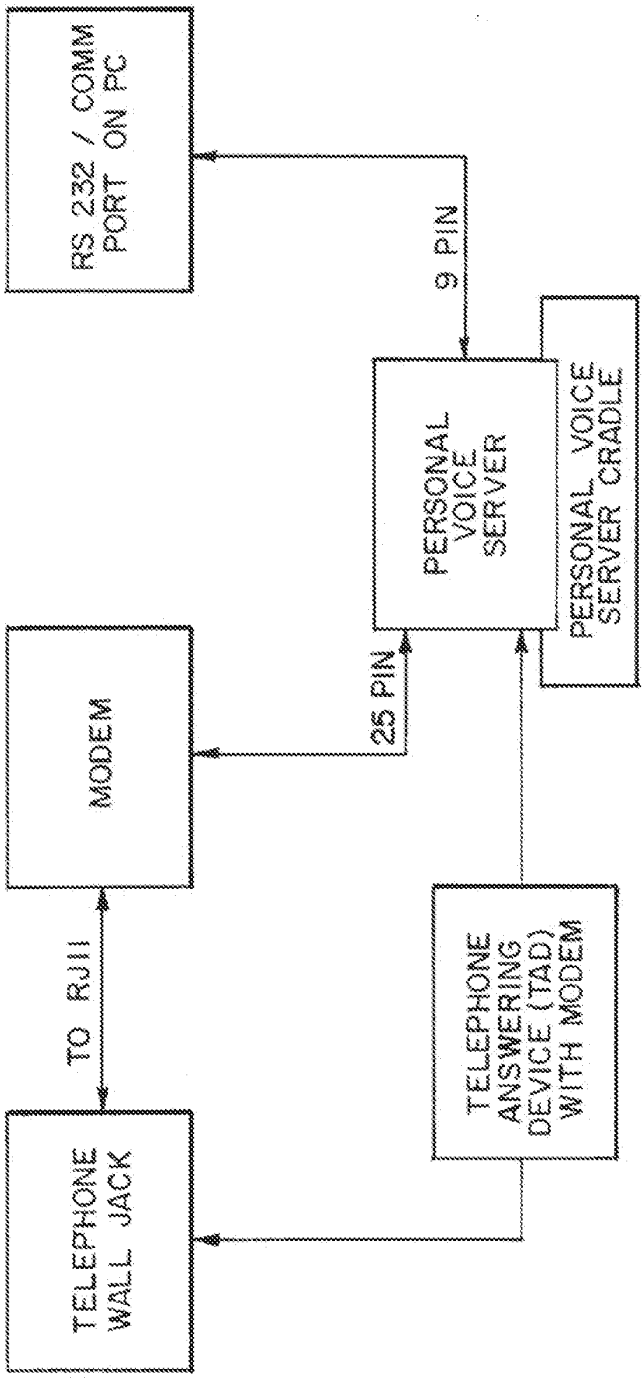


FIG. 7


RS 232 / COMM PORT ON PC
9 PIN
PERSONAL VOICE SERVER
PERSONAL VOICE SERVER CRADLE
MODEM
25 PIN
TO RJ11
TELEPHONE WALL JACK
TELEPHONE ANSWERING DEVICE (TAD) WITH MODEM

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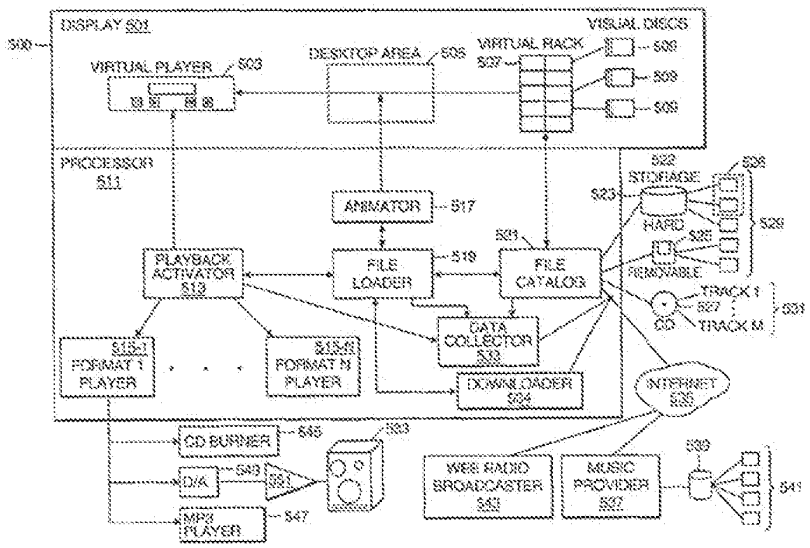
(54) Title: UNIVERSAL MUSIC PLAYER

(57) Abstract

A universal music player system includes a virtual player which has the appearance and functionality of a real media player. One or more media object displays display media objects which are owned by or accessible to a user. An animator visually emulates loading a media object from the virtual rack onto the virtual media player responsive to a user command. A loader loads a media object file corresponding to the selected media object in response to the user command. A playback activator selects playback software appropriate for the loaded file's format and for activating the selected playback software to play the loaded media object file. Each media object file is represented by an icon which is unrelated to where the media object file is stored. The appearance of icons is independent of where the associated media object files are located. When a user clicks on a media object, the media object is visually loaded by the animator onto a media object holder in the virtual player. After the media object is loaded onto the media object holder, the media object holder closes and the associated media object file automatically begins to play. A virtual rack holds media objects owned by or accessible to a current user, and displays media objects according to a selected category. A data collector collects statistical data about a user's use, including but not limited to, a list of purchased music, a list of sampled selections downloaded from a provider, a history of the user's playback of any of media or selections, or a history of selections received via Web radio.



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UNIVERSAL MUSIC PLAYER

BACKGROUND OF THE INVENTION

Songs and compact disc (CD) content are typically available for downloading over the Internet for as little as a dollar per song. It takes only minutes to download an entire album. To play such files, the user typically uses a special software program, i.e., a player, that is capable of understanding the particular format and playing it on speakers connected to the computer. Typical players such as WinAmp and LiquidAudio only read a single format, so that a user must have several players to play the various formats in which a music file may be downloaded.

The standard that constitutes the Compact-Disc Digital Audio (CD-DA), also called the Red-Book, has been designed by Sony and Philips to contain only audio tracks. A maximum of 99 tracks or 74 minutes and 33 seconds can be printed on a spiral going from the center to the edge of the CD. The disc itself is divided into three areas: Lead In, Program, and Lead Out.

A table of contents, situated in the Lead In area, specifies only the starting place of each track in minutes, seconds and blocks. Each block contains 1/75 of a second of audio data. The Program area contains the audio data of each track. The data is made of two channels of audio stream. Each stream is sampled at a frequency of 44.1KHz with 16-bit accuracy. The Lead Out area contains only blank sectors (90 seconds of silence).

Contrary to other standards, such as the Yellow-book (CD-ROM), there is no additional information such as text, image, or identification stored on the CD.

SUMMARY OF THE INVENTION

The present invention provides a front-end consumer interface. It merges all of a user's music and music-related activities into a single unified user interface, which is based on real-world metaphors, providing a fun, inviting and easy-to-use multimedia music experience. As a desktop-based portal, the present invention establishes a two-way conversation between the user and a music supplier by exploiting the Internet and augmenting the user's choices.

An embodiment of the present invention provides playback for common audio formats such as MP3, Liquid Audio, WMA and WAV, and allows the user to organize his collection of downloaded music in a manner not previously available.

The present invention improves on the prior art, first by providing "color" information., i.e., the printed information that typically accompanies a CD, which can include cover art, pictures and liner notes.

Once the content of a CD, or other audio content, has been downloaded from a music supplier or other source or copied digitally by the user, it is saved, as a "virtual CD," on some storage means, such as a hard disk, or a removable disk, for example, a Zip drive made by Iomega Corporation. After receiving many such virtual CDs, users tend to forget exactly where a specific virtual CD has been stored, i.e., in what folder, on what disk. The present invention maintains this information and knows where to find a downloaded CD wherever it is stored. A user interface is provided which aids user access, so that the user never has to search for the CD, so far as retrieving and playing the CD are concerned.

The present invention, having found the desired CD, can play the music back through any appropriate player, or through its own player.

For example, a user may visit a Web site which offers downloadable music, e.g., CD content, although the present invention is easily extendable to other formats including, but not limited to, video formats such as DVDs, and other audio formats as well. The user selects some music such as an MP3 file, by clicking on the music and selecting the desired storage drive. The music file is then downloaded to the selected storage device. Transfer typically takes on the order of a minute for a song, or about fifteen minutes for a CD. A typical song consumes about 3MB of disk storage.

Alternatively, the user can digitally record music from a CD player.

The user simply clicks on the CD rack to select a CD, clicks on a CD "jewel" box graphic to open it, and drags the CD out of the jewel box to the CD player to play it. A CD presented to the user has the appearance of a real CD. The covers look like the common "jewel" cases that are currently in use, whether open or closed. Dragging a second CD to the CD player while the first is playing preferably causes the first CD to stop playing and moves the first CD back to its jewel case.

Alternatively, the user can simply click on a CD in an open case, and the CD is instantly moved to the player using animation.

The present invention is fun and interactive, and provides an interface which a user who is used to a physical CD and CD player can easily understand. Once the music is downloaded over the Internet, the user does not need to be concerned with technical computer operations, for example, finding the music and finding the proper player. Prior art players are not as successful at emulating a physical CD player as the present invention, which fully copies the appearance and functionality of a CD player. This helps the user to bridge the gap between the physical world and the digital world of music and other audio. Of course, the same technique can be used for video and other media presentations, as well.

The universal player (UP) is the first of its kind to present the user with access to streamed audio/radio and video content; music-related auctions; sampling of digital music; purchasing managing and playing back digital audio files; ripping and burning CDs, that is copying CD content from a CD to storage, and copying CD content from storage to a writeable CD; cataloging, managing and playing back standard CDs, including presentation of lyrics, liner notes, album cover art and track listings, as well as managing the transfer of music tracks to portable audio players and removable storage, supporting digital rights management techniques as appropriate.

Virtually every desktop or laptop personal computer (PC) today has a CD-ROM drive capable of playing back standard audio CD's. The projected installed base of recordable CD's, e.g., CD-R and CD-RW formats, was expected to reach 20 million by the end of the calendar year 1999. Exploiting PC users' demonstrated interest to listen to music while at their computers, the UP launches automatically whenever a standard audio CD is inserted, presenting the user with a friendly and intuitive interface.

If the user is currently on-line, the UP can access an Internet music database service to retrieve CD meta-data such a track listings, artists, title, genre, album cover art, liner notes and lyrics, etc., and can automatically populate the UP interface with this information. The user can then listen to the CD, digitally record all or part of the CD to his hard drive or removable storage ("ripping") or simultaneously listen

to and record all or part of the CD. The same user interface also allows the user to organize his music into custom playlists or compilations, and to re-record the digital files he has recorded or downloaded to a standard audio CD format (CDR) for playback at, for example, his PC, his car stereo or his "CD-Walkman" or "boombox".

Because multiple formats exist for storage and playback options, managing a music collection is a challenge. Just retrieving a music track from the Internet, a CD collection or a digital music file stored on a hard drive or removable storage device can be difficult. Matching the audio file format, e.g., MP3, AAC, QuickTime, .wav, AIFF, MS Audio, etc., with the proper playback application complicates matters. The virtual player of the present invention automatically selects and activates the proper playback software for virtually all popular digital file formats including standard audio CDs, DVDs, etc. The software may be internal to the universal player, or may be supplied by another vendor.

In addition, the universal player allows a user to organize his music at one central location and in a variety of ways. Users can sort and/or categorize their music by genre, title and/or artists as well as create custom playlists or compilations. The universal player remembers the physical locations of a user's music and manages complex security and copy protection issues such as "right to copy" or "checking-out" songs to portable audio playback devices such as secure versions.

Having "aggregated" a music collection into one simple user interface that is based on real world metaphors, the universal player visually mimics the best elements of standard audio CD players, television and FM radio, allowing the user to easily select and listen to or watch his favorite music or videos. The virtual player also assists the user in finding music he is interested in sampling, and purchasing from a music provider.

Therefore, in accordance with an embodiment of the present invention, a universal music player system includes a virtual player which has the appearance and functionality of a real media player. One or more media object displays display media objects which are owned by or accessible to a user. An animator visually emulates loading a media object from the virtual rack onto the virtual media player responsive to a user command. A loader loads a media object file corresponding to

the selected media object in response to the user command. Finally, a playback activator selects playback software appropriate for the loaded file's format and for activating the selected playback software to play the loaded media object file.

A media object is a representation of, for example, physical and virtual CDs or DVDs or other media, or individual selections such as songs, or user-defined compilations.

The universal player system can also include a desktop area in which available media objects are displayed, each media object having the appearance of being contained in a container. Available media objects are those which have been moved from the virtual racks for immediate access and availability.

A catalog of media objects owned by or accessible to a user is maintained, such that at least one of virtual rack displays media objects referenced in the catalog.

In an embodiment of the present invention, in which media objects represent CDs, the virtual media player has the appearance and functionality of a real CD player. Following the real world metaphor, the CD media objects, or "virtual CDs," appear as jewel cases.

As in the real world, one embodiment of universal player system has a virtual player which has a tray which holds a single media object. Another embodiment has a rotatable tray which holds up to a predetermined number of media objects. Another embodiment accepts a virtual magazine which holds up to a predetermined number of media objects. Yet another embodiment has a rotatable, jukebox-style media holder which holds up to a predetermined number of media objects.

Each media object file is represented by an icon which is unrelated to where the media object file is stored. In at least one embodiment, this icon has the appearance of a container, such as a jewel case. The appearance of icons is independent of where the associated media object files are located, which may be for example, in any or all of memory, hard drive, removable drive, CD-ROM drive (for a physical CD), or even at an Internet music provider site.

Upon clicking by a user on a container, the container opens, revealing the media object inside. For example, if the media object represents a CD, a virtual CD is visible inside the open container. As with real CDs, a booklet can be included in

the container or case, such that when the user clicks on the booklet, liner notes are displayed. Where the media object is a virtual CD, liner notes include a list of all tracks on the virtual CD. Liner notes can include, but are not limited to, artist reviews, reviews about the instant object, e.g., CD or DVD, artist resume, artist biography, discography, cover art, and / or pictures.

In at least one embodiment of the universal player system, a media object file contains audio information. This can be, for example in MP3 format, Quicktime format, or some other format. Audio information can include music, but may also include other audio such as speech.

In another embodiment, a media object file contains video information, which typically includes an audio soundtrack.

The virtual player can have an information display for displaying information about the playing media object file. Such information can include the name of at least one artist associated with the playing media object file, or a title of the CD or the particular song being played, or the movie being played back. Other information which can be displayed includes, for example, elapsed time.

When a user clicks on an exposed media object, that is, a media object which can be seen inside an open case, or where cases are not used, simply a visible media object, the media object is visually loaded onto a media object holder, such as a single- or multiple object tray, or a multiple object magazine or jukebox. After the media object is loaded onto the media object holder, the media object holder closes and the associated media object file automatically begins to play. The animator emulates a smooth loading of the media object onto the media object holder.

In a further embodiment of the universal player system, a downloader downloads media object files from a provider. A librarian stores downloaded media object files and maintains references to their stored locations. These downloaded media object files are typically purchased from the provider by a user.

In a further embodiment of the universal player system, a Web-receiver receives streams from a Web broadcaster. These streams can be, for example, video or audio streams, and can be broadcast by a Web radio broadcaster.

Media objects can also be created by recording information from an external source, such as a CD player.

In at least one embodiment, a media object display is a "virtual rack" which holds at least one media object, preferably media objects owned by or accessible to a current user. The universal player includes a mouse, trackball, trackpad, keyboard entry or other means for allowing a user to move or drag a media object from the virtual rack to the desktop area, or directly to the virtual player. The virtual rack can display media objects according to a selected category, including, but not limited to, genre, artist, or title. The selected category itself can be displayed on the virtual rack.

In a further embodiment, a virtual rack emulates a spinner, as found, for example, in restaurants where a user selects a song at his table to be played on a centrally located jukebox. As with the physical device, in the universal player, a user can spin a spinner to scroll through a selected category.

In a further embodiment, the universal player includes means for allowing a user to define at least one compilation, where a compilation comprises a list of media objects, including media collections such as CDs, selections such as individual tracks, and other compilations. Each compilation itself appears and behaves as a media object.

Specifically, in one embodiment, a compilation is created by dragging a first selection, such as a CD or DVD, one or more tracks of a CD or DVD, or another compilation, to an empty slot in the virtual rack. Adding to the compilation is done by dragging subsequent selections to the compilation.

When a user clicks on a media object, the contents of the media object are displayed. The contents can be displayed as a list of selections or tracks, or if the media object is a compilation, the media objects which make up the compilation. Status for each item can also be displayed. Such status can include, but is not limited to, the source from which the media object was obtained, or the physical location, for a physical object such as a CD or DVD, which the user has previously specified as a storage location.

In yet a further embodiment of the universal player, a data collector collects statistical data about a user's use, including but not limited to, a list of purchased music, a list of sampled selections downloaded from a provider, a history of the

user's playback of any of media or selections, or a history of selections received via Web radio.

The data collector itself preferably includes a transmitter which sends the collected statistical data to a vendor or music provider. The vendor can then offer the user a special promotion, or recommend music to the user, based on the collected data.

A further embodiment of the present invention includes means for playing back a physical CD such as a CD-ROM drive, a CD player with a digital output. A CD identifier identifies a physical CD being played back. One way to identify a CD is to manually enter, e.g., by keyboard or by scanning a bar code identifier or by scanning a text identifier and using optical character recognition, an identification code imprinted on the CD or the CD package. The code is then matched against a database, for example, at a music provider, and the CD identified.

Alternatively, a software "spider" can examine the shape of data on the CD and compare the shape against a database of CD data "shapes," thereby identifying the CD. The shape of data can be, for example, timing information. Alternatively, the shape could be derived from portions of the data itself, such as the first 100 bits of each selection, or from some other aspect of the data or the data organization.

The downloaded CD can be registered with the universal player's database by the librarian, or with a vendor or music provider's database, or both.

In one embodiment, a vendor searcher allows the user to search for media in the vendors's database. A virtual shopping basket displays the user's purchase selections

In a further embodiment, a preview guide displayer displays a preview guide which is downloaded from a vendor upon a request by the user. The preview guide can be periodically updated by the vendor. For example, the guide can be updated on a monthly or weekly basis.

The preview guide can be customized by a vendor or music provider based on user use statistical data, such as is collected by the data collector. The preview guide can include, but is not limited to, promotion offers, pictures of featured artist, cover art, liner notes, concert dates for an artist, trailers, track samples, and reviews.

Another embodiment of the present invention includes a community screen for providing links to related Web sites. The community screen can include a link to customizable yellow pages which provide searchable links to related Web sites.

Further embodiments of the present invention include a viewer for viewing videos, and / or a virtual receiver, such as a virtual radio or video receiver which receive and play respectively audio and video streams broadcast over the Web radio broadcasts, where a receiver has the appearance and functionality of a real radio or video receiver, or a television. A librarian stores a portion of the received broadcast and maintains references to their stored locations.

BRIEF DESCRIPTION OF THE DRAWINGS

The foregoing and other objects, features and advantages of the invention will be apparent from the following more particular description of preferred embodiments of the invention, as illustrated in the accompanying drawings in which like reference characters refer to the same parts throughout the different views. The drawings are not necessarily to scale, emphasis instead being placed upon illustrating the principles of the invention.

Fig. 1A is a block diagram of an embodiment of the present invention.

Fig. 1B is a schematic diagram illustrating the relationship between visual objects, their logical pointers and the associated media objects.

Fig. 2A is an illustration of the main window console of an embodiment of the present invention.

Fig. 2B is a an illustration of the main window console of Fig. 2A, additionally demonstrating opening of a jewel box.

Figs. 3A-3E are illustrations of the main window console of Fig. 2A which demonstrate the animation of a selected virtual CD from the desktop into the virtual player.

Figs. 4A-4F are illustrations of liner notes as provided by the present invention.

Fig. 5A is an illustration of the main window of an alternate embodiment of the present invention, illustrating two virtual racks, or spinners.

Fig. 5B is an illustration showing the meta data draw, which shows the cover art of the CD that is playing.

Fig. 5C is an illustration showing the meta data draw having an advertisement displayed.

Figs. 6A-6C are illustrations demonstrating how compilations are created and maintained.

Figs. 6D and 6E are illustrations showing how cover art is selected for a compilation.

Fig. 7 is an illustration showing how the embodiment of Fig. 5A displays the musical content of a media object such as a virtual CD.

Figs. 8 is an illustrations showing how the embodiment of Fig. 5A can provide a list of media objects.

Fig. 9 is a block diagram illustrating an embodiment of the present invention having both a local database and a remote music-provider database.

Fig. 10 is an illustration demonstrating the 6-CD rotating tray of the embodiment of Fig. 5A.

Fig. 11 is an illustration of a search feature in an embodiment of the present invention.

Fig. 12 is an illustration of a virtual shopping basket in an embodiment of the present invention.

Fig. 13 is an illustration of a monthly music guide in an embodiment of the present invention.

Fig. 14 is an illustration of a alternate monthly music guide.

Fig. 15 is an illustration of a community screen in an embodiment of the present invention.

Fig. 16 is an illustration of a virtual radio and video screen of an embodiment of the present invention.

Fig. 17 is a schematic diagram illustrating how an embodiment of the present invention identifies a CD from the shape of the CD's data.

DETAILED DESCRIPTION

Fig. 1A illustrates an embodiment 500 of the present invention. A display device 501 such as a CRT display or an LCD display, driven by a processor 511, displays a virtual player 503 which emulates all of the functionality of a real player. A virtual rack 507 displays media objects 509 such as virtual CDs, virtual DVDs, compilations, video cassettes, etc.

As in the physical world, a user can move one or more visual objects 509 from the virtual rack 507 to a desktop 505, where they can be opened. Once opened, the contents of the container, such as liner notes and cover art, can be examined. In addition, a visual object 509 can be dragged to the virtual player 503 for playback.

Each visual object 509 represents, for example, a CD, a single song or group of songs, or a compilation of CDs. CDs, for example, can be physical or virtual. A virtual CD is, for example, a collection of song files corresponding to the songs of the corresponding physical CD, if any, or simply to the songs of a collection defined by a vendor as a virtual CD. Other media such as DVDs can also be represented. The term "media collection" is used herein to refer to a particular album or collection or presentation, such as a CD or a DVD. Each media object is associated with a media object file 529 which contains data for the actual audio, video, picture, etc. These media object files can be stored in multiple locations and on multiple types of storage 522, such as hard drives 523 and removable drives 525. Media object files 529 can also be in various formats, such as MP3 and Quicktime.

In the processor 511, a file catalog 521 tracks the locations of all of the media object files 529 to which the user has access locally. In addition, the file catalog 521 is capable of tracking the locations of physical CDs 527 owned by the user, and the individual songs or tracks 531 on each CD. Of course, this applies as well to other types of media such as DVDs. Finally, the user may also have paid for access to music or other media object files 541 which a music provider 537 maintains in its own storage 539. The file catalog 521 maintains a list of these media object files and locations, such as corresponding Web universal resource locators (URLs). A downloader 534 retrieves these media object files 541 from the music provider 537 over the Internet 535, upon a request by the user.

In one embodiment of the present invention, the user can drag a media object 509, such as a virtual CD, to the virtual player 503 to begin playback. Alternatively,

the user can click on a media object which is displayed in the desktop area 505 to open the media object's case, which for CDs has, for example, the appearance of a jewel case. Clicking on the exposed media object activates the animator 517, which provides smooth animation, opening the tray of the virtual player 503, smoothly moving the selected media object to the tray, and closing the tray.

When a media object is loaded into the virtual player's tray, the media object file loader 519 retrieves the media object file or files and passes them to the playback activator 513. The playback activator 513 activates selects a player suited to the particular format of the media object file, for example, player 515-1, from a group of available players 515. Generally, these players 515 are provided by various vendors, but one embodiment of the present invention also provides a player which is able to interpret one or more formats.

The selected player, here 515-1, plays back the media object file. Assuming a music file, the audio output can be sent to, for example, a CD burner 545 to create a customized CD, or a portable player such as an MP3 player 547. Alternatively, the output can be converted to an analog signal by an analog-to-digital converter 549 and amplified by amplifier 551, where it can be played on external speakers 553, headphones, or for example, recorded to analog tape.

In addition, if the user inserts a CD into a CD-ROM drive, the universal player immediately responds by scanning the CD for its data shape, accessing a remote database over the Web to identify the CD from the shape, and retrieving information such as cover art, title, lyrics, etc.. The CD then appears as a visual CD on the rack.

In addition, a Web radio broadcaster 543 may broadcast audio streams, which can be captured by a Web radio feature of the present invention (not shown), stored in local storage 522, catalogued by the file catalog 521, and displayed in the virtual rack 507.

Finally, a data collector 533 collects statistical information about the user's preferences, and uploads the information occasionally to the music provider 537, which can then customize music previews and periodic guides, and offer special promotions.

Fig. 1B illustrations the relationships between visual objects 509, the corresponding pointers 524A-524D within a catalog 521 to media objects, and the media objects. In one embodiment, visual objects 509 come in three varieties, marked "R" for real or physical 509A, "V" for virtual 509B and "C" for a compilation 509C. Each of these objects has a corresponding pointer, 524A, 524B, 524C respectively, in the catalog 521. A real visual object 509A points to a physical CD 527. The physical CD 527 comprises a plurality of tracks 531.

A virtual object 509B, on the other hand, points to a virtual CD 526, which comprises a plurality of files 529A. These files 529A can include, for example, audio information, video information, cover art, lyrics, liner notes, etc.

A visual compilation 509C points to a play list 528. The play list 528 is simply a file 529B containing a list of all the items to be included in the compilation.

The objects 526-528 are shown as local media objects. In addition, visual object 509D, points to a remote virtual CD 560 which is accessed over the internet 535. The virtual CD 560 comprises a plurality of files 541 which must be downloaded to the universal player.

The term "CD" as used herein is used to refer to a physical CD, virtual CD, or a visual CD.

Fig. 2A illustrates the main window console 10 of one embodiment of the present invention. A realistic virtual CD player 12, corresponding to 503 of Fig. 1, sits at the top of the screen and a collection 14 of playable CDs 14A, from which a user can make a selection, is organized beneath the virtual CD player 12. The CDs appear visually as "jewel" cases in which CDs are commonly stored, along with the appropriate cover art, when available.

The virtual CD player 12 includes a Web link at button 16 to, for example, a music provider. Buttons 18 enable a user to select a CD and / or track for shuffle playback. A display 20 provides such information as time remaining for a CD or for the current song or lapse time for the current CD or song. In addition, the display 20 can provide information such as the name of the CD, the artist, and the song. Gauge 22 provides a pictorial representation of the volume. By clicking on the gauge 22, the user can instantly change the volume of the universal player. Alternatively

volume control 40 allows a user to adjust the volume. Buttons 24 allow a user to select track and / or CD for a loop mode.

At the bottom of the virtual CD player 12 are several additional controls. The first, a change mode button 26 enables a user to change modes. As with real CD players, a pause button 28 and a play button 30 are provided. The front of the CD tray 32 serves as a reject button. In addition, rewind 34 and fast forward 36 controls are also provided. Finally, a download command button 38 is provided, to initiate downloading of a music file.

While audio files may be stored at different locations and on different storage media, such as hard drives, removable disc drives such as Iomega's Zip (TM) or Jaz (TM) drive, and CD-ROMs, all virtual CDs 14A have a similar appearance, regardless of actual location. When a user selects a particular CD 14A, the corresponding audio file is located.

The selected audio file is played back using any playback system which is available on the user's computer. The virtual player 12 of the present invention integrates with commercially available playback systems such as Liquid Audio Player (TM), Real Player (TM), Shockwave (TM), etc. Thus, users only need the player 12 of the present invention as their primary interface for playing music.

As Fig. 2B illustrates, clicking on CD case 14A opens the case and reveals the virtual CD 14B therein. The corresponding file, which resides somewhere in storage, either on the user's computer, or possibly on a different computer, is located.

As the sequence of Figs. 3A-3E demonstrates, when a user clicks on an exposed virtual CD 14B, the tray, or CD holder, 32 opens. The CD 14B lifts up from the jewel case 14A and moves to the tray 32. During this transition, the actual file is loaded from its location in storage. The tray 32 closes and the loaded audio file begins to play automatically. Animation provides a smooth, realistic opening and closing of the tray 32, and a smooth glide of the CD 14B to the tray 32, but one skilled in the art would recognize that animation is not necessary to convey a sense of the operation to a user.

The virtual CD player 12 operates much the same way as an actual CD player or deck, giving the user the ability to play an entire CD, selected tracks,

random tracks, loop, pause, skip, adjust the volume, and eject a disc from the tray 32.

A playback activator 513 (Fig. 1) selects and activates a playback system 515 the user has in resident memory which is appropriate for the file format of the particular selection about to be played. If there is no playback system in memory, the player will activate its own playback capabilities. Thus, users can easily collect music digitally and play back the music because the present invention associates music, other audio, files to playback mechanisms regardless of how the files are encrypted or where they are stored. In a sense, the playback activator 513 acts as an interpreter when a user has a combination of incompatible playback and encryption formats.

When a user clicks on the booklet 14C inside the case 14A, "liner notes" are displayed. As illustrated in Fig. 4A, the first screen provides a numerical list of all of the tracks on the CD. In addition, the cover art 52 is displayed. Note that the player 12 is still displayed and that play of a CD continues while the liner notes are displayed.

Navigation buttons are provided with the liner notes. Clicking on the "next" or right arrow 44 scrolls further into the liner note pages, as exemplified by Figs. 4B-4F. Clicking on the "previous" or left arrow 46 scrolls to the previous page. In Fig. 4A, there is no previous page, so the left arrow 46 is dimmed. Clicking on the home button 48 returns to the first page of the liner notes (Fig. 4A), and clicking on the X button 50 returns to the main screen such as that shown in Fig. 3E.

Thus, for the particular CD shown in this example, for each click of the right arrow button 44, a user is presented first with a first review 54 of the album in Fig. 4B, a second review 56 in Fig. 4C, the artist's resume 58 in Fig. 4D, which can include for example personal information, career summary and contact information.

As shown in Fig. 4E, further clicking on the right button 44 provides an extensive biography 60A-60F of the artist.

Finally, clicking on the right button 44 again provides a selected discography 62 of the artist, as seen in Fig. 4F.

Figs. 5A-15 illustrate an another embodiment 100 of the present invention.

Fig. 5A illustrates a virtual CD player 110 with a 6-CD changer, which corresponds with the virtual player 503 of Fig. 1, with all of its accompanying controls and indicators. A first virtual rack, or spinner 120, displays all music owned by or accessible to the user, i.e., "virtual" CDs, which includes, for example, physical CDs, music stored on hard disks and removable media, data streams, and downloadable music stored at a music server. An icon, preferably comprising the cover art of a CD, represents the CD.

Display 102 indicates which positions in the 6-CD changer are occupied. Preferably these are color coded and shaded. For example, a shaded number indicates that the corresponding position in the tray is empty. A green colored number may indicate the presence of a CD in the corresponding holder position. Finally a red colored number indicates the CD which is currently playing. When the user rolls the cursor over the numbers, a description of the CD corresponding to the number pops up. Clicking on a number causes the corresponding CD to start playing.

Bar 175 indicates elapsed time for the playing song. The user can click anywhere on this graph to move the current point of play.

The cover of the currently playing CD is displayed at 170.

A user can view his virtual CDs in the spinner 120, for example, by title, artist or genre by clicking on one of the tabs at view control 126. The title, artist, or genre is displayed in the spinner selection display 122.

Clicking on arrows 124A and 124B cause the spinner to scroll through the various genre categories available, or titles or artists depending on the selected view.

If more than six virtual CDs are in the category, for example, clicking on arrows 128A or 128B causes an animation in which the spinner 120 appears to rotate, to display additional CDs in the category.

Clicking on clasp 127 causes the spinner 120 to collapse out of view. If the spinner is collapsed, then clicking on the clasp 127 causes it to re-appear.

A CD is made available for playing simply by dragging the cover to the desktop area 140. This is equivalent to taking a physical CD out of a rack and leaving it on the table next to the stereo, where a user's favorite or commonly played CDs frequently end up for an extended time. Alternatively, the user can simply

click on a CD which is visible within an open case, and the CD moves to the virtual player.

One skilled in the art would recognize that this same type of real-world object manipulation can be performed for other types of media such as DVDs, video tapes, CD-ROMs, etc.

A second spinner 130 is similar to the first, but displays user-defined display lists, or compilations. A compilation is created by dragging and dropping a CD or song from the desktop 140 or from the first spinner 120, or an existing compilation from the compilation spinner 130, into an unoccupied space 131 in the compilation spinner 130. Individual songs from a CD are displayed by clicking on a CD, and can then be dragged and dropped.

A user can then add to a compilation by dragging and dropping additional music, that is, individual songs, virtual CDs, compilations, tracks from physical CDs, into the newly created compilation.

For example, a user can create a custom playlist or compilation that fits on his portable digital audio product or other secure removable storage, such as an MP3 player, and copy the music or compilation to the device.

Custom graphics can be designated as the background for the desktop area 140. The desktop area 140 can thus be customized for a particular music provider or other vendor that provides the universal player to a user. For example, a provider could place its logo in the desktop area 140.

Fig. 5B illustrates the meta data draw 171. When the user clicks on this draw 171 the draw 171 opens to expose the cover art 172 of the CD currently in play.

As Fig. 5C illustrates, from time to time, the meta data draw 171 may pop open to display an advertisement 173, on which the user can click to obtain additional information.

Fig. 6A illustrates the dragging of a visual CD 132 to compilation rack 130. If the user drops the visual object 132 into position 134, which is already occupied, then visual CD 132 will be added to the compilation existing in position 134. If, on the other hand, visual object 132 is dropped into empty position 136, a new compilation 136 is created, containing the contents of visual object 132.

Fig. 6B illustrates dragging a particularly selection 140 to a compilation 142. As the user drags the selection 144 to the compilation 142, a line 145 appears, designating the position where the selection 144 will be inserted if it is dropped at that moment. By moving the selection 144, the insertion line 145 moves accordingly.

Similarly, Fig. 6C demonstrates that a visual object such as CD 150 can also be dropped into a compilation 152. Again, a line 154 indicates the current insertion point.

As illustrated in Fig. 6D, the user can assign a name 200 to a compilation and select art for the compilations's cover from a library of pictures, either supplied as part of the present invention, or created by the user himself, or purchased as part of clip art collection, etc.

Three buttons 162, 164, 166 are available on the compilation 160. "Select Artwork" 162 allows a user to select artwork from a library provided by the universal player. "Select From File" 164, allows the user to select a picture from a file stored on disk or some other location. Finally, "Paste From Clipboard" 166 allows a user to paste a picture or graphic previously copied to the clipboard.

Fig. 6E illustrates a selection 168 of art that might be available when the user selects from the "Select From File" button 164 of Fig. 6D.

As with virtual CDs in the virtual CD spinner 120 (Fig. 5A), compilations in the compilation spinner 130 may be displayed by category, for example, by title or compilation date.

Fig. 7 illustrates that opening a virtual CD or compilation, by clicking on the cover, displays its musical contents 210. Different selections, i.e., tracks or songs, can originate from different sources, as shown by the various statuses 212. As shown, all songs are stored on a hard disk, but CDs, records, tapes, data streams, etc. can also be represented. Each track's title 214 and duration 216 is displayed.

An icon 217 is displayed in the top right corner to indicate the genre. The track currently playing is highlighted 211. Clicking on another track causes the other track to start playing. In addition, to create a compilation, the user can grab one or more tracks and drag them to the compilation rack as discussed above. A "Select All" button 218 allows a user to select all songs displayed with one click. A

"More" button 219 requests more information on the selection. This information is obtained, for example, from a music provider over the Internet. A "Record" button 215 allows the user to record onto his hard disk the currently playing selection, which may be an audio stream, for example, or a physical CD track.

Fig. 8 illustrates that the song/album database may be displayed in a more typical "list" fashion, sorted, for example, by song, album, artist or genre. Just those songs currently in the virtual CD player can be shown, or all songs can be shown. This screen is selected by clicking on the Song Library button 223.

For example, the list interface 220 provides the choices of searching for files in the player 110, or all songs to which the user has access. In addition, various tabs exist to list by song, by album or CD, by artist or by genre. Here, the song tab has been selected and the list displays selections by song title. Of course other combinations and sorting of the CD data are possible, as would be obvious to one skilled in the art. A status window 222 provides additional status for a selected line. A particular selection 221 can be selected by the user, in which case it is highlighted and selected by the player.

For physical CDs owned by the user, the user can input the physical location where the CD is physically stored. Upon placing the CD in the computer's CD-ROM drive, the CD appears on the desktop, having similar appearance to the virtual CDs.

As illustrated in Fig. 9, there can actually two or more databases or storage systems. At the user's location 400, the user of the virtual player 500 typically has his own local storage, as described above with respect to Fig. 1A. A local database 235A keeps track of all music which the user either owns or has access to, and the location of each music file.

In addition, the player 500 communicates with a music provider or vendor 537 at a remote site 410 over a network such as the Internet 535. The music provider 238 also has storage 240 on which CDs and other audio files 242 are stored. The music provider 537 can also maintain a data records 235B - 235N for each user. Here, record 235B corresponds to the database 235A for the user shown, while records 235C-235N correspond to other users. The database record 235B includes any selections the user has made on line, as well as use statistics, described

below. The player virtual 500 thus maintains this use information locally and uploads this information to the music provider 537 when connecting to the music provider 537. Thus, each user's preferences can be tracked both locally and by the music provider 537.

As Fig. 10 illustrates, the player 110 of the embodiment 100 is a 6-CD changer. Like the single CD player described previously, a CD is placed into the CD changer by dragging and dropping the CD into or onto the changer. This changer, like the real 6-CD changer it emulates, can hold up to 6 CDs and/or compilations in its tray 250, thus allowing the user to program an entire day's worth or more of music.

A user can drag and drop CDs and compilations onto the tray 250 to, for example, shuffle an album or CD, shuffle a user-defined compilation, or shuffle all compilations and CDs in the changer.

In the center 251 of the tray 250 are numbers corresponding to each location. These numbers are color coded in the same manner as the numbers in panel 102 as discussed previously with respect Fig. 5A.

It is also noteworthy that a visual CD can be opened in a rack as well as in the desktop area. For example, visual CD 252 has been opened and its CD, which is currently in the tray 250, is not shown in the case. Visual CD 254 is also opened, however, the CD appears in the case.

Note also that several of the CDs in the tray such as CD 256 have a "V" for "virtual". CD 256 represents a virtual media object, that is, one which exists in files in storage. Another disc 258 has "C" on it, for "compilation". Not shown, a CD which represents a physical CD in, for example, a CD-ROM player, would have a "R" for "real".

Of course, one skilled in the art would recognize that other configurations are also possible. For example, 100-CD "juke-box" players are available and could easily be emulated.

In one embodiment, the dragging and dropping of a CD or compilation into the CD player results in an animation, again emulating real life, in which an image of a CD moves from the cover art or jewel box to an empty slot in the changer. If there are no empty slots, one of the CDs currently in the tray 250 is removed. The

6-CD tray 250 itself rotates like a real 6-CD changer, bringing a particular CD to the forefront .

As Fig. 11 shows, an embodiment of the present invention can connect to a specific music vendor. Using a searcher 180, a user can search for certain music by artist, album, or other selection criteria. The user can search, for example, for CDs, DVDs, or digital tracks. The user may then purchase the music from the music vendor by selecting various albums, which are then placed in the buylist 181.

Alternatively, as Fig. 12 shows, selected items can be placed into a virtual shopping basket 182.

Fig. 13 illustrates a screen displaying a monthly music guide 260, which is displayed when a user clicks on a Monthly Preview tab 160 (Fig. 5A). Each month, a predetermined number of CDs are suggested, based on net perception by the music provider 238. The music guide 260 can offer special promotions and features. Buttons (not shown) are provided which allow the user to add the displayed album to the shopping cart 182 (Fig. 12), to an on-line registry, or to the buy list 181 (Fig. 11). The guide 260 provides additional information when, for example, the user clicks on a picture 262 of the artist. Such additional information can include cover art, liner notes, and even concert dates for the recording artist, as well as trailers (similar to movie trailers), track samples and reviews. Of course, the guide could as easily be a weekly or daily guide, or could be updated according to some other period, or irregularly.

Fig. 14 is an alternate preview guide, which appears when the user clicks on the monthly-preview tab 160. A selection of CDs 161 is displayed along with a button 162 for each CD. For example, clicking on a button 162 allows the user to download sample tracks. A featured album can be displayed in more detail on the main screen 163. Indicator 164 indicates the current month, and allows a user scroll through previous months as well. The screen 163 can offer multi-media promotional information including animation, music, streaming video.

Fig. 15 illustrates the Rock-dot-community menu screen 270, which is displayed when the user clicks on the corresponding button 164 (Fig. 5A). Links 272 provide two-way communication with a site and provides links to digital downloads, auctions, and music and other content. A "yellow pages" link 274

retrieves a yellow pages service which includes links to over 300,000 music-related sites, and which can be customized for a particular user based on that user's interests.

Fig. 16 illustrates a radio/video screen 360 with net-radio 302 and net-video playback screen 304, which appears up when the user clicks on tab 162. The user can find and bookmark his favorite streamed content, whether audio or video, including stills, on the Internet. The player is capable of using popular audio and video formats such as Quicktime.

As with the CD racks, video rack 320 and 322 can hold and display virtual and physical video clips, music videos, and other video/audio content. Rack 320 holds user defined compilations. A desktop area 324 can hold video clips that have been selected by the user. Image 326 portrays the cover of the currently playing video.

In a preferred embodiment the video playback screen 304 adapts to the aspect ratio and size of the source video. Clicking on a video representation starts the video playing.

At least one embodiment of the virtual player collects statistical use data. This is done in one alternative, for example, at the user's system. Such data includes, for example, a list of tracks, e.g., songs, that a user samples (e.g., a 30 second sample of a track), the actual music a user purchases and which CDs and tracks a user listens to on an on-going basis after purchase. This music use data can then be used to better recommend music to the user/customer and can be sold to the record companies as marketing information for future promotions. The use data can then be sent back to a vendor, for example, over the Internet.

The data collector 533 (Fig. 1) observes user behavior to develop a unique profile for every user based on behaviors, actions and usage patterns. The following user behaviors and actions are among those captured by the present invention, although one skilled in the art would recognize that other comparable behaviors and actions could also be captured without changing the scope of the present invention:

* online searching for music or entertainment content;

* downloading of digital music or entertainment content;

* requesting of music- or entertainment-related Web pages;

* online purchasing of music or entertainment content;

* playback sessions with streamed content, such as radio or video;

* playback sessions with local digital and CD music; and

* declarations of personal interest, e.g., a preference for rock music but a distaste for rockabilly, heavy metal or a particular band.

The user's declaration of tastes, likes / dislikes, favorite genres, and artists etc. is captured via local interaction.

Finally, in the near future if not in the present, users will be able to play music or video broadcast over the internet or other network by a "Web radio" broadcaster. Such Web radio signals comprise audio or video streams. At least one embodiment of the present invention can also be used to monitor use of Web radio in the same way it monitors the use of music files.

The present invention can thus catalog the music inventory of CDs and digital music that the user owns or has downloaded as a promotion, or has downloaded from a broadcaster. Based on these characteristics, this embodiment characterizes the user to a host database over the Internet.

The local database's interaction with a host database containing the characteristics and buying patterns for all users on the system creates a customer profile on the host database that is used to customize promotions, music and entertainment news and make suggestions to the user of music or entertainment content that he may enjoy listening to or purchasing. For example, if a user buys two CDs of a particular recording artist, at some later time the user will be presented with a promotion for a third CD by the same or similar artist.

The local database continues 235A (Fig. 10) to collect user information during each session and periodically refreshes the host database's user profile 235B (Fig. 10).

Extensible databases already exist which contain information about virtually every audio CD in print. This information can be accessed by browsing or searching its web sites. But if a user needs to access information about CDs he has already

bought, there is no direct way of making the link between the information contained on the server and the user audio CD.

An embodiment of the present invention allows a direct approach of detecting the CD owned by some user and creating the link with the server database. Two different embodiments are described: one with user manual data entry and one with CD media identification. Both embodiments allow the user to put a physical CD into the CD-ROM draw on a computer/system, to identify the CD, and to link it to the server's database.

Once a CD has been registered, a record company, for example, will allow the user to download an electronic copy, or will verify for a retailer that the user possesses a copy, the retailer then providing an electronic version to the user.

All retail CDs have a bar code number printed on the back cover or the jewel case. The most widely used are the Universal Product Code (UPC), used mostly in North America, and the European Article Numbering (EAN).

To recognize a CD, the application prompts the user to manually enter this code into the system. Once the user has entered the code, the server searches the database using an UPC or EAN indexed table and gives back requested information about the CD to the user. Such information may include, but is not limited to, the CD cover, liner notes and track lists.

Alternatively, the user can insert the CD into the CD-ROM player of his computer and have the system automatically identifies the CD.

A preferred embodiment uses a "spider," which is a piece of search software which typically reaches out through the Web and looks at the "shape" of data, rather than analyzing the data itself. Since there is no unique identification already on an audio CD, the software uses the tracks table of contents to calculate a unique shape to distinguish between various CDs. This shape consists of a string of digits where each digit represents a specific track. The digits are calculated using, for example, timing information such as minutes, second and block of the corresponding track. To normalize the shape, the string is preferably padded or truncated to a specific number of digits.

Fig. 17 illustrates a simplified example. The geometry of the user's CD 310 as having various tracks A, B, C, D and so on. This is compared against a library

312 of known CD geometries 314A - 314N. If a match is found, the user's CD 310 is identified. Of course, the actual tracks do not need to be examined, as the timing data is available in the table of contents.

When the user inserts a new CD, the database may not yet have the unique shape stored. In that case, an initial user must manually identify the CD, using the search engine or the manual approach, and the shape will be stored in the database for the next user.

One skilled in the art would recognize that the techniques disclosed herein could equally be applied to other physical and virtual media, including other forms of audio, video, virtual digital video/versatile discs (DVD), drawings, pictures, photographs, movies, slides, video cassettes, other CD formats such as CD-ROM, etc.

It will be apparent to those of ordinary skill in the art that methods involved in the present system for monitoring a supply chain may be embodied in a computer program product that includes a computer usable medium. For example, such a computer usable medium can include a readable memory device, such as a hard drive device, a CD-ROM, a DVD-ROM, or a computer diskette, having computer readable program code segments stored thereon. The computer readable medium can also include a communications or transmission medium, such as a bus or a communications link, either optical, wired, or wireless, having program code segments carried thereon as digital or analog data signals.

While this invention has been particularly shown and described with references to preferred embodiments thereof, it will be understood by those skilled in the art that various changes in form and details may be made therein without departing from the scope of the invention encompassed by the appended claims. For example, while reference has been made to computers, the present invention is equally applicable to other devices such as set top boxes, internet appliances and gaming consoles.

CLAIMS

1. A universal player, comprising:

a virtual player which emulates visually and functionally a physical media player;

a media object display in which media objects owned by or accessible to a user are displayed;

an animator which visually emulates loading a media object from the media object display onto the virtual media player responsive to a user command;

a loader which loads a media object file associated with the selected media object, responsive to the user command; and

a playback activator which selects playback software appropriate for the loaded file's format and for activating the selected playback software to play the loaded media object file.

2. The universal player of Claim 1, wherein a media object comprises a virtual compact disc (CD).

3. The universal player of Claim 1, wherein a media object comprises at least one track from a virtual CD.

4. The universal player of Claim 1, further comprising:

a desktop area in which available media objects are displayed, each media object having the appearance of being contained in a container.

5. The universal player of Claim 1, further comprising:

a catalog of media objects owned by or accessible to a user, wherein the media object display displays media objects referenced in the catalog.

6. The universal player of Claim 1, wherein a virtual medium is a virtual compact disc (CD) and the virtual media player has the appearance and functionality of a real CD player.

7. The universal player of Claim 6, wherein a container has the appearance of a jewel case.

8. The universal player of Claim 6, wherein the virtual media player comprises a tray which holds a single media object.

9. The universal player of Claim 1, wherein the virtual media player comprises a rotatable tray which holds up to a predetermined number of media objects.

10 10. The universal player of Claim 1, wherein the virtual media player a virtual magazine which holds up to a predetermined number of media objects.

11. The universal player of Claim 1, wherein the virtual media player comprises a rotatable, jukebox-style media holder which holds up to a predetermined number of media objects.

12. The universal player of Claim 1, wherein a media object file is represented by a case icon which is independent of where the media object file is stored.

13. The universal player of Claim 12, wherein a media object file is stored in any of memory, hard drive, and removable drive.

14. The universal player of Claim 1, wherein, upon clicking by a user on a container, the container opens, revealing the media object therein.

15. The universal player of Claim 14, wherein an open container reveals a booklet, such that when a user clicks on the booklet, liner notes are displayed.

16. The universal player of Claim 15, wherein a media object is a virtual CD, and liner notes comprise a list of all tracks on the virtual CD.

17. The universal player of Claim 15, wherein liner notes comprise reviews.

18. The universal player of Claim 17, wherein reviews are with respect to at least one artist.

19. The universal player of Claim 17, wherein reviews are with respect to the instant media object.

20. The universal player of Claim 15, wherein liner notes comprise an artist resume.

21. The universal player of Claim 15, wherein liner notes comprise an artist biography.

22. The universal player of Claim 15, wherein liner notes comprise a discography.

23. The universal player of Claim 15, wherein liner notes comprise cover art.

24. The universal player of Claim 15, wherein liner notes comprise at least one picture associated with the instant media object.

25. The universal player of Claim 1 wherein the media object file contains audio information.

26. The universal player of Claim 25 wherein a media object file format is MP3.

27. The universal player of Claim 25 wherein a media object file format is Quicktime.

28. The universal player of Claim 1 wherein the media object file contains music.

29. The universal player of Claim 1 wherein the media object file contains video information.

30. The universal player of Claim 1, further comprising an information display for displaying information about the playing media object file.

31. The universal player of Claim 30, wherein the information comprises at least one name of an artist associated with the playing media object file.

32. The universal player of Claim 30, wherein the information comprises a title of a song being played.

33. The universal player of Claim 30, wherein the information comprises elapsed time.

34. The universal player of Claim 1, wherein upon clicking on an exposed media object, the media object holder is opened, and the media object is visually loaded onto the media object holder.

35. The universal player of Claim 34, wherein after the media object is loaded onto the media object holder, the media object holder closes and the file automatically begins to play a media object file associated with the media object.

36. The universal player of Claim 34, wherein the animator animates a smooth transition of loading the media object onto the media object holder.

37. The universal player of Claim 1, further comprising:

a downloader which downloads media object files from a provider; and

a librarian which stores downloaded media object files and maintains references to their stored locations.

38. The universal player of Claim 37, wherein the downloaded media object files are purchased by a user.

39. The universal player of Claim 1, further comprising:

a Web-receiver which receives streams from a Web broadcaster.

40. The universal player of Claim 39, wherein a stream is a Web-radio stream.

41. The universal player of Claim 39, wherein a stream is a video stream.

42. The universal player of Claim 1 further comprising:

means for recording music from a CD player.

43. The universal player of Claim 1, wherein the media object display comprises a virtual rack for holding at least one media object.

44. The universal player of Claim 43, further comprising:

means for allowing a user to move a media object from the virtual rack.

45. The universal player of Claim 43, wherein the virtual rack displays media objects according to a selected category.

46. The universal player of Claim 45, wherein the selected category is genre.

47. The universal player of Claim 45, wherein the selected category is artist.

48. The universal player of Claim 45, wherein the selected category is title

49. The universal player of Claim 45, wherein the selected category is displayed on the virtual rack.

50. The universal player of Claim 43, wherein the virtual rack displays media objects owned by or accessible to a current user.

51. The universal player of Claim 43, wherein the virtual rack emulates a spinner, which a user can cause to spin to scroll through a selected category.

52. The universal player of Claim 1, further comprising:

means for allowing a user to define at least one compilation, a compilation comprising at least one media object, wherein the compilation appears and behaves as a media object.

53. The universal player of Claim 1, further comprising:

a virtual rack,

wherein dragging a first selection to an empty slot in the compilation rack creates a compilation comprising the first media object, and

wherein dragging a subsequent selection to the compilation adds the media selection the compilation.

54. The universal player of Claim 53, wherein the first and subsequent selections each comprise any of a media collection, a selected portion of a media collection or another existing compilation.

55. The universal player of Claim 53, wherein upon a user clicking on a media object, contents of the media object are displayed.

56. The universal player of Claim 55, wherein the contents are displayed as a list.

57. The universal player of Claim 55, wherein status of the media object is displayed.

58. The universal player of Claim 57, wherein status comprises a source from which the media object was obtained.

59. The universal player of Claim 1, wherein a media object is a virtual digital video disc (DVD) and the virtual media player has the appearance and functionality of a real DVD player.

60. The universal player of Claim 1, further comprising:

a data collector which collects statistical data about a user's use.

61. The universal player of Claim 60, wherein the statistical data comprises a list of purchased music.

62. The universal player of Claim 60, wherein the statistical data is responsive to the user's use history.

63. The universal player of Claim 62, wherein the user's use history comprises a list of sampled selections downloaded from a provider.

64. The universal player of Claim 62, wherein the user's use history is responsive to the user's playback of any of media or selections.

65. The universal player of Claim 62, wherein the user's use history is responsive to selections received via Web radio.

66. The universal player of Claim 60, wherein the data collector further comprises:

a transmitter which sends the collected statistical data to a vendor.

67 The universal player of Claim 66, wherein the vendor offers the user a special promotion based on the collected data.

68. The universal player of Claim 66, wherein the vendor recommends music to the user responsive to the collected data.

69. The universal player of Claim 1, further comprising:

means for playing back a physical CD; and

a CD identifier which identifies a physical CD being played back.

70. The universal player of Claim 69, wherein the CD identifier comprises:

means for entering an identification code which identifies the CD.

71. The universal player of Claim 69, wherein the CD identifier comprises:

a software spider which examines the shape of data on the CD and compares the shape against a database of CD data shapes, identification of the CD being responsive to the comparison.

72. The universal player of Claim 71, wherein the shape of data comprises timing information.

73. The universal player of Claim 69, wherein the CD is registered with the universal player system's database by the librarian.

74. The universal player of Claim 69, wherein the CD is registered in a vendor's database.

75. The universal player of Claim 1, further comprising:

a vendor searcher which allows the user to search for media in the vendors's database; and

a virtual shopping basket which displays the user's purchase selections.

76. The universal player of Claim 1, further comprising:

a preview guide displayer which displays a preview guide which is downloaded from a vendor upon a request by the user, the preview guide being periodically updated by the vendor.

77. The universal player of Claim 76, wherein the preview guide is customized by the vendor responsive to user use statistical data.

78. The universal player of Claim 77, wherein customization of the preview guide comprises promotion offers.

79. The universal player of Claim 76, wherein the preview guide comprises any of a picture of a featured artist, cover art, liner notes, concert dates for the artist, trailers, track samples, and reviews.

80. The universal player of Claim 1, further comprising:

a community screen for providing links to related Web sites.

81. The universal player of Claim 80, wherein the community screen comprises:

customizable yellow pages providing searchable links to related Web sites.

82. The universal player of Claim 1, further comprising:

a viewer for viewing videos.

83. The universal player of Claim 1, further comprising:

a virtual receiver which receives and plays Web broadcasts, the virtual receiver having the appearance and functionality of a real receiver; and

a librarian which stores a portion of the received broadcast and maintains references to their stored locations.

84. The universal player of Claim 1, wherein the virtual receiver is a virtual radio receiver and the Web broadcasts comprise an audio stream.

85. The universal player of Claim 1, wherein the virtual receiver is a virtual television receiver and the Web broadcasts comprise streaming video.

86. A method for maintaining and playing a collection of media objects, comprising:

providing a virtual player having the appearance and functionality of a real media player;

displaying media objects owned by or accessible to a user are displayed;

visually emulating loading a displayed media object onto the virtual media player responsive to a user command;

loading a media object file corresponding to the selected media object, responsive to the user command; and

selecting playback software appropriate for the loaded media object file's format.

87. The method of Claim 86, further comprising:

activating the selected playback software to play the loaded media object file.

88. A computer program product for maintaining and playing a collection of media objects, the computer program product comprising a computer usable

medium having computer readable code thereon, including program code which:

provides a virtual player having the appearance and functionality of a real media player;

displays media objects owned by or accessible to a user are displayed;

visually emulates loading a displayed media object onto the virtual media player responsive to a user command;

loads a media object file corresponding to the selected media object, responsive to the user command; and

selects playback software appropriate for the loaded media object file's format.

89. A computer system comprising:

a processor;

a memory system connected to the processor; and

a computer program, in the memory, which:

provides a virtual player having the appearance and functionality of a real media player;

displays media objects owned by or accessible to a user are displayed;

visually emulates loading a displayed media object onto the virtual media player responsive to a user command;

loads a media object file corresponding to the selected media object, responsive to the user command; and

selects playback software appropriate for the loaded media object file's format.

90. A computer data signal embodied in a carrier wave for maintaining and playing a collection of media objects, comprising:

program code for providing a virtual player having the appearance and functionality of a real media player;

program code for displaying media objects owned by or accessible to a user are displayed;

program code for visually emulating loading a displayed media object onto the virtual media player responsive to a user command;

program code for loading a media object file corresponding to the selected media object, responsive to the user command; and

program code for selecting playback software appropriate for the loaded media object file's format.

91. A system for displaying, on a processor display, a collection of media, comprising:

a media object organizer,

wherein dragging a first selection to an empty slot in the media object organizer creates a compilation comprising the first selection, and

wherein dragging a subsequent selection to the compilation adds the selection to the second existing compilation.

92. A system for displaying a collection of media as claimed in Claim 91, wherein media include at least one of text files, drawings, music, videos and photos.

93. A system for displaying a collection of media as claimed in Claim 91, wherein the collection is sorted by category.

94. A system for displaying a collection of media is claimed in Claim 91, wherein the media object organizer is a virtual rack.

95. A computer program product for displaying a collection of media objects, the computer program product comprising a computer usable medium having computer readable code thereon, including program code which:

provides a media object organizer;

creates a compilation when a user drags a first selection to an empty slot in the media object organizer, the compilation comprising the first selection; and

adds a subsequent selection to the compilation when the user drags the subsequent selection to the compilation.

96. A method, in a processor, for defining a compilation of media objects, each media object representing at least one media object file, comprising:

creating a compilation upon a user dragging and dropping an icon representing a media object into an empty position in a virtual rack, such that a reference to the media object file represented by the icon is associated with the compilation;

creating an icon associated with the compilation and placing the icon in the virtual rack;

adding to the compilation, upon a user dragging and dropping a second icon representing a second media object onto the icon associated with the compilation, such that references to media object files represented by the second icon are associated with the compilation.

97. The method of Claim 96, wherein media object files are audio files.

98. The method of Claim 97, further comprising:

copying the media object files associated with a compilation to a portable digital audio device.

99. The method of Claim 97, further comprising:

copying the media object files associated with a compilation to a compact disc (CD).

100. The method of Claim 96, further comprising:

assigning a title to a compilation responsive to a user's specification.

101. The method of Claim 96, further comprising:

associating a picture to a compilation's associated icon, responsive to a user's specification.

102. The method of Claim 96, further comprising:

saving a list of references associated with a compilation in a storage device.

103. The method of Claim 96, further comprising:

displaying representations of the media object files associated with a compilation in an order specified by a user.

104. The method of Claim 103, wherein the representations are icons.

105. The method of Claim 103, wherein the representations are displayed in order by title.

106. The method of Claim 103, wherein the representations are displayed in order by compilation date.

107. A computer program product for identifying a physical media object, the computer program product comprising a computer usable medium having computer readable code thereon, including program code which:

examines data characteristics of data on the physical media object;

compares the data characteristics against a database of physical media object data characteristics; and

identifies the physical media object responsive to the step of comparing.

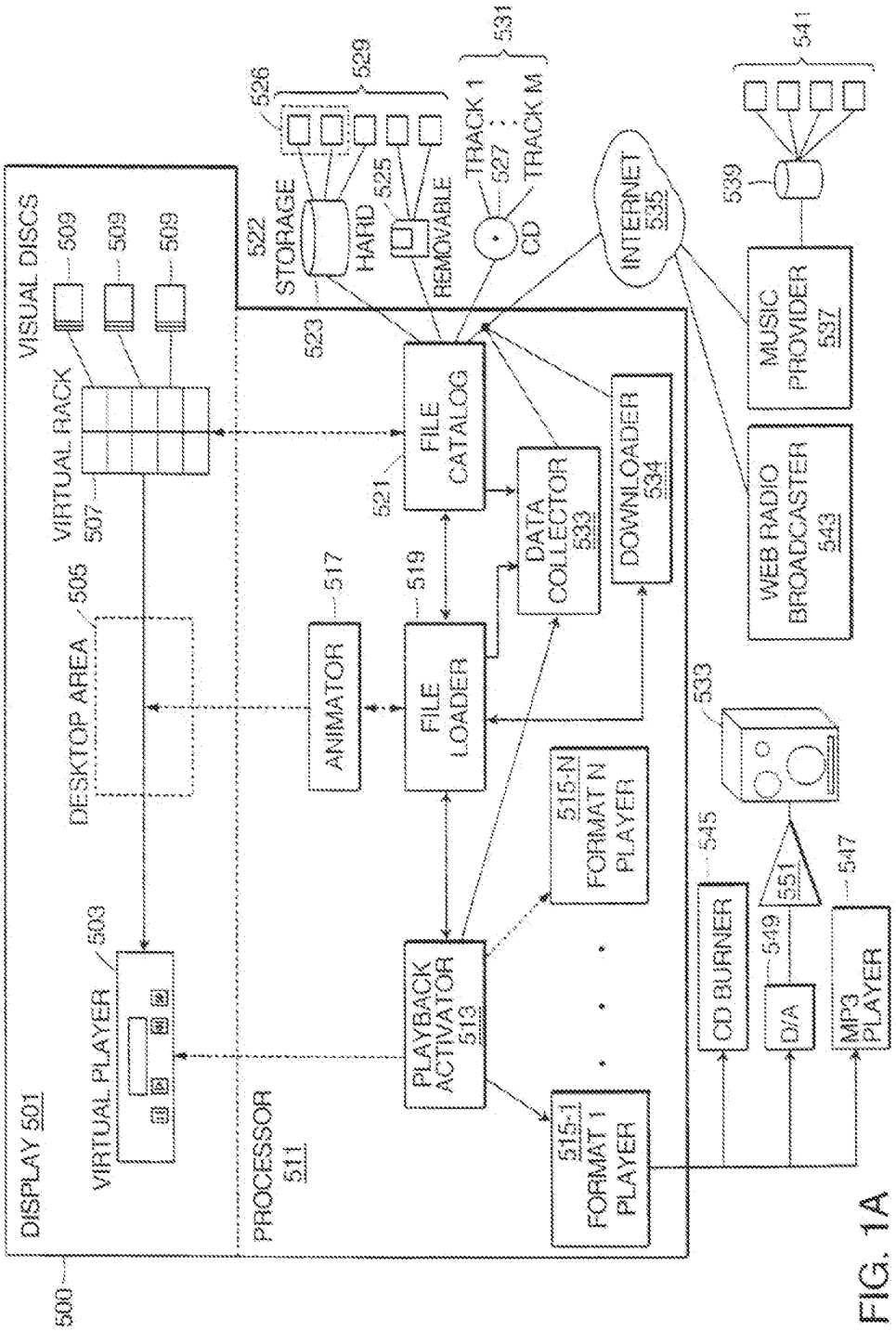


FIG. 1A

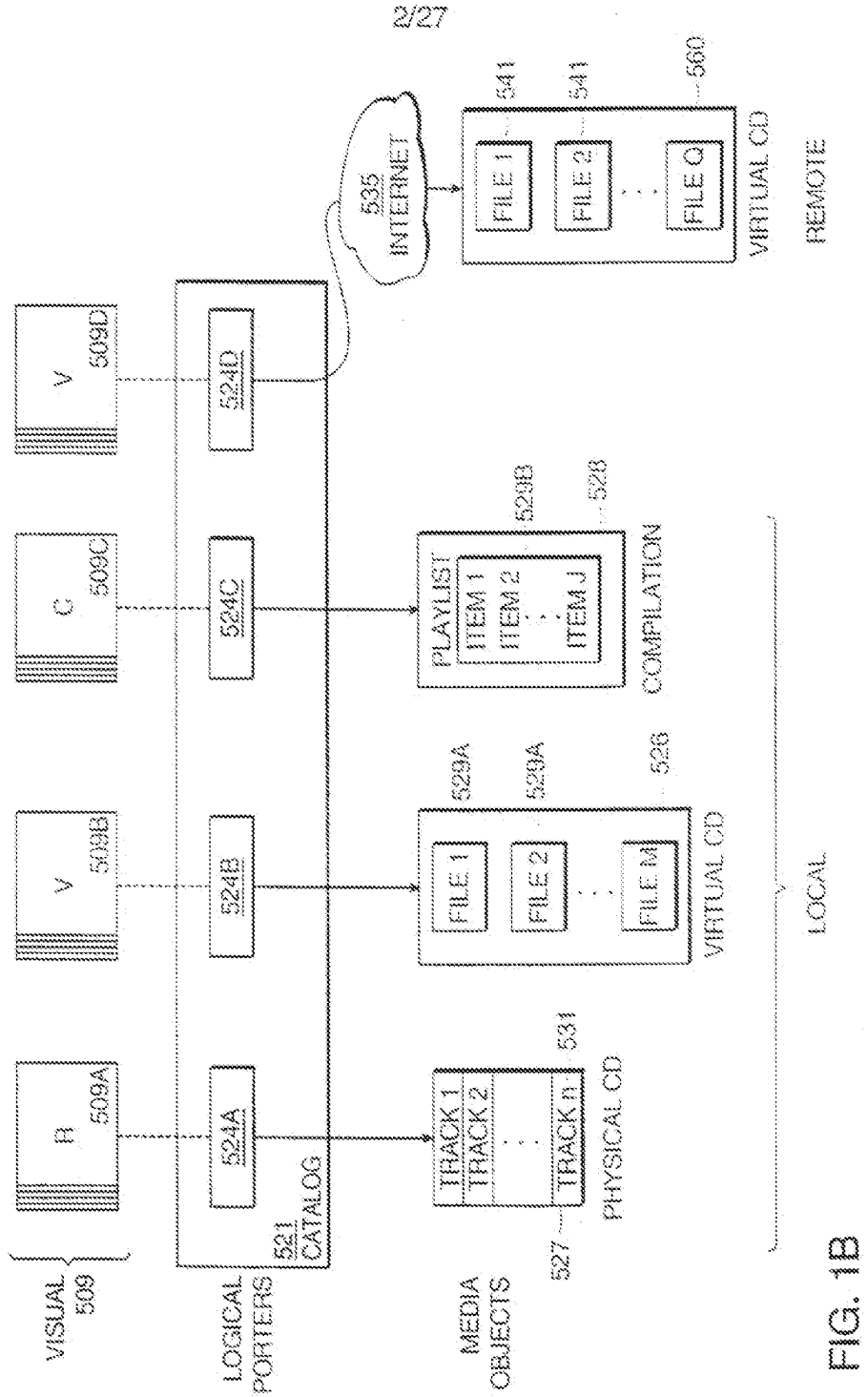


FIG. 1B

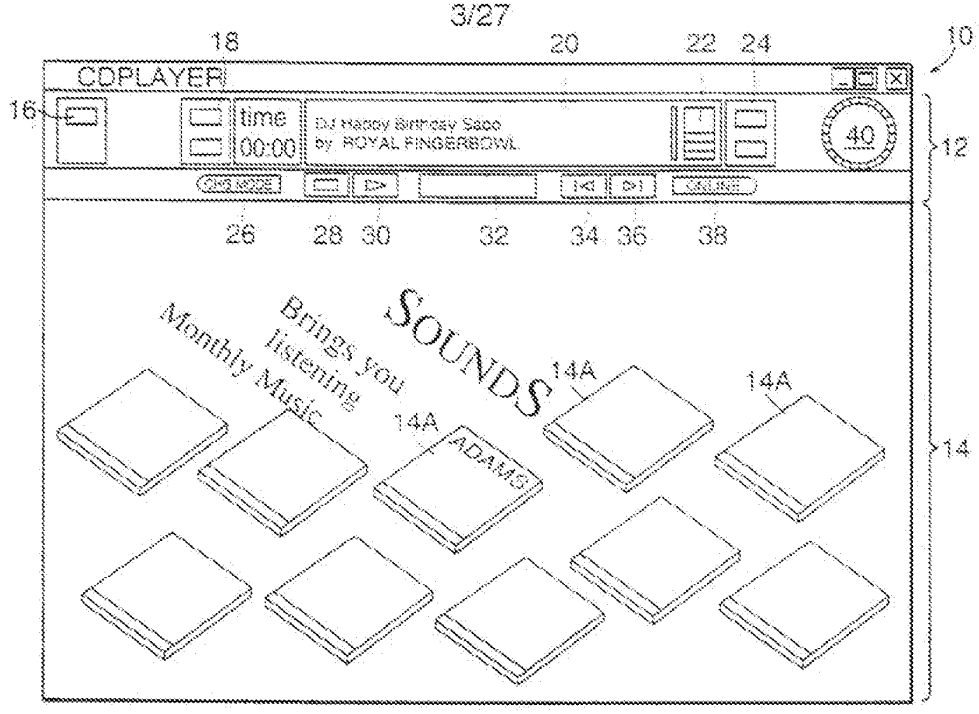

18
20
22
24
10
CDPLAYER
16
time
00:00
DJ Happy Birthday Saco
by ROYAL FINGERBOWL
40
12
26
28
30
32
34
36
38
Brings you
listening
Monthly Music
SOUNDS
14A
14A
14A
ADAMS
14

FIG. 2A

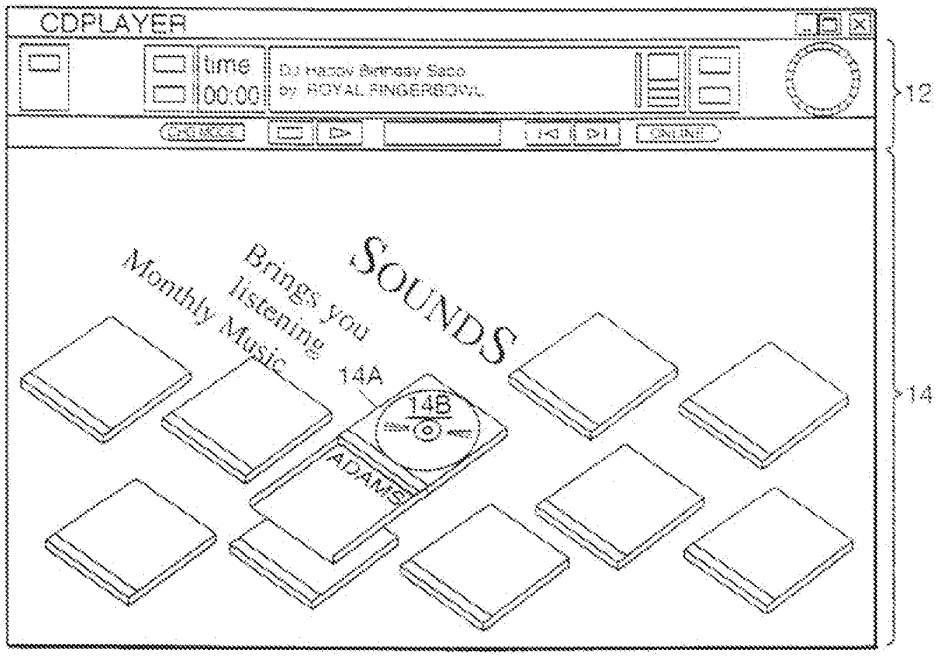

CDPLAYER
time
00:00
DJ Happy Birthday Saco
by ROYAL FINGERBOWL
12
Brings you
listening
Monthly Music
SOUNDS
14A
14B
ADAMS
14

FIG. 2B

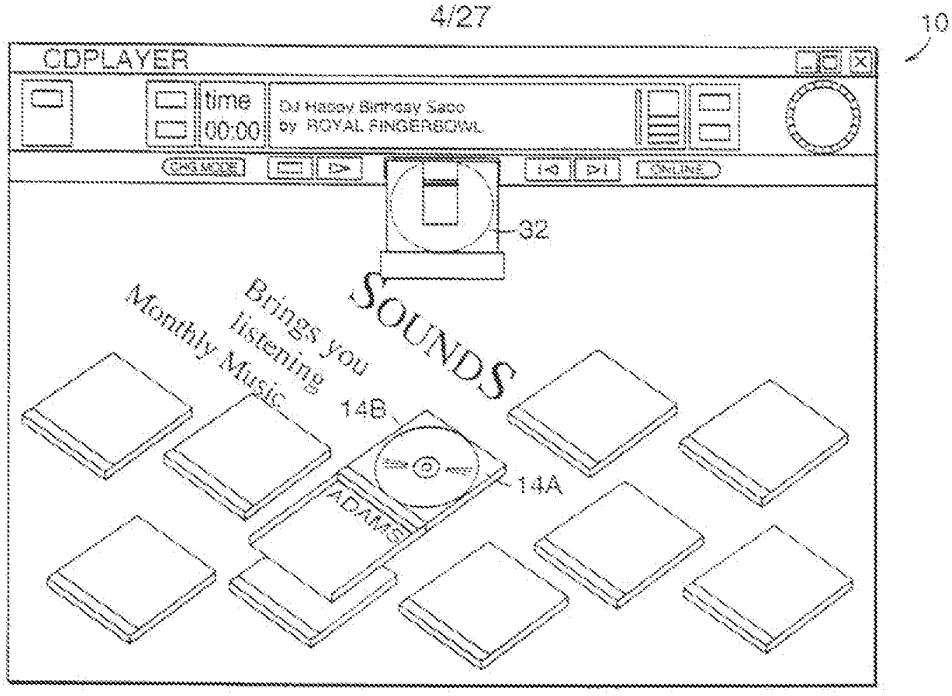

10
CDPLAYER
time
00:00
DJ Happy Birthday Sabo
by ROYAL FINGERBOWL
32
SOUNDS
Brings you
listening
Monthly Music
14B
14A
ADAMS

FIG. 3A

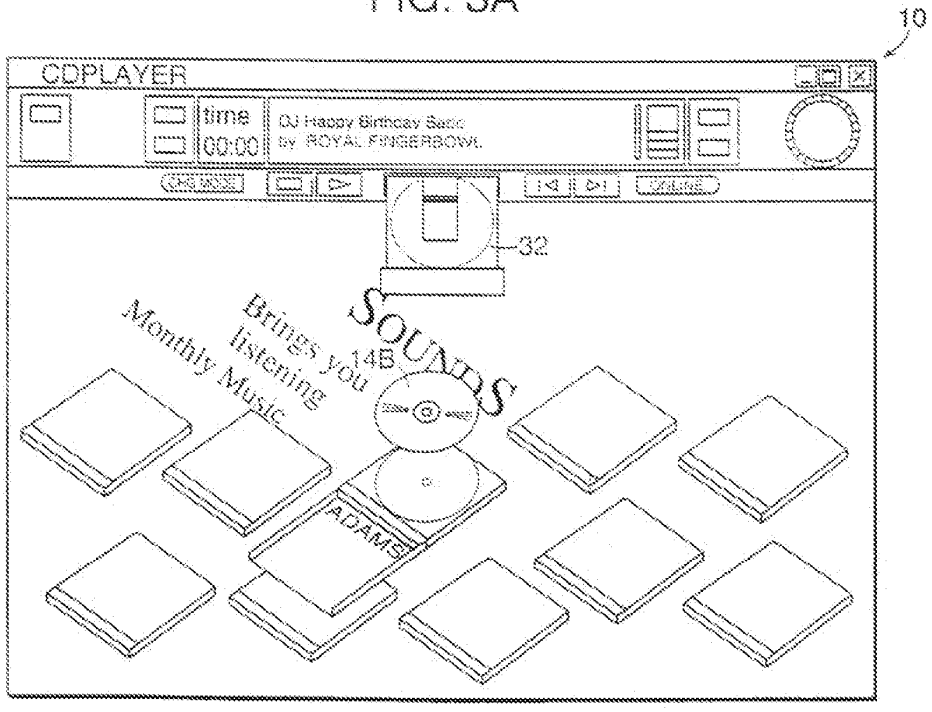

10
CDPLAYER
time
00:00
DJ Happy Birthday Sabo
by ROYAL FINGERBOWL
32
SOUNDS
Brings you
listening
Monthly Music
14B
ADAMS

FIG. 3B

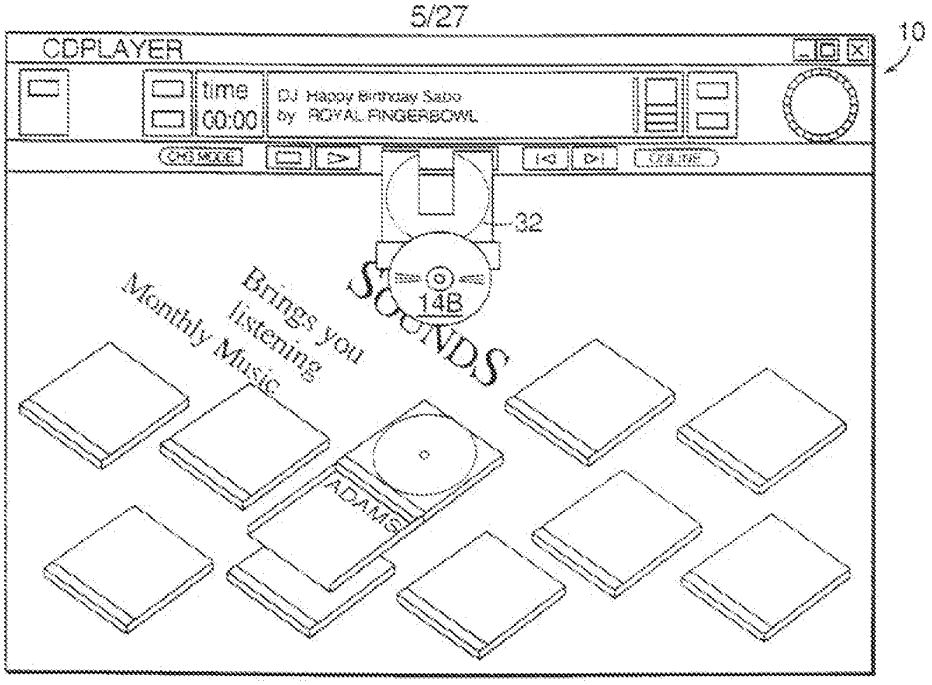


FIG. 3C

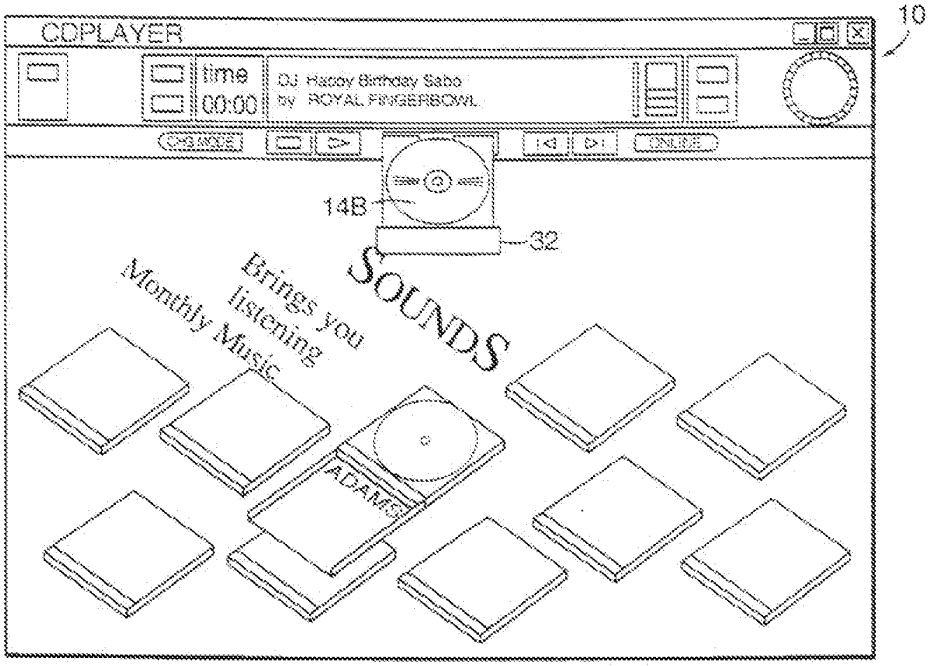


FIG. 3D

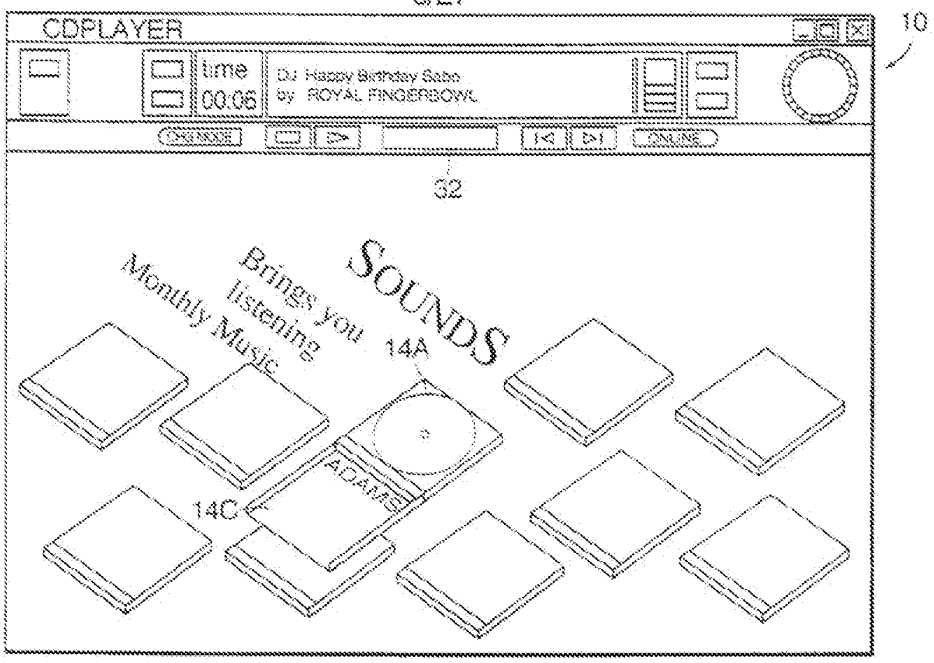

CDPLAYER
time
00:06
DJ Happy Birthday Sabo
by ROYAL FINGERBOWL
10
32
SOUNDS
Brings you
listening
Monthly Music
14A
14C
ADAMS

FIG. 3E

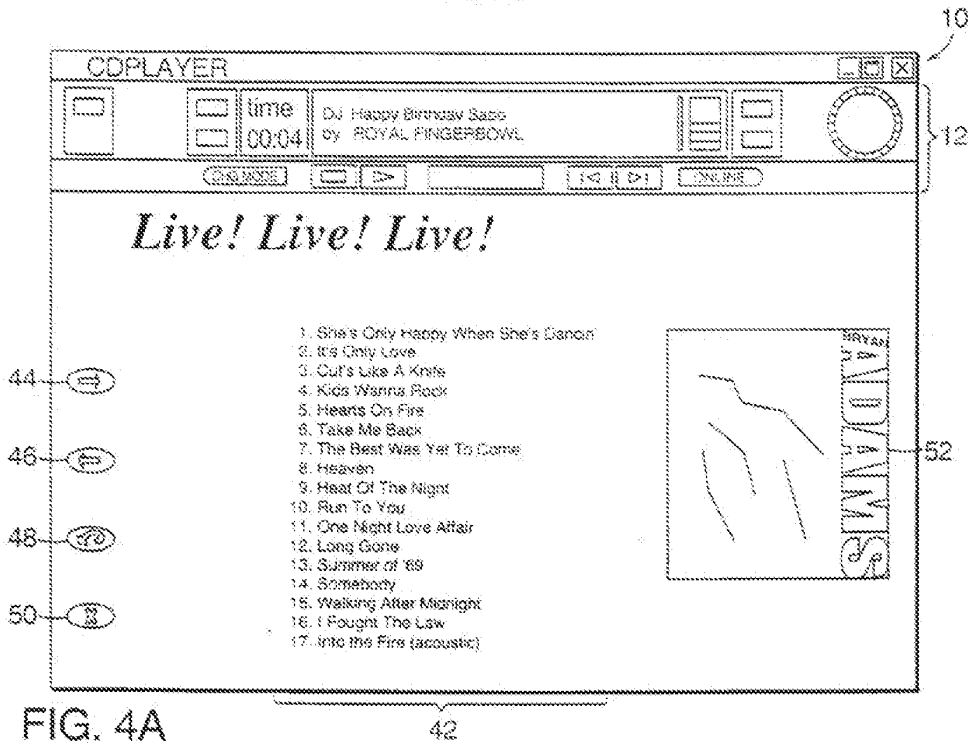

10
CDPLAYER
time
00:04
DJ Happy Birthday Sabo
by ROYAL FINGERBOWL
12
Live! Live! Live!
1. She's Only Happy When She's Dancin
2. It's Only Love
3. Cut's Like A Knife
4. Kids Wanna Rock
5. Hearts On Fire
6. Take Me Back
7. The Best Was Yet To Come
8. Heaven
9. Heat Of The Night
10. Run To You
11. One Night Love Affair
12. Long Gone
13. Summer of '69
14. Somebody
15. Walking After Midnight
16. I Fought The Law
17. Into the Fire (acoustic)
44
46
48
50
52
ADAMS
42

FIG. 4A

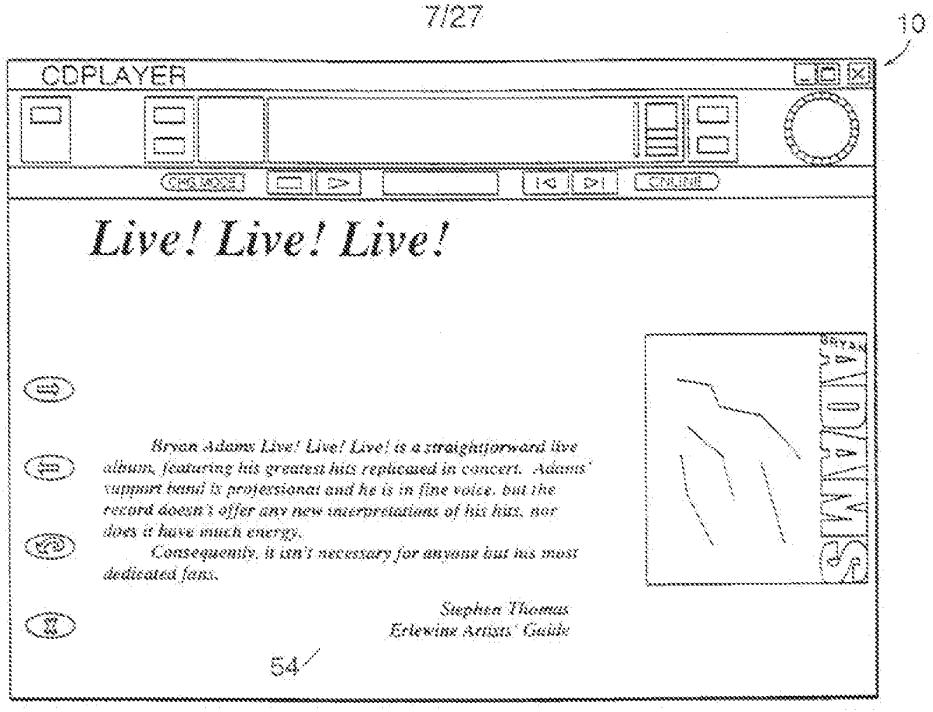

10
CDPLAYER
Live! Live! Live!
Bryan Adams Live! Live! Live! is a straightforward live album, featuring his greatest hits replicated in concert. Adams' support band is professional and he is in fine voice, but the record doesn't offer any new interpretations of his hits, nor does it have much energy.
Consequently, it isn't necessary for anyone but his most dedicated fans.
Stephen Thomas
Erlewine Artists' Guide
54
BRYAN ADAMS

FIG. 4B

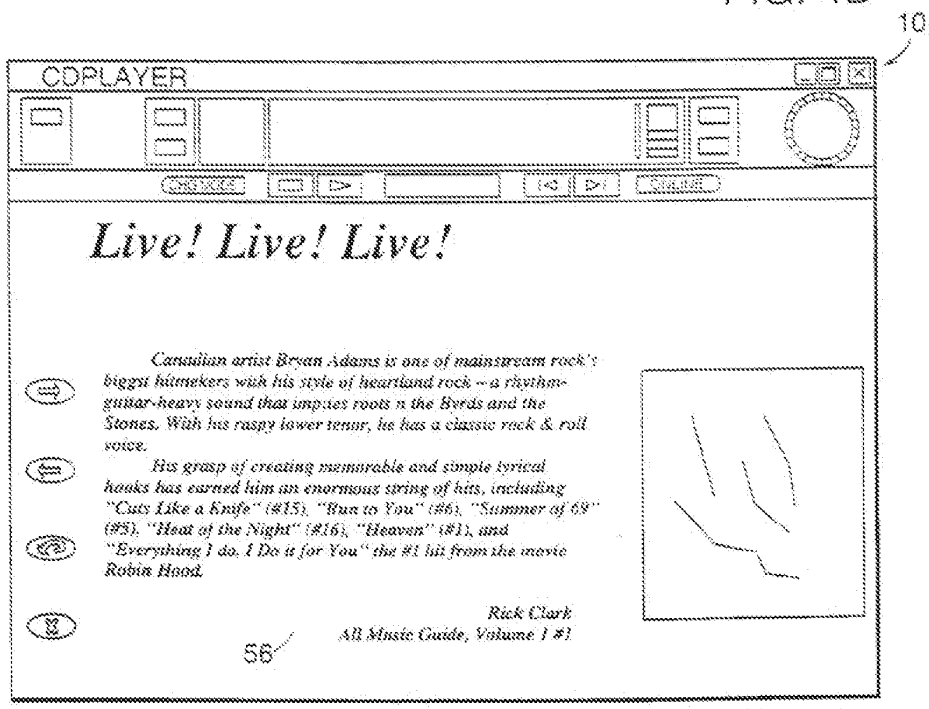

10
CDPLAYER
Live! Live! Live!
Canadian artist Bryan Adams is one of mainstream rock's biggest hitmakers with his style of heartland rock -- a rhythm-guitar-heavy sound that imputes roots n the Byrds and the Stones. With his raspy lower tenor, he has a classic rock & roll voice.
His grasp of creating memorable and simple lyrical hooks has earned him an enormous string of hits, including "Cuts Like a Knife" (#15), "Run to You" (#6), "Summer of 69" (#5), "Heat of the Night" (#16), "Heaven" (#1), and "Everything I do, I Do it for You" the #1 hit from the movie Robin Hood.
Rick Clark
All Music Guide, Volume 1 #)
56

FIG. 4C

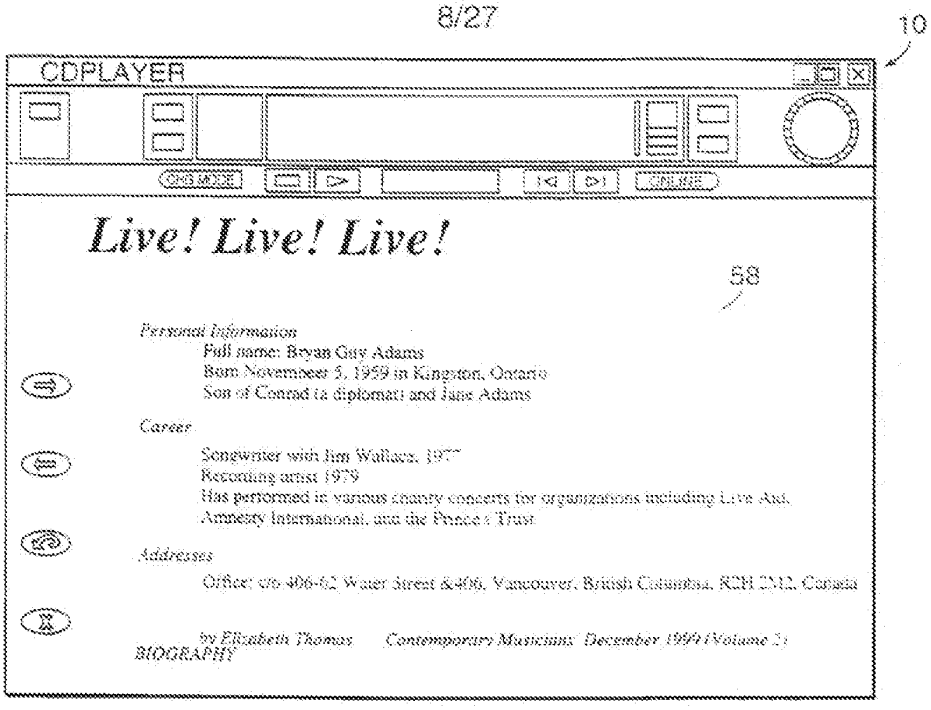


FIG. 4D

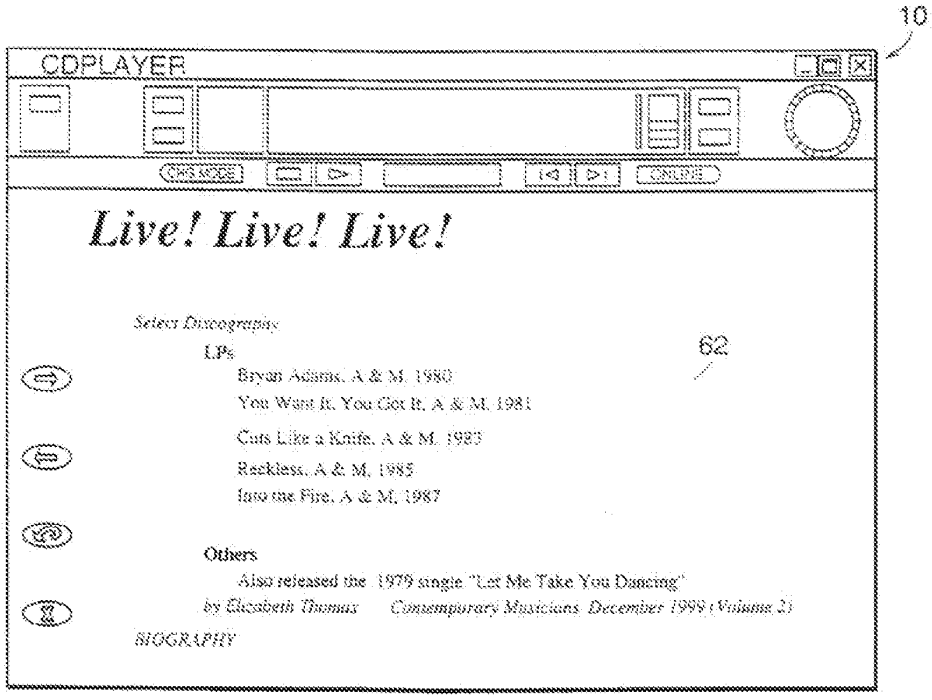


FIG. 4F

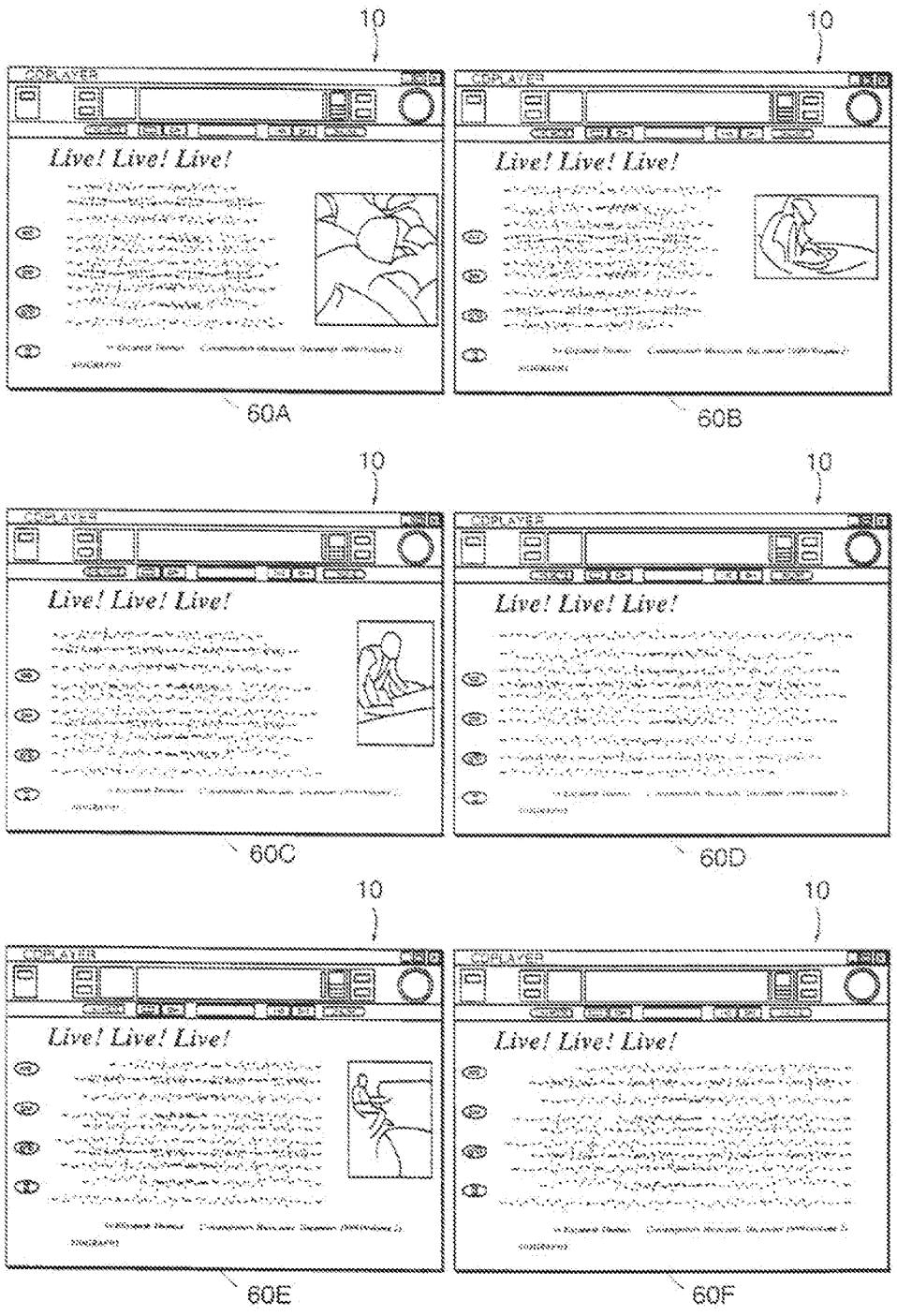


FIG. 4E

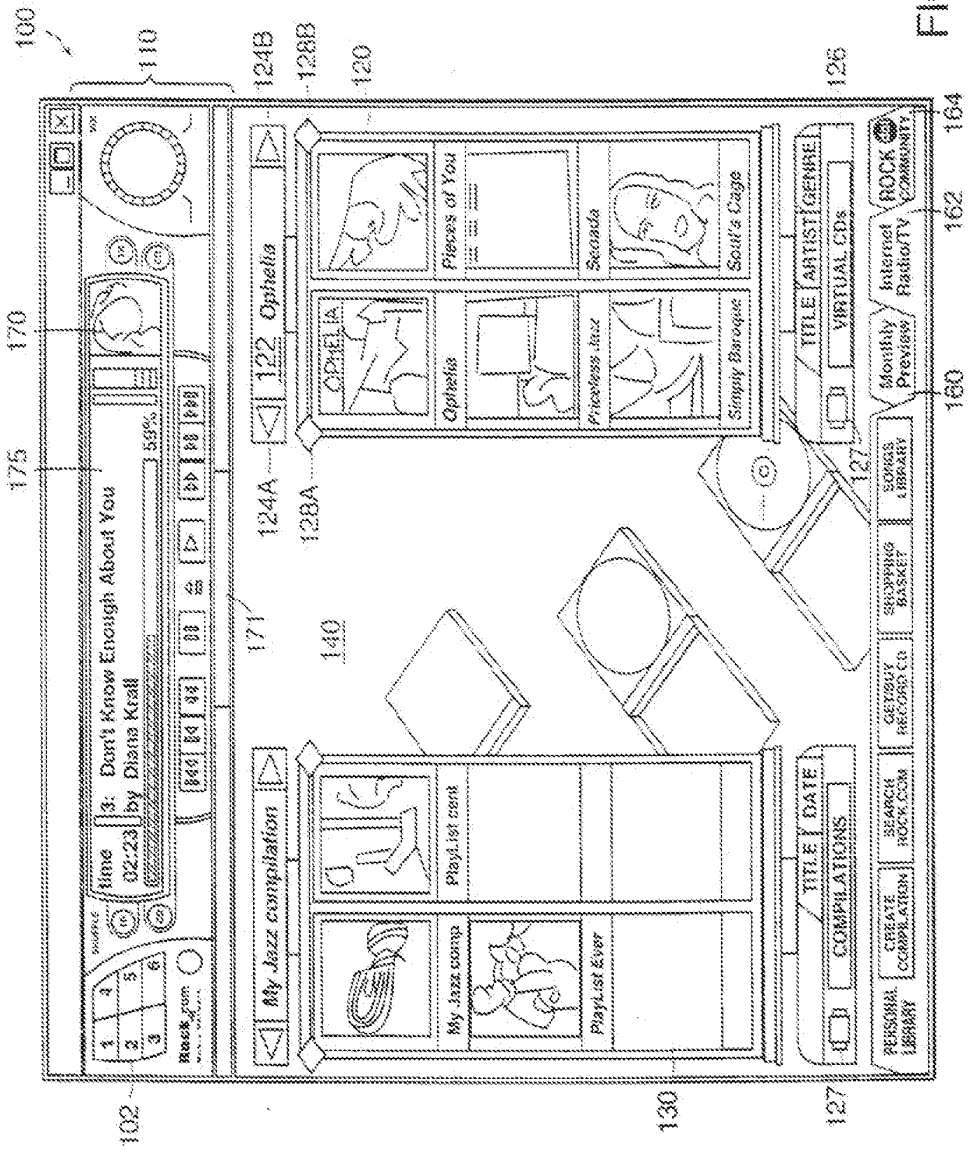


FIG. 5A

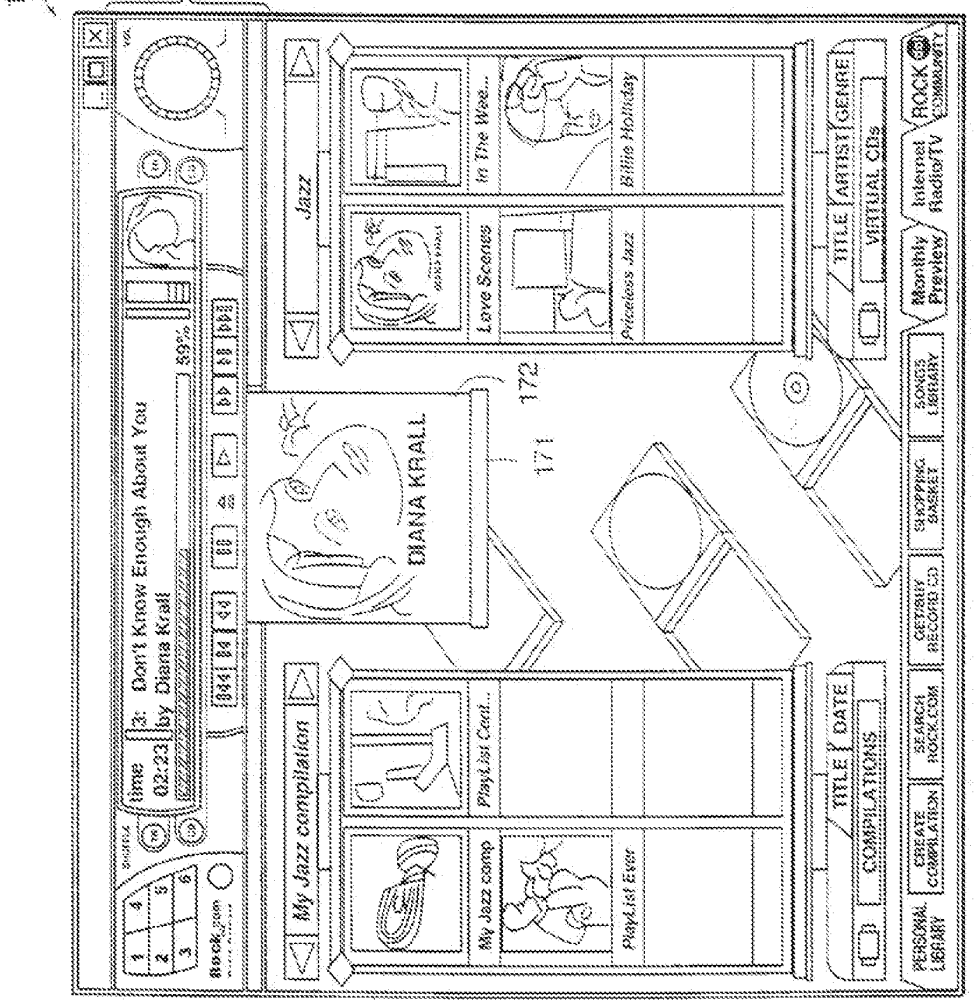


FIG. 5B

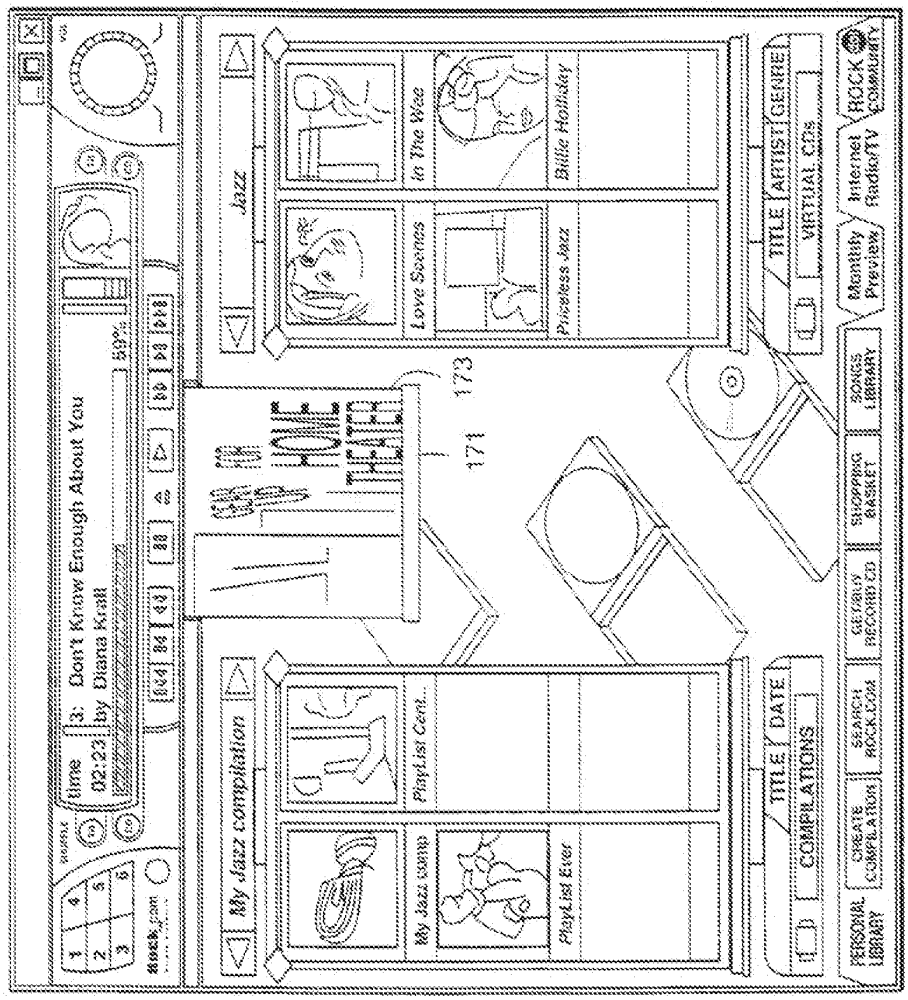


FIG. 5C

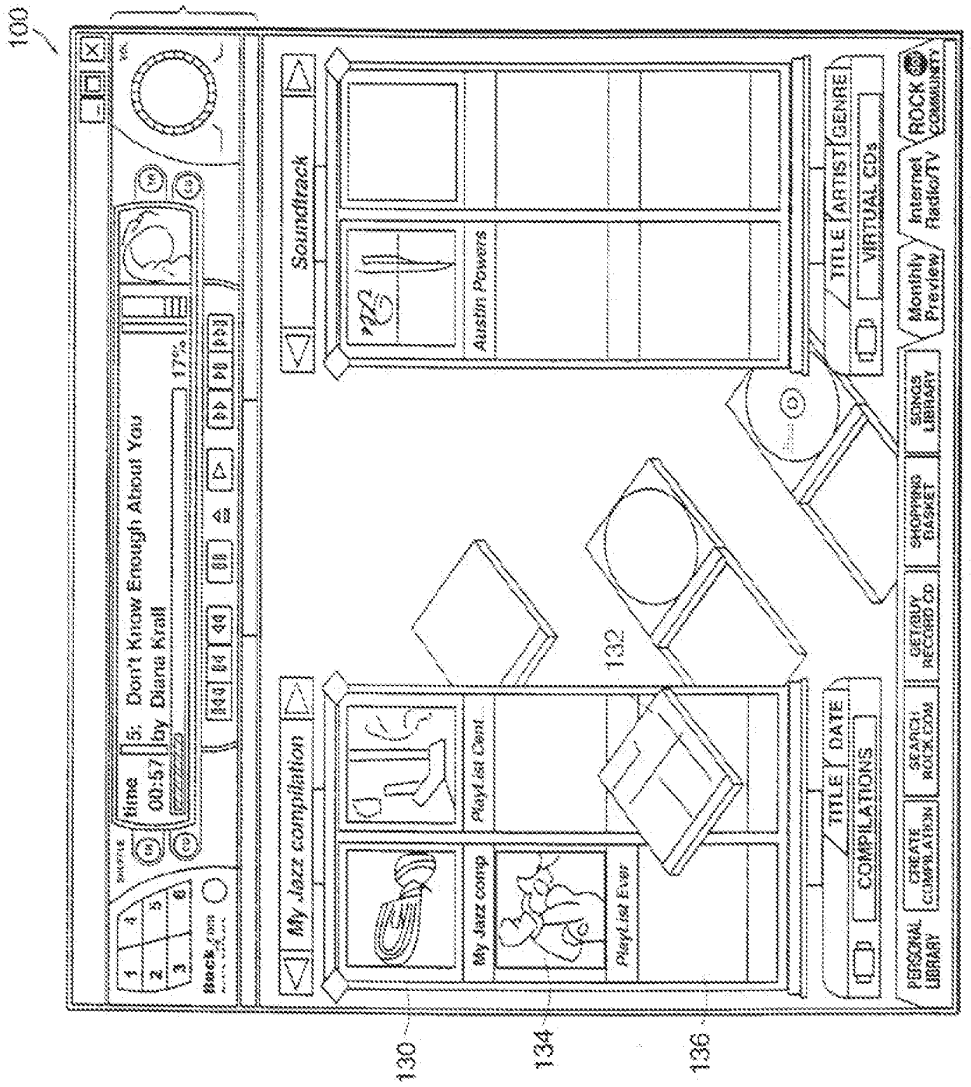


FIG. 6A

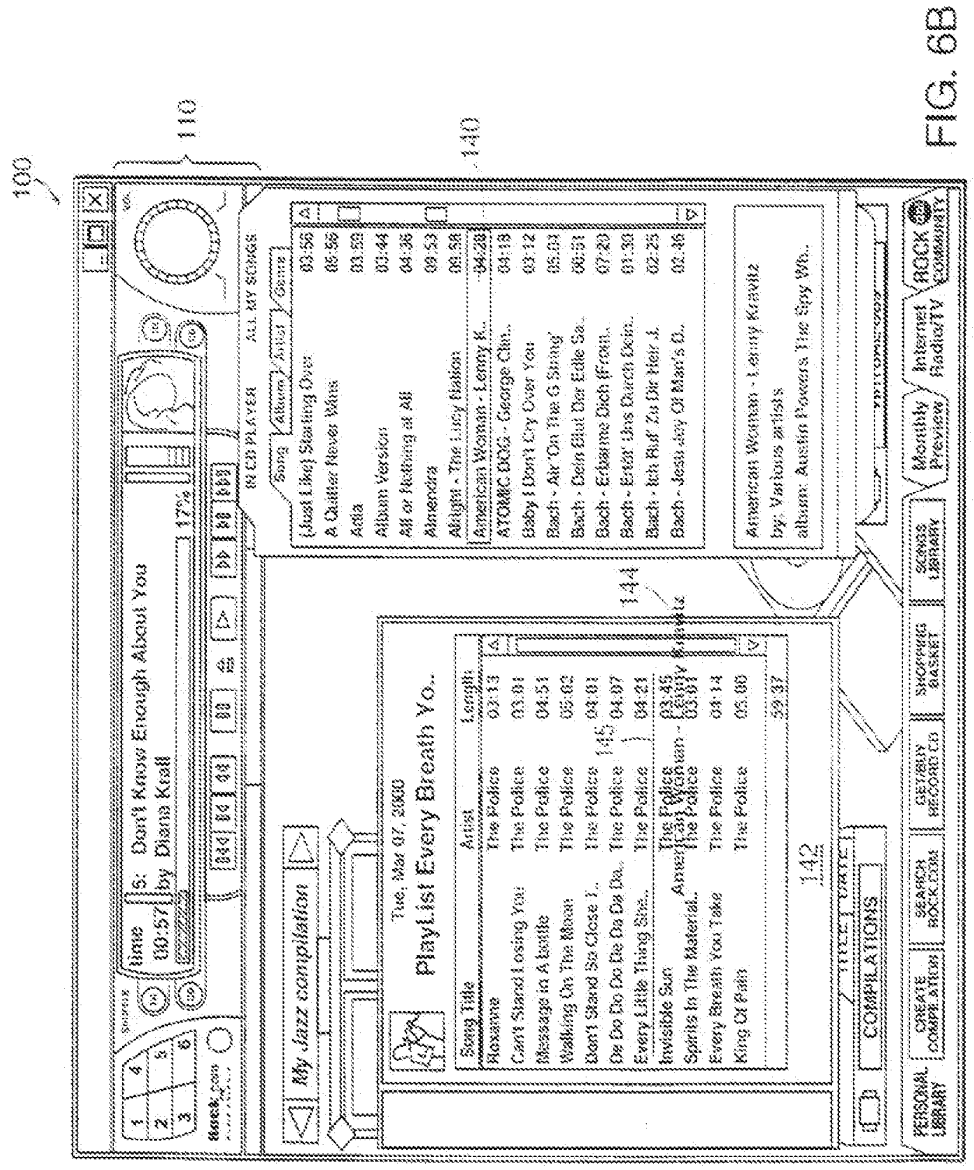


FIG. 6B

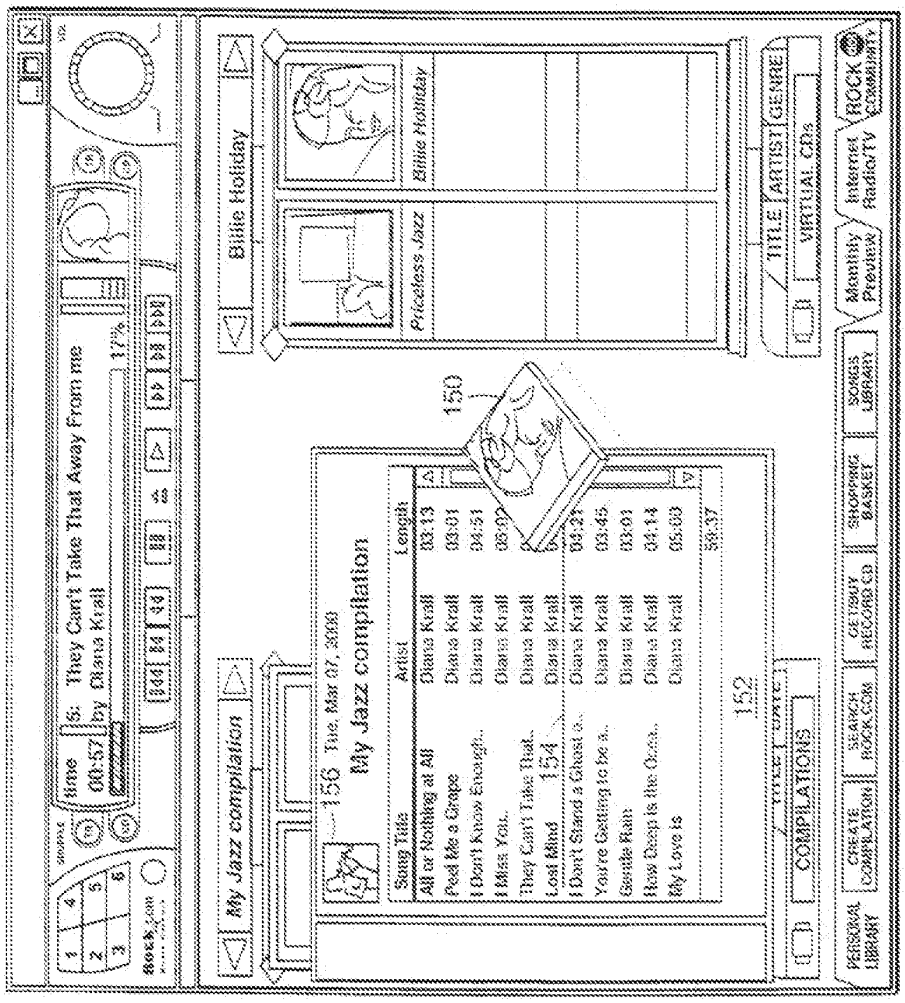


FIG. 6C

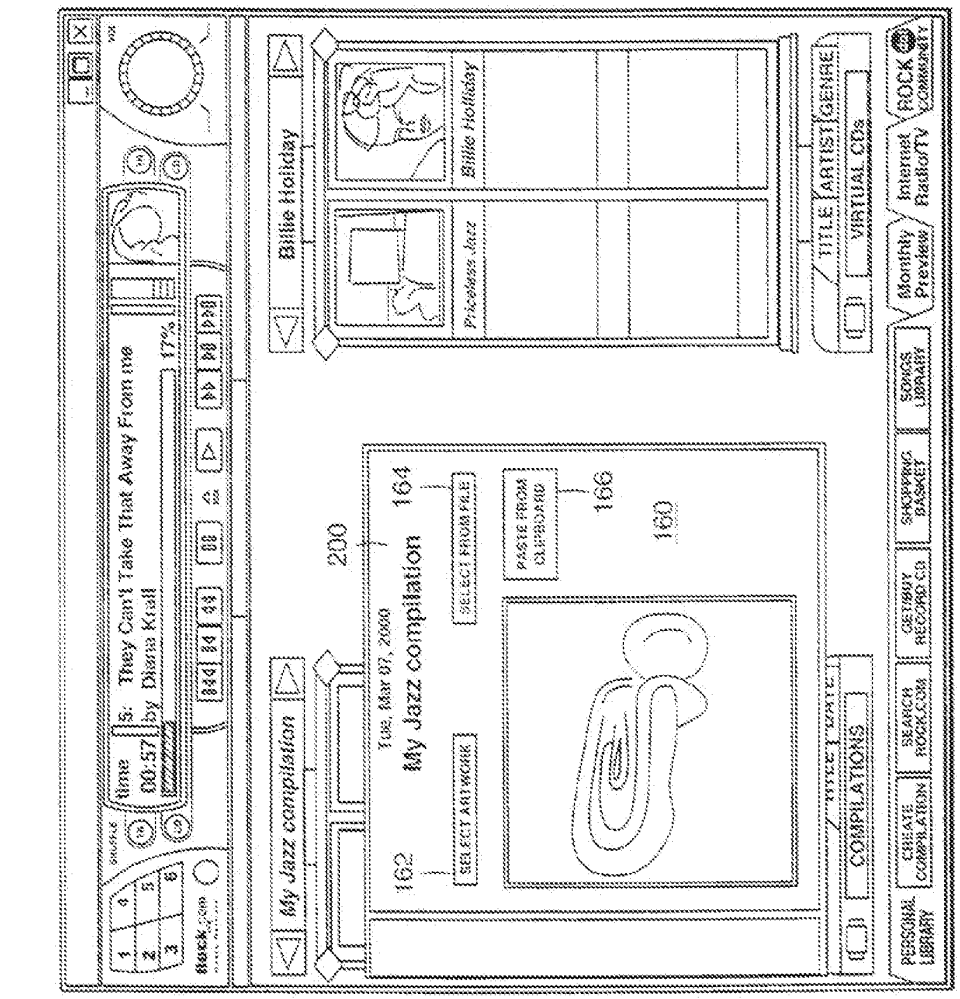


FIG. 6D

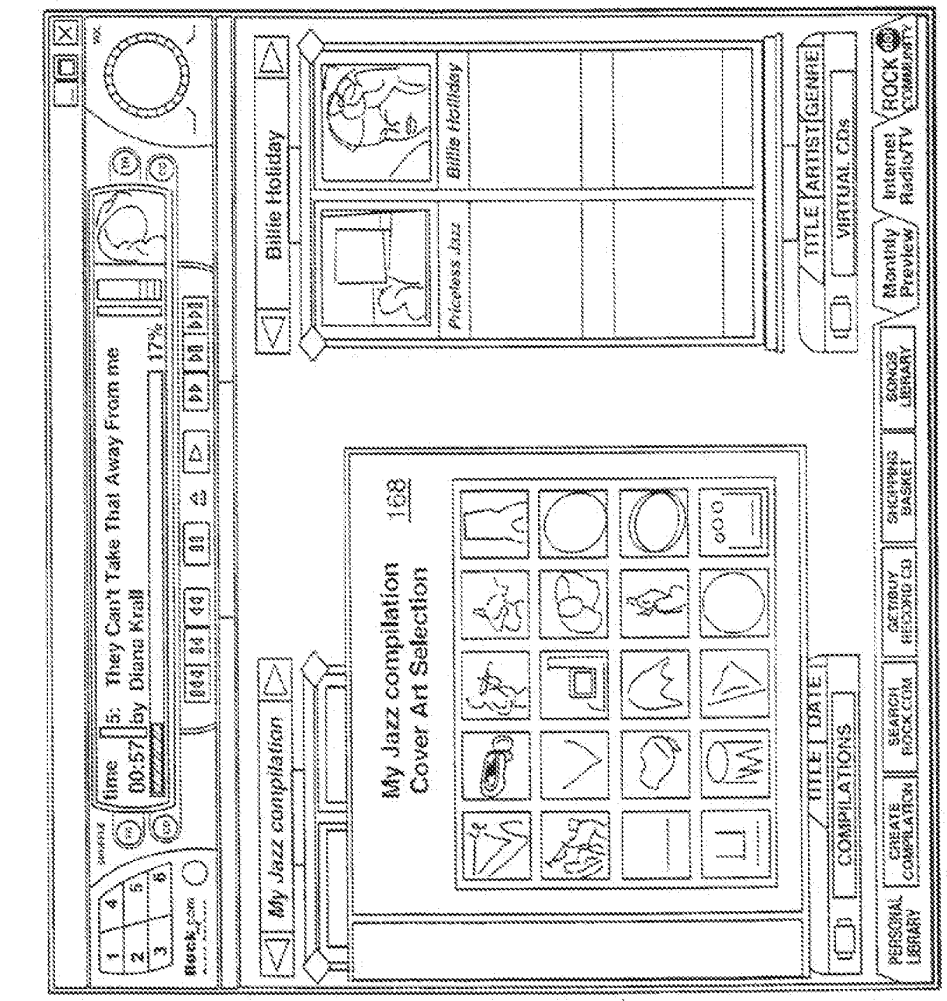


FIG. 6E

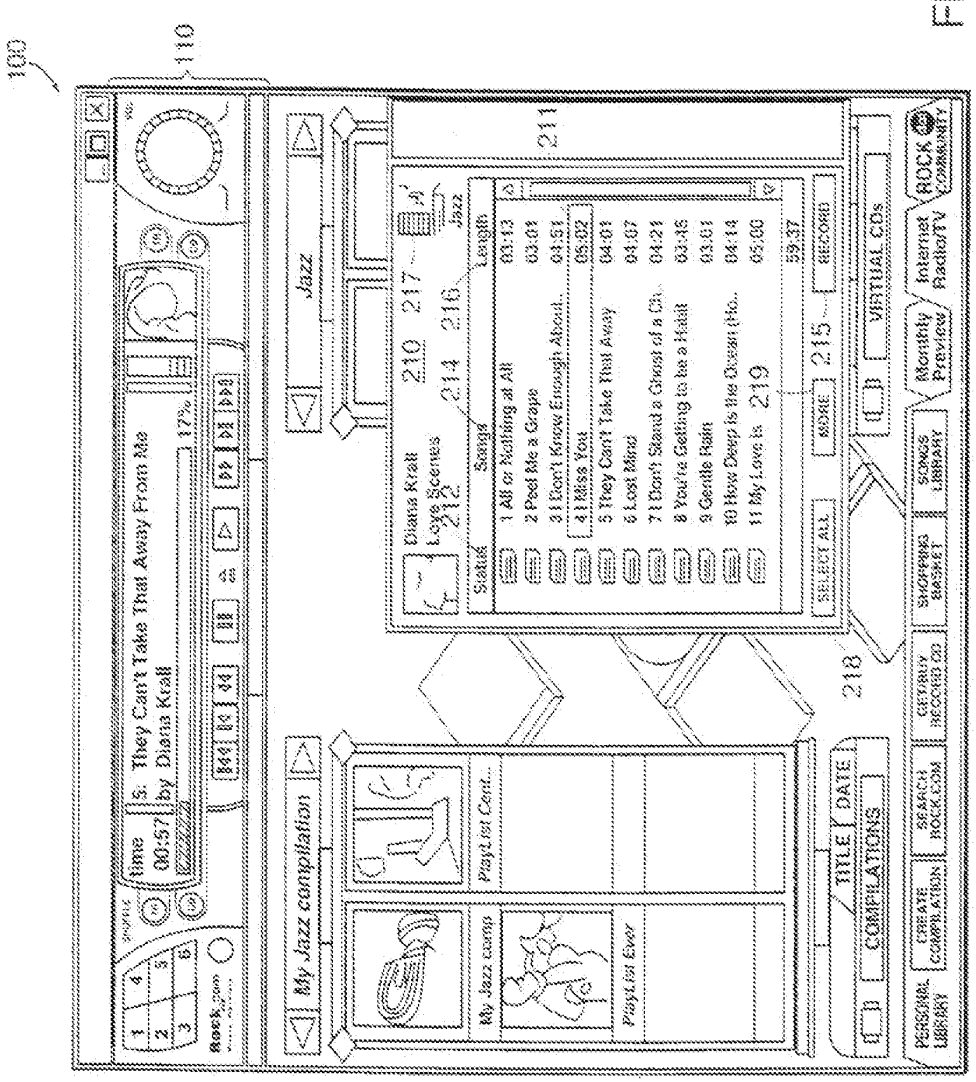


FIG. 7

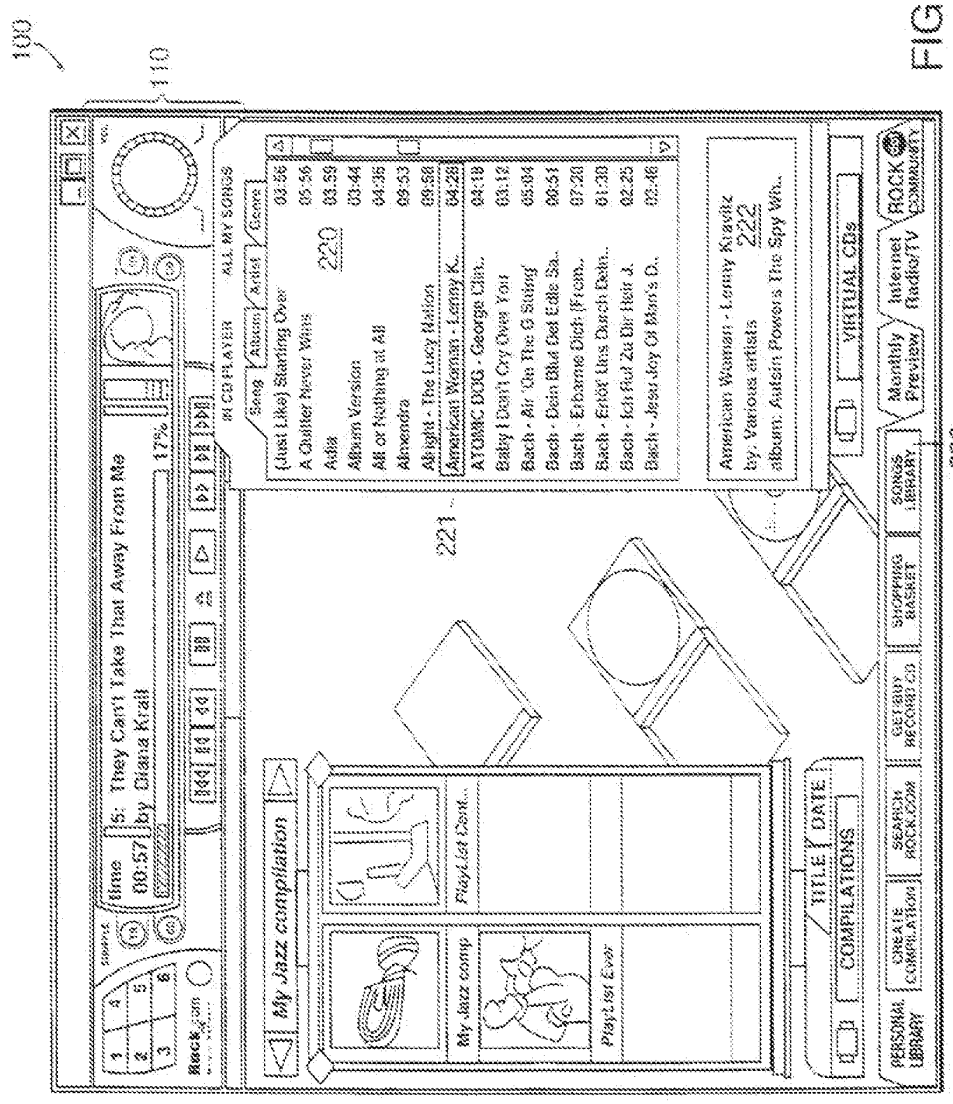


FIG. 8

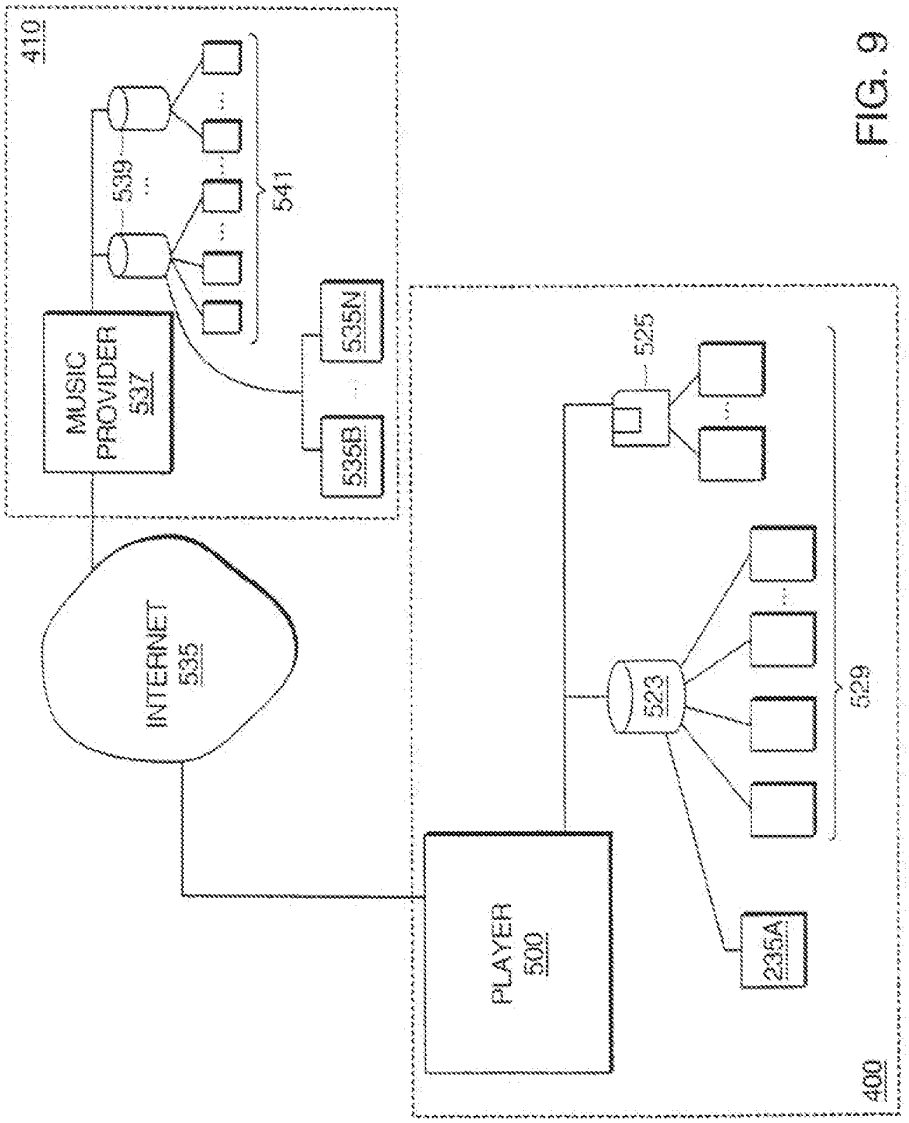


FIG. 9

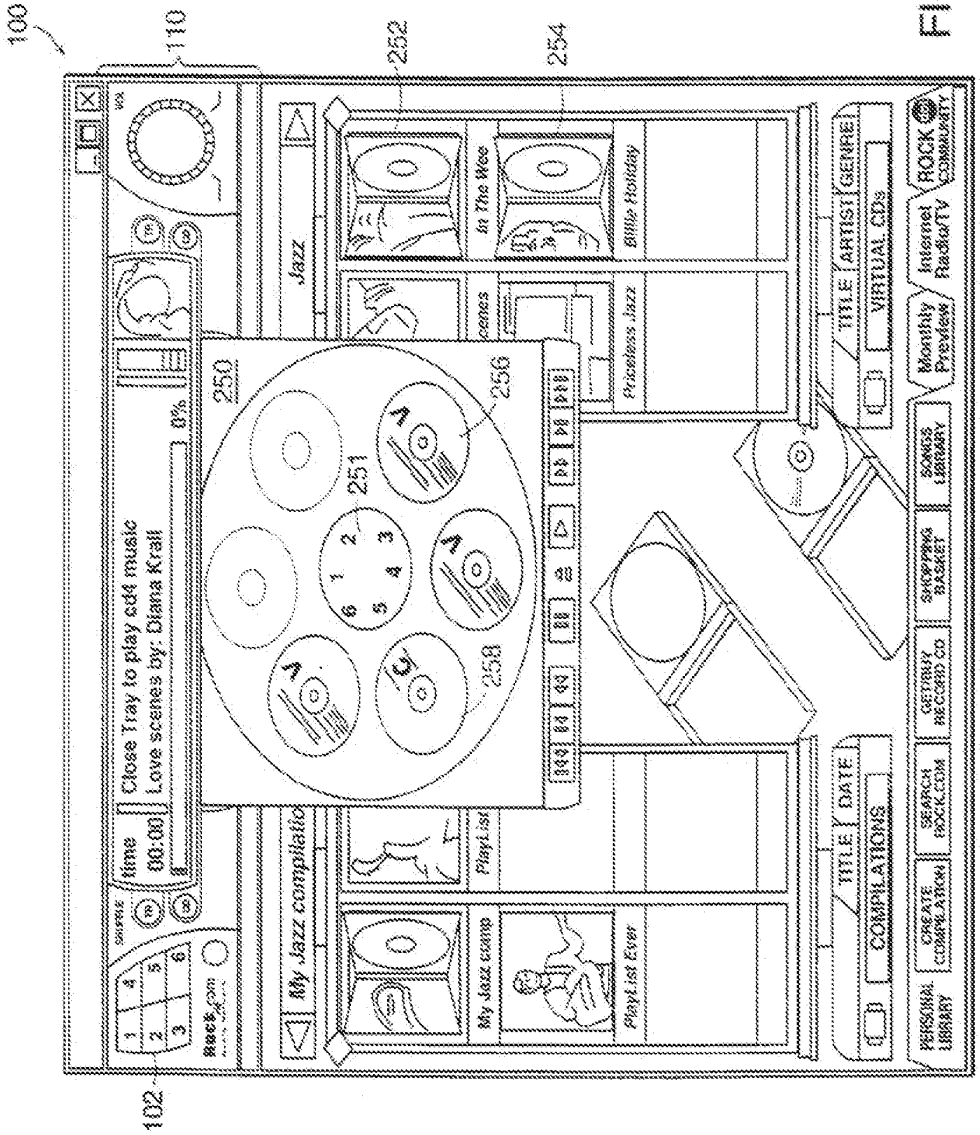
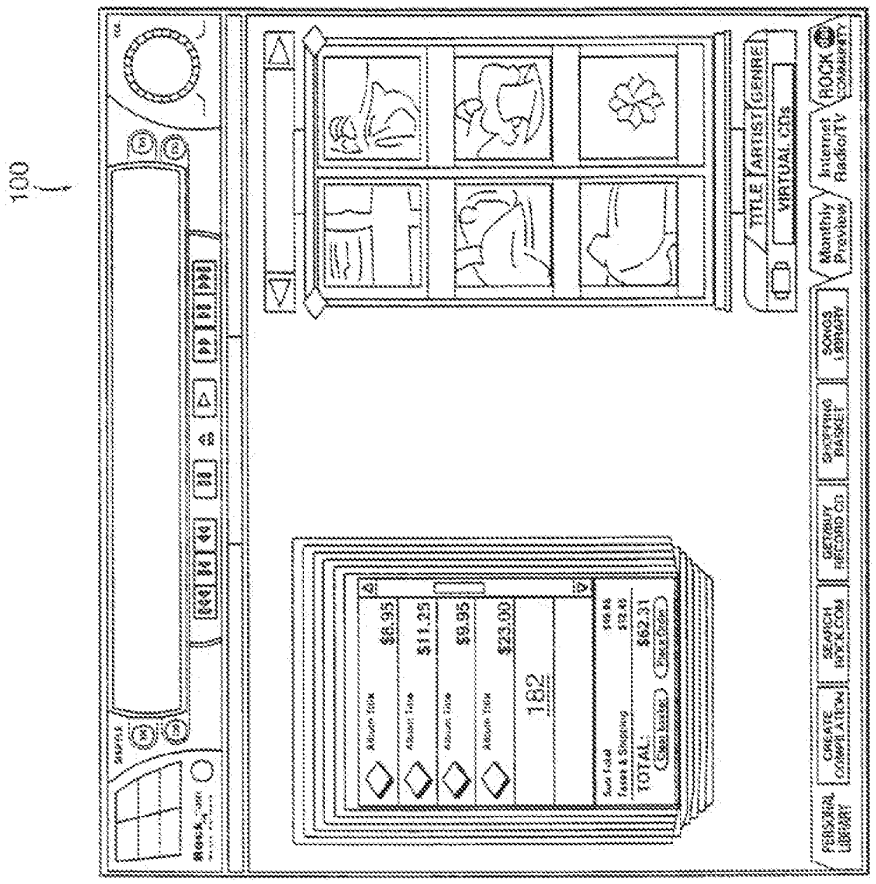


FIG. 10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Internet RadioTV
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GET NEW RECORD CD
SEARCH RECORD
CREATE CAMPAIGN

FIG. 12

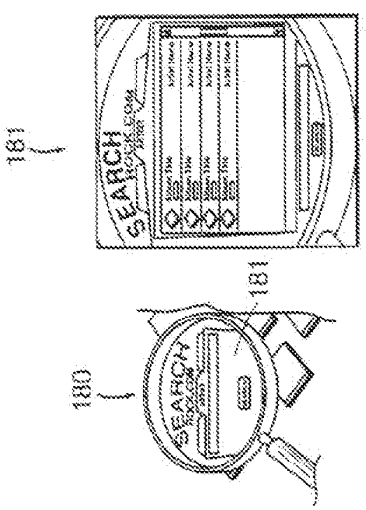
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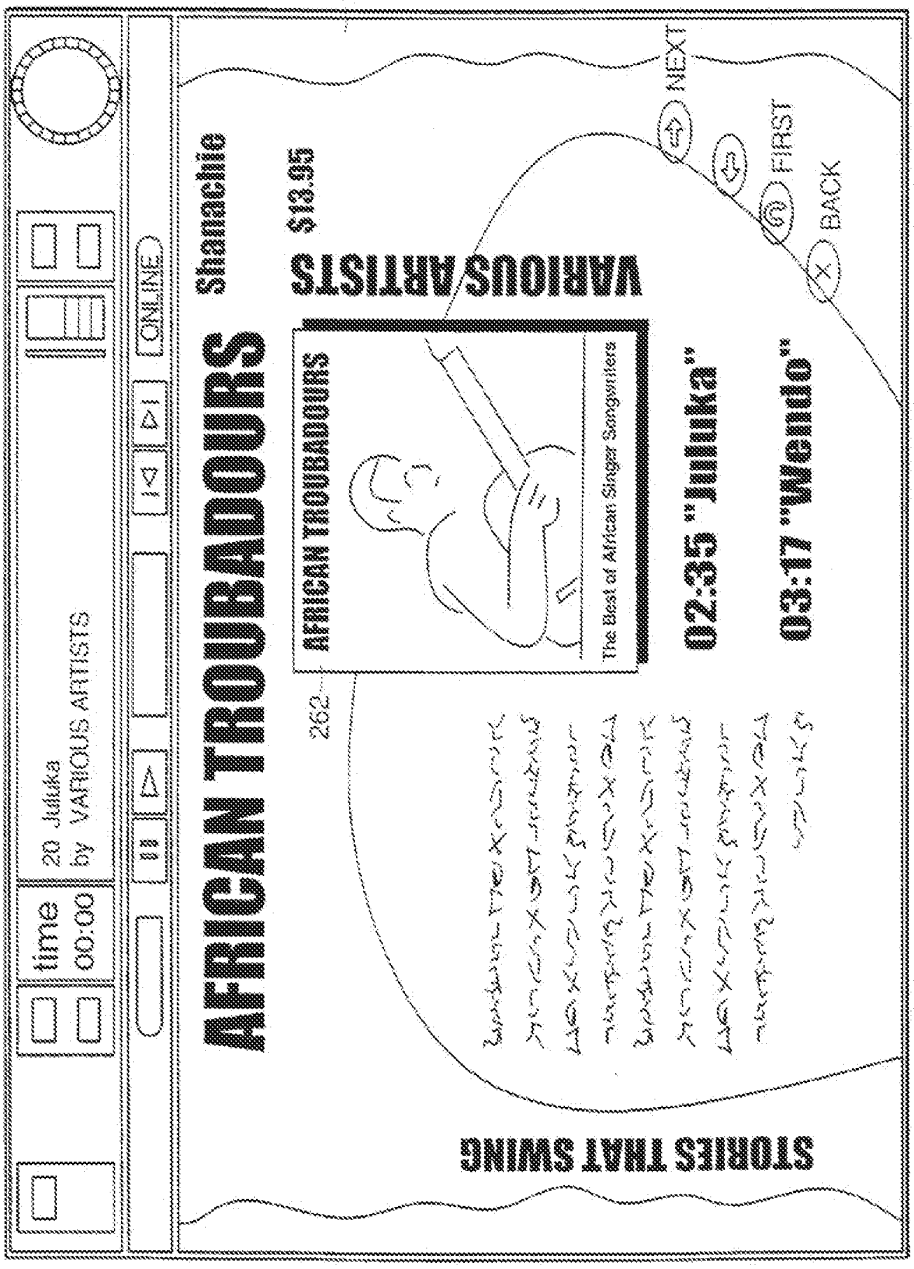
FIG. 11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time
00:00
20 Juluka
by VARIOUS ARTISTS
ONLINE
AFRICAN TROUBADOURS
Shanachie
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VARIOUS ARTISTS
AFRICAN TROUBADOURS
The Best of African Singer Songwriters
262
02:35 "Juluka"
03:17 "Wemlo"
NEXT
FIRST
BACK
STORIES THAT SWING

FIG. 13

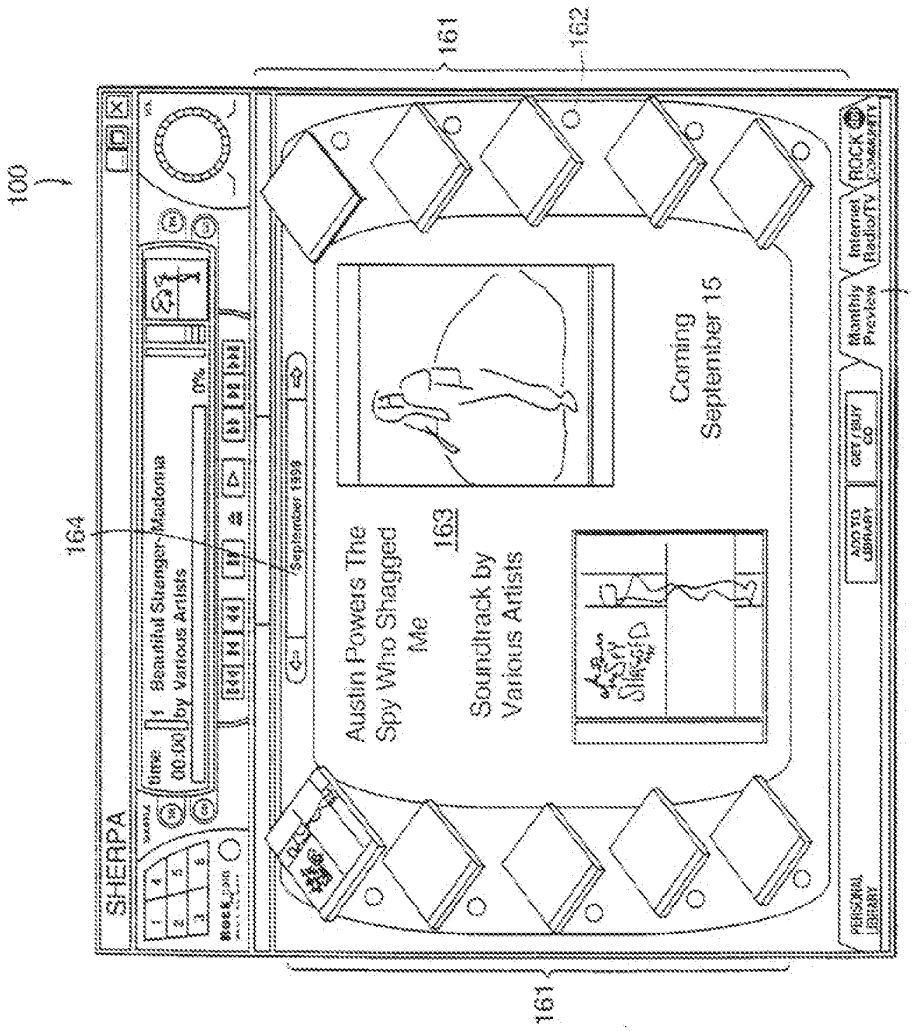
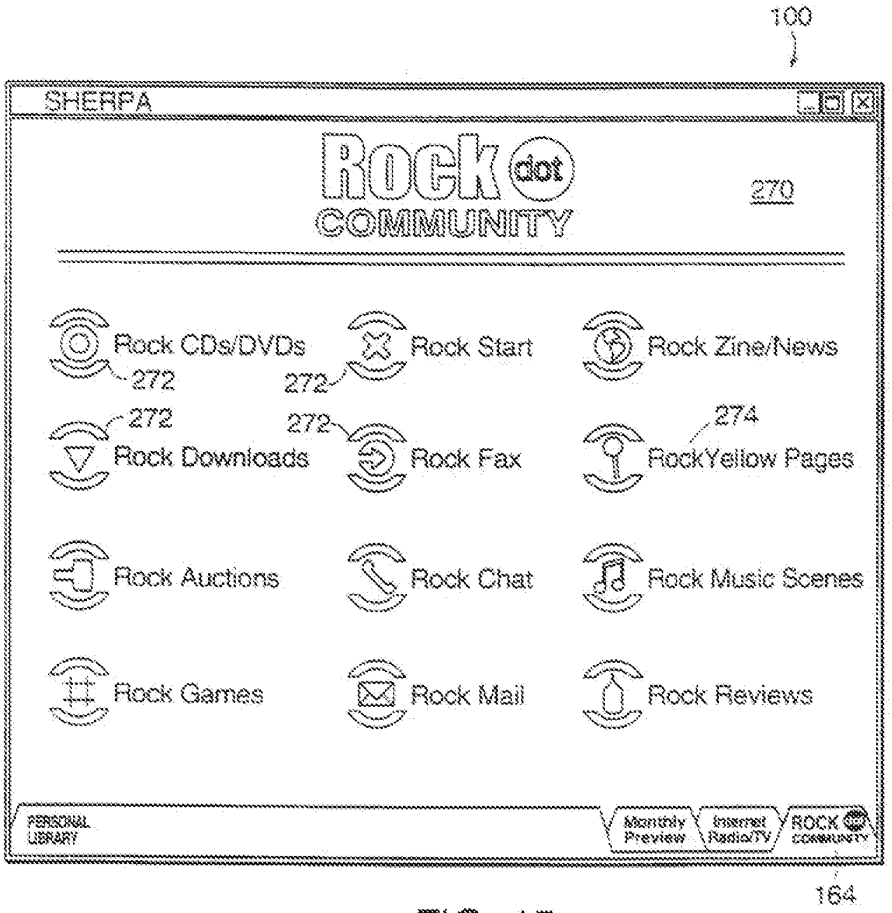


FIG. 14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Rock Downloads
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274
Rock Auctions
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Rock Music Scenes
Rock Games
Rock Mail
Rock Reviews
PERSONAL LIBRARY
Monthly Preview
Internet Radio/TV
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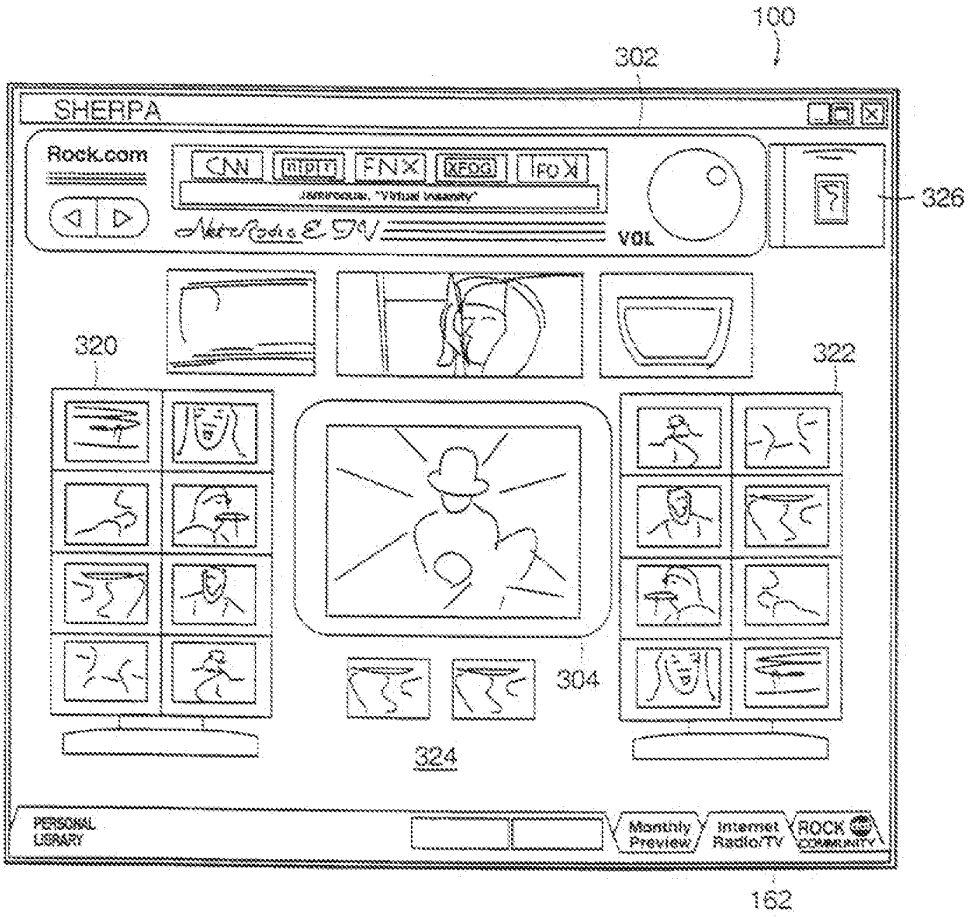
164

FIG. 15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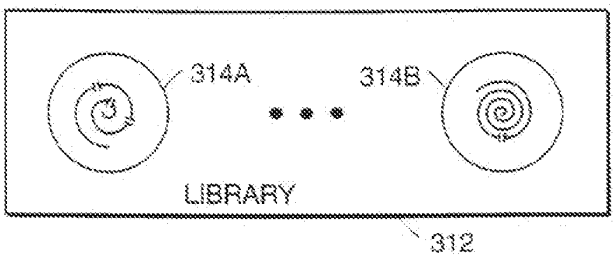
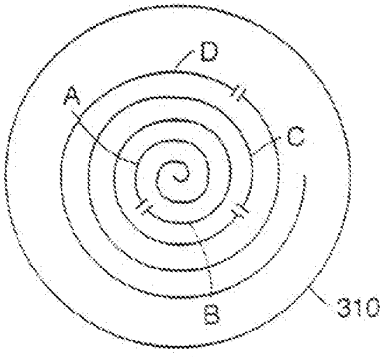
Monthly Preview
Internet Radio/TV
ROCK COMMUNITY
162

FIG. 16





USER'S CD

FIG. 17

INTERNATIONAL SEARCH REPORT

Inter nal Application No
PCT/US 00/06188

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 G06F17/30

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 G11B

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)
WPI Data, EPO-Internal, PAJ, IBM-TDB

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	GB 2 327 327 A (IBM) 20 January 1999 (1999-01-20) page 6, line 21 -page 7, line 16; figures 1,2	1-8,13, 16,23, 25,28, 30-32, 43,44, 86-92, 94-97
A	EP 0 847 156 A (WOLFE ROBERT L) 10 June 1998 (1998-06-10) column 7, line 24 -column 8, line 54; figure 3	1,38-41, 67,68, 77,86, 88-91, 95,96

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[X] Further documents are listed in the continuation of box C. [X] Patent family members are listed in annex.

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"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
26 July 2000	09/08/2000

Name and mailing address of the ISA	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016	Deane, E

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INTERNATIONAL SEARCH REPORT

International Application No
PCT/US 00/06188

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication,where appropriate, of the relevant passages	Relevant to claim No.
A	ANON: "Stream Embedded Compressor/Decompressor" IBM TECHNICAL DISCLOSURE BULLETIN., vol. 38, no. 9, September 1995 (1995-09), pages 273-276, XP002143471 IBM CORP. NEW YORK., US ISSN: 0018-8689 page 273, line 1 -page 274, line 17; figure 1	1,86, 88-91, 95,96
X	EP 0 521 236 A (PIONEER ELECTRONIC CORP) 7 January 1993 (1993-01-07) abstract	107
X	PATENT ABSTRACTS OF JAPAN vol. 015, no. 492 (P-1287), 12 December 1991 (1991-12-12) & JP 03 212724 A (FUJITSU LTD), 18 September 1991 (1991-09-18) abstract	107
X	EP 0 397 404 A (ALPHATRONIX INC) 14 November 1990 (1990-11-14) column 6, line 34 -column 7, line 1 abstract; figures 1,2	107

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INTERNATIONAL SEARCH REPORT

ormation on patent family members

Inter nal Application No
PCT/US 00/06188

Patent document cited in search report		Publication date	Patent family member(s)		Publication date
GB 2327327	A	20-01-1999	JP	11126123 A	11-05-1999
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			US	6038591 A	14-03-2000
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JP 03212724	A	18-09-1991	NONE		
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			JP	3129443 A	03-06-1991
			US	5537592 A	16-07-1996

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(51) International Patent Classification 7 : G06F 7/50 — A1

(11) International Publication Number: WO 00/60450

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(21) International Application Number: PCT/US00/09188

(22) International Filing Date: 7 April 2000 (07.04.00)

(30) Priority Data:
60/128,138 7 April 1999 (07.04.99) US

(71) Applicant (*for all designated States except US*): KHYBER TECHNOLOGIES CORPORATION [US/US]; Suite 600, 3009 Smith Road, Fairlawn, OH 44333-3771 (US).

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(75) Inventor/Applicant (*for US only*): KUMAR, Rajendra [US/US]; 712 Stonecliff Drive, Akron, OH 44313 (US).

(74) Agent: ROBBINS, Howard, S.; Khyber Technologies Corporation, Suite 600, 3009 Smith Road, Fairlawn, OH 44333-3771 (US).

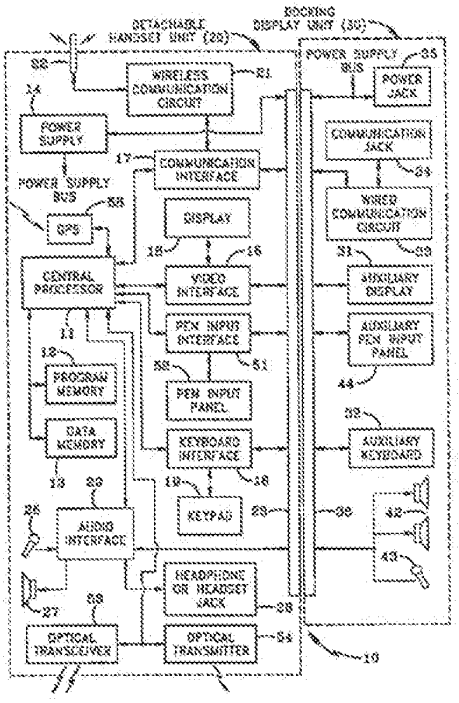
(81) Designated States: AZ, CA, CN, JP, SG, US, European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE).

Published
With international search report.

(54) Title: PORTABLE COMPUTING, COMMUNICATION AND ENTERTAINMENT DEVICE WITH CENTRAL PROCESSOR CARRIED IN A DETACHABLE HANDSET

(57) Abstract

A handheld device (10) for mobile computing, communication and entertainment includes a detachable handset unit (20) and a portable docking display unit (30). Detachable handset unit (20) is sized for handheld grasping and includes a processor (11) and a plurality of first circuits (12 – 19). Processor (11) controls the operation of the first circuits (12 – 19). Portable docking display unit (30) is dimensioned to receive docking of detachable handset unit (20) and includes a first display (31) and a plurality of second circuits (32, 33). Processor (11) controls the operation of at least one of the second circuits (32, 33) and the first display (31) when detachable handset unit (20) is docked with the docking display unit (30).



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PORTABLE COMPUTING, COMMUNICATION AND ENTERTAINMENT DEVICE WITH CENTRAL PROCESSOR CARRIED IN A DETACHABLE HANDSET

REFERENCE TO COPENDING APPLICATION

This application claims the benefit of United States Provisional Application Serial No. 60/128,138 filed April 7, 1999.

TECHNICAL FIELD

The present invention relates in general to portable processor based devices that provide computing, communication or entertainment functionality. More particularly, the present invention pertains to portable processor based devices operable while being held in its user's hand and providing communications, organizer and/or entertainment functions, such as cellular telephones, palm-sized organizers, and MP3 players, and to portable processor based devices providing general computing capabilities, such as laptop or handheld personal computers (PCs). More specifically, the present invention relates to systems that detachably mate a plurality of portable processor based devices to provide their combined functionality in an integrated structure.

BACKGROUND ART

To address consumers' portable computing, mobile communications, and portable entertainment needs, a variety of portable devices have been developed. The distinctly differing requirements of each application has made it too costly and unwieldy for such devices to fulfil more than one type, or two closely related types of need.

For example, smart cell phones are devices that combine the capabilities of cell phones and electronic organizers. Typical of such devices are the Model PDQ-800 from Qualcomm, Incorporated of San Diego, California, and the Model R380 from Ericsson, Incorporated of Richardson, Texas. These products perform quite well as handheld computing and communication devices by allowing the user to access the

Internet for email, stock quote, etc., while preserving their use as simple wireless phone units. However, in order to allow handheld grasping these units had to be kept small, thereby limiting their display to a size that is too small for practical use in conventional computing such as Web browsing, word processing, etc. Also, to keep the cost of such devices low, their designers employed central processors that have just enough power to carry out smart phone functions, and not enough power to handle general computing requirements.

Recently Motorola, Inc. of Schaumburg, Illinois has begun to sell its clipOn Organizer as an attachment to its StarTAC cellular telephone and provide it with smart phone functionality. The clipOn Organizer and StarTAC phone have been designed to operate as individual, standalone units that each furnish its own processor and power supply. Consequently, attaching the units does not achieve the reduced size or cost desired in an integrated combination.

For portable computing, the industry provides conventional laptop computers, such as those based on Pentium processors from Intel Corporation of Santa Clara, California and Windows software from Microsoft Corporation of Redmond, Washington, and mini-laptop computers, such as Microsoft WindowsCE based devices, called Handheld Personal Computers (HPCs). The industry has also furnished palm-sized devices for personal information management and organization such as the Palm Pilot from 3Com Corporation of Santa Clara, California, and Microsoft WindowsCE-based palm-sized PCs.

To fulfil the portable entertainment needs of consumers, the computer industry provides digital audio players, such as the Diamond Multimedia Rio model made by s3, Inc. of Santa Clara, California that plays MP3 compatible audio content downloaded from the Internet. Another portable entertainment device is the wireless system controller for home entertainment systems provided by Harman/Kardon International of Woodbury, New York.

To fulfil both mobile computing and communications needs, a mobile worker has to carry two, and sometimes three devices -- a smart phone unit, an organizer, and a laptop unit. Of course, if entertainment is also desired, the user must carry yet another device - the MP3 player. The user has to purchase and maintain multiple units – charging multiple sets of batteries and synchronizing data from one with that of the other. Consequently, there is a need for a device that provides a complete

solution for mobile computing, communication and entertainment without having to own and maintain multiple units.

SUMMARY OF THE INVENTION

It is, therefore, an object of the present invention to provide a portable processor based device for mobile computing, communication and entertainment without having to acquire and maintain multiple units. Such device works in much the same way as conventional laptop computers. However, in the current invention, the central processor, communication circuit, speaker, microphone, and power supply are carried in a detachable handset. The detachable handset unit functions as a wireless phone unit. Also, by having its own display and keypad it can serve as an Internet appliance for email access and for downloading of information from the Internet, such as electronic books, audio books, digital music, etc.

For applications requiring larger display and keyboard, the detachable handset unit is docked into the main unit, the docking display unit. In this mode the detachable handset unit provides the processing and the communication power to the docking display unit. The combined unit is suitable for conventional computing such as Web browsing, word processing, and spreadsheet applications. The combined unit can also be used for reading downloaded electronic books.

The detachable handset unit has additional functions. It can be used as a portable digital audio player in one of two ways. First, by plugging a headphone into its jack, the user can listen to downloaded music or audio books. Second, by docking into the docking display unit, that contains larger speakers, the downloaded music or other content can be played back in much the same way as done by a standard PC or a laptop computer. The detachable handset can be equipped with appointment manager software, thereby functioning as a clock radio by itself or while docked with the docking display unit.

The detachable handset can be equipped with infrared transceiver for providing wireless optical communication with other compatible units such as those compatible with IrDA standard. With suitable software the detachable handset unit can be made to function as a remote control unit for TV, VCR and other home entertainment systems and appliances. The user can pre-enter the desired program schedule once and thereafter have the detachable handset select the channels automatically.

The docking display can be mounted in a vehicle, further extending the function of the mobile computing and communication device. The detachable handset may be fitted with a Global Positioning Satellite System (GPS) capability. In that case when the detachable unit is docked in the docking display, the combined unit serves as an auto PC, giving the vehicle driver the location of the vehicle on a map on the large display in much the same way as AutoPC reference design from Microsoft, with the exception that in the current case the detachable unit is usable in a plurality of applications.

These and other objects and advantages of the present invention over existing prior art forms will become more apparent and fully understood from the following description in conjunction with the accompanying drawings.

In general, a portable computing, communication and entertainment device in accordance with the present invention includes a detachable handset unit and a portable docking display unit. The detachable handset unit is sized for handheld grasping and includes a processor and a plurality of first circuits, the processor controlling the operation of the first circuits. The portable docking display unit is dimensioned to receive docking of the detachable handset unit and includes a first display and a plurality of second circuits. The processor controls the operation of at least one of the second circuits and the first display when the detachable handset unit is docked with the docking display unit.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is a perspective view of an exemplary device in accordance with the present invention for mobile computing, communication and entertainment. This view presents a front perspective view of a detachable handset unit and a top perspective view of a clamshell shaped docking display unit having a partially open lid and base, and illustrates diagrammatically how exemplary electrical connectors in each unit may engage and mate so that the units form a single combined device.

Fig. 2 is a cross section elevational view of the exemplary device shown in Fig. 1 with the detachable handset unit mated with the docking display unit.

Fig. 3 is an exemplary block diagram of the device shown in Fig. 1.

Fig. 4 is a rear perspective view of the detachable handset unit.

Fig. 5 is a side elevational view of the device shown in Fig. 1 when mounted in

a vehicle and in an operational configuration.

PREFERRED EMBODIMENT FOR CARRYING OUT THE INVENTION

One embodiment of an exemplary device in accordance with the present invention for mobile computing, communication and entertainment, is illustrated in Figs. 1 through 4 and generally indicated by the numeral 10. Device 10 includes a detachable handset unit 20 and a docking display unit 30.

Detachable handset unit 20 includes a housing 48 with front and backsides and two opposite ends, a display 18 and a keypad 19 on the front side. Through apertures on its backside, detachable handset unit 20 carries a microphone 26 and a speaker 27 placed on opposite ends as in conventional telephone handsets. A conventional stub antenna 22 is located at the top end of the detachable handset unit 20, as found in conventional cellular phone handsets. Slots 24 and 25 are provided at the opposite ends of unit 20 to detachably mate detachable handset unit 20 and docking display unit 30, as described more fully hereinafter. An electrical connector 23 in detachable handset unit 20 enables electrical interconnection with docking display unit 30.

Docking display unit 30 includes a recessed platform 38, with an electrical connector 36, a fixed tab 39 and a movable tab 41, retractable by latch 37. To dock detachable handset unit 20 into docking display unit 30, fixed tab 39 is slid into slot 24 with the front side of detachable handset unit 20 facing platform 38. The other end of detachable handset unit 20 is brought down to have connector 23 on detachable handset unit 20 mate with connector 36 of docking display unit 30. Tab 41 is slid into slot 25 to secure detachable handset unit 20 in place.

Docking display unit 30 is shown as a clamshell style unit, including an auxiliary display 31, in the lid portion and an auxiliary keyboard 32 in the base portion, facing each other in the closed position. The lid of docking display unit 30 also contains a communication jack 34, such as a standard RJ-style telephone jack, and a power jack 35, such as an AC adapter/charger jack.

The block diagram in Fig. 3 shows detachable handset unit 20 including a central processor 11, and the circuits supported and/or controlled by it, namely program memory 12, data memory 13, power supply 14, video interface 15, keyboard interface 16, communication interface 17, pen-input interface 51, and audio interface 29. In turn, video interface 15 drives display 18, the keyboard interface 16 drives the

keypad 19, communication interface 17 drives wireless communication circuit 21, pen-input interface 51 drives the pen-input panel 52, and audio interface 29 drives microphone 26 and speaker 27, and connects to the headphone jack 28. Wireless communication circuit 21 is connected to the antenna 22. GPS receiver 58, such as that supplied by SiRF Technology of San Jose, California, is also connected to central processor 11.

Detachable handset unit 20 also includes an electrical connector 23 that carries signals from the central processor 11 through video interface 15, keyboard interface 16, communication interface 17, pen-input interface 51, audio interface 29, and power supply 14. Mating electrical connector 36 in docking display unit 30 connects these signals to auxiliary display 31, auxiliary keyboard 32, wired communication circuit 33, auxiliary pen-input panel 44, speakers 42 and microphone 43, and power-jack 35. Wired communication circuit 33 is connected to communication jack 34 for further connection to external wired communication lines such as the public switched telephone network.

Detachable handset unit 20 may also contain an optical transmitter 54 for transmission of remote control signals to TV, VCR, etc. Alternately, it may be equipped with an optical transceiver 53 for optical communication with other compatible devices such as laptop computers, printers and network interfaces.

In another variation of the above embodiment the interface signals connecting the circuitry carried in detachable handset unit 20 and docking display unit 30 may be multiplexed, using conventional multiplexing circuits, in order to reduce the number of interconnect signals and hence reducing the size of connectors 23 and 36.

In another variation of the above embodiment, detachable handset unit 20 may contain no display at all, like conventional cordless handsets. In this case central processor 11 will still drive the auxiliary display 31 through the video interface 15, and video interface 15 may be housed in docking display unit 30, further reducing the size of detachable handset unit 20.

Fig. 5 shows docking display unit 30 mounted on the floor of a vehicle 70. The bottom end of a pedestal 60 is attached to the vehicle floor 70. Clamps 61 are attached to the top end of pedestal 60. Docking display unit 30 can be removably mounted on pedestal 60 by sliding into clamps 61. Alternately, docking display unit 30 may be fixed-mounted on pedestal 60 using bolts or other conventional methods.

Detachable handset unit 20 can then be docked in docking display unit 30 in the same manner as in the other applications described hereinbefore.

The ordinarily skilled artisan should now appreciate that in this way a portable computing, communication and entertainment device can be created that has a detachable handset unit. When mated with a docking display unit, the detachable handset unit becomes the controller for the entire portable computing, communication and entertainment device. The detachable handset unit is in a smaller housing that is dimensioned for handheld grasping, and is sized to be carried in a pocket like an average cell phone. The docking display unit carries an auxiliary, larger display and other components. The central processor, carried in the detachable handset unit, must have enough processing power to adequately perform functions of an entire portable computing, communication and entertainment device, and not just the functions of a wireless phone. Examples of commercially available processors adequate for this task include the Intel StrongARM processor, the models SH-3 and SH-4 processors from Hitachi American, Ltd. of Brisbane, California, and the model 4100 RISC processor from NEC America, Inc. of Irving, California.

As technology advances in the future, the Pentium processor from Intel, used in most laptop computers, may be used in other embodiments of the current invention. The other components used in device 10 can be similar to those employed by traditional computing devices, communication devices and entertainment devices. Typical of these other components are: liquid crystal displays of small and large sizes from Optrex America Inc. of Detroit, Michigan, and Seiko Instruments USA, Incorporated of Torrance, California; memory chips from Micron Technologies, Inc. of Boise, Idaho, VLSI Technologies wireless communication chips available from Philips North America in Atlanta, Georgia, power supply chips from Analog Devices Inc. of Norwood, Massachusetts, and pen-input panels from MicroTouch Systems, Inc. of Methuen, Massachusetts.

Device 10 as described hereinbefore will require operating system software such as Microsoft Windows or WindowsCE. Off-the-shelf application software such as Microsoft Outlook, PocketWord, etc. can be used for various tasks. Alternately, the Java software platform from Sun Microsystems, Inc. of Palo Alto, California, can be implemented in device 10. In this instance, Java applets can be downloaded into device 10 from the Internet via wireless communication circuit 21 or via wired

communication circuit 33.

Inasmuch as the present invention is subject to variations, modifications and changes in detail, some of which have been expressly stated herein, it is intended that all matter described throughout this entire specification or shown in the accompanying drawings be interpreted as illustrative and not in a limiting sense. It should thus be evident that a device constructed according to the concept of the present invention, and reasonably equivalent thereto, will accomplish the objects of the present invention and otherwise substantially improve the art of devices for mobile computing, communication and entertainment.

CLAIMS:

1. A portable computing, communication and entertainment device comprising:

a detachable handset unit sized for handheld grasping and including a processor and a plurality of first circuits, said processor controlling the operation of said first circuits;

a portable docking display unit dimensioned to receive docking of said detachable handset unit and including a first display and a plurality of second circuits; and,

said processor controlling the operation of at least one of said second circuits and said first display when said detachable handset unit is docked with said docking display unit.

2. A device, as set forth in claim 1, wherein said processor generates control signals, and said portable docking display unit includes a platform dimensioned to accept docking of the detachable handset unit and a first electrical connector for receiving said control signals.

3. A device, as set forth in claim 2, wherein said portable docking display unit further includes a second electrical connector for removably engaging said first electrical connector when said detachable handset unit and said portable docking display unit are docked.

4. A device, as set forth in claim 3, wherein said detachable handset unit further includes a memory, a wireless communication circuit, an audio interface circuit, a first microphone, a first speaker, and a power supply.

5. A device, as set forth in claim 4, wherein said docking display unit further includes a wired communication circuit and a communication jack.

6. A device, as set forth in claim 5, wherein said docking display unit further includes a second speaker and a second microphone.

7. A device, as set forth in claim 6, wherein said docking display unit includes a power jack.

8. A device, as set forth in claim 7, wherein said docking display unit includes a first pen-input panel.

9. A device, as set forth in claim 8, wherein said docking display unit is mounted in a vehicle.

10. A device, as set forth in claim 1, wherein said detachable handset unit includes a second display.

11. A device, as set forth in claim 10, wherein said detachable handset unit includes a second pen-input panel.

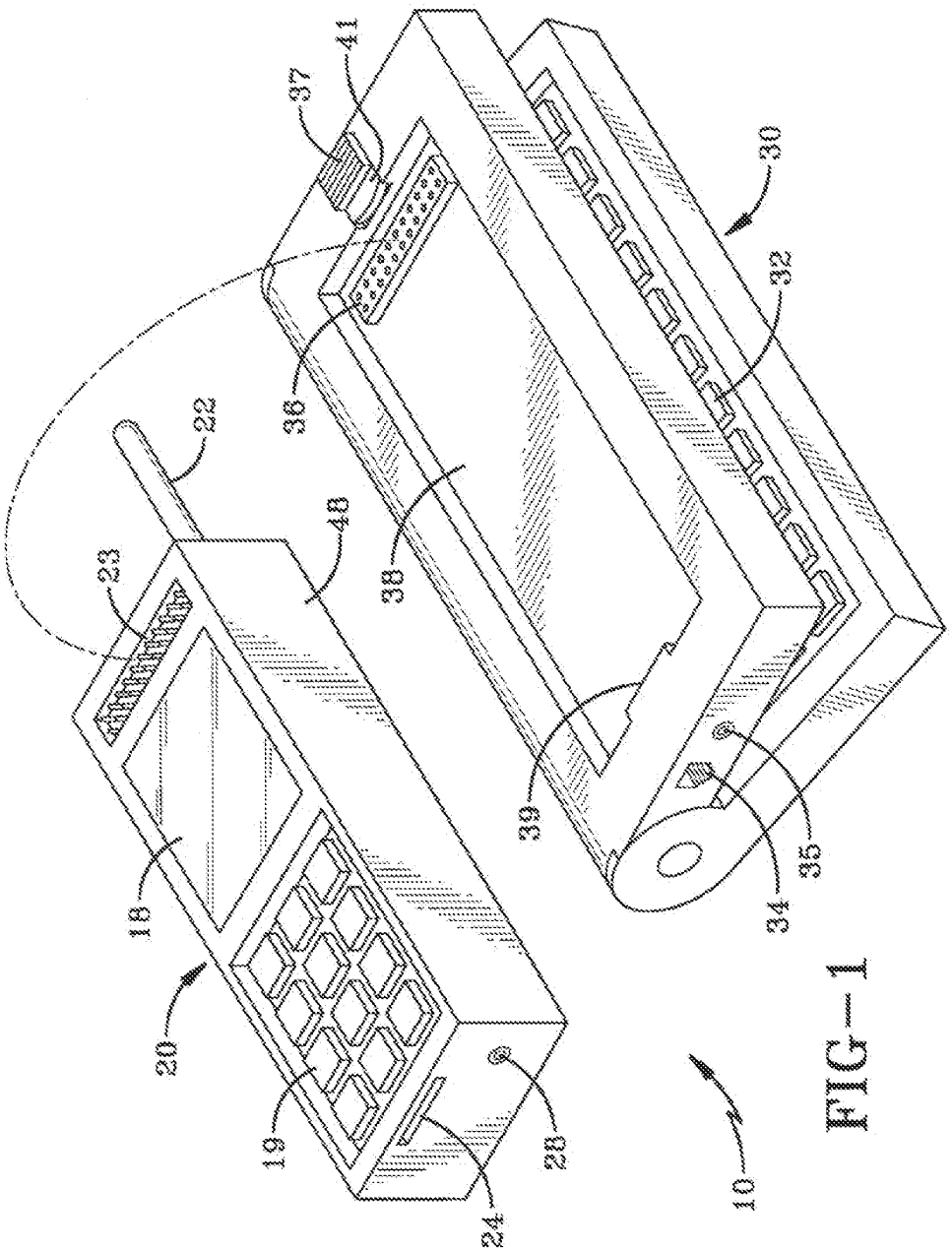
12. A device, as set forth in claim 11, wherein said detachable handset unit includes a first keyboard and said docking display unit includes a second keyboard.

13. A device, as set forth in claim 12, wherein said detachable handset unit includes a jack to connect to an external headphone.

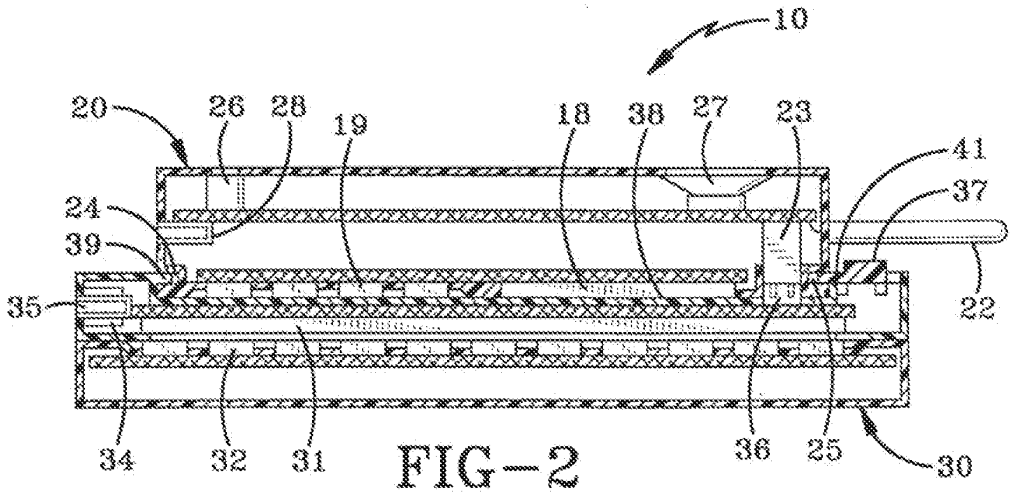
14. A device, as set forth in claim 13, wherein said detachable handset unit includes a jack to connect to an external headset.

15. A device, as set forth in claim 14, wherein said detachable handset unit includes at least one of an optical transmitter and an optical transceiver.

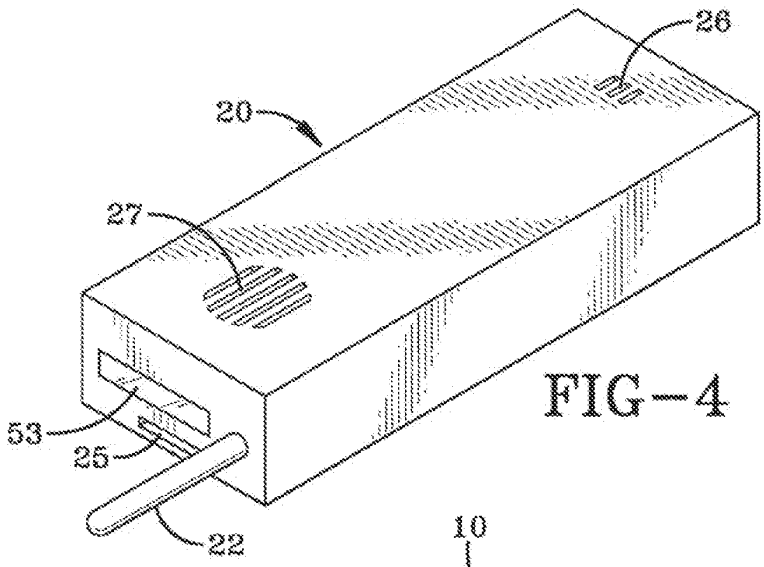
16. A device, as set forth in claim 15, wherein said detachable handset unit includes a Global Positioning System receiver.



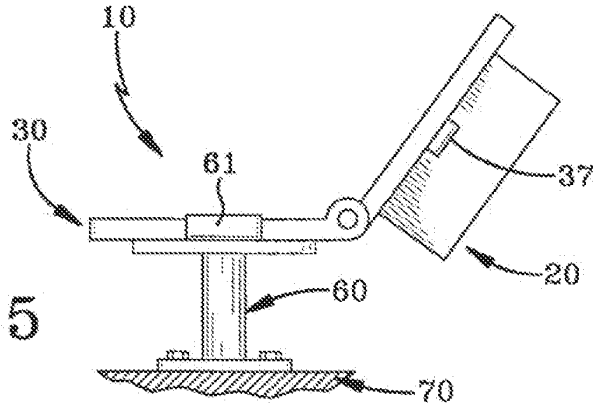
FIG—1



FIG–2



FIG–4



FIG–5

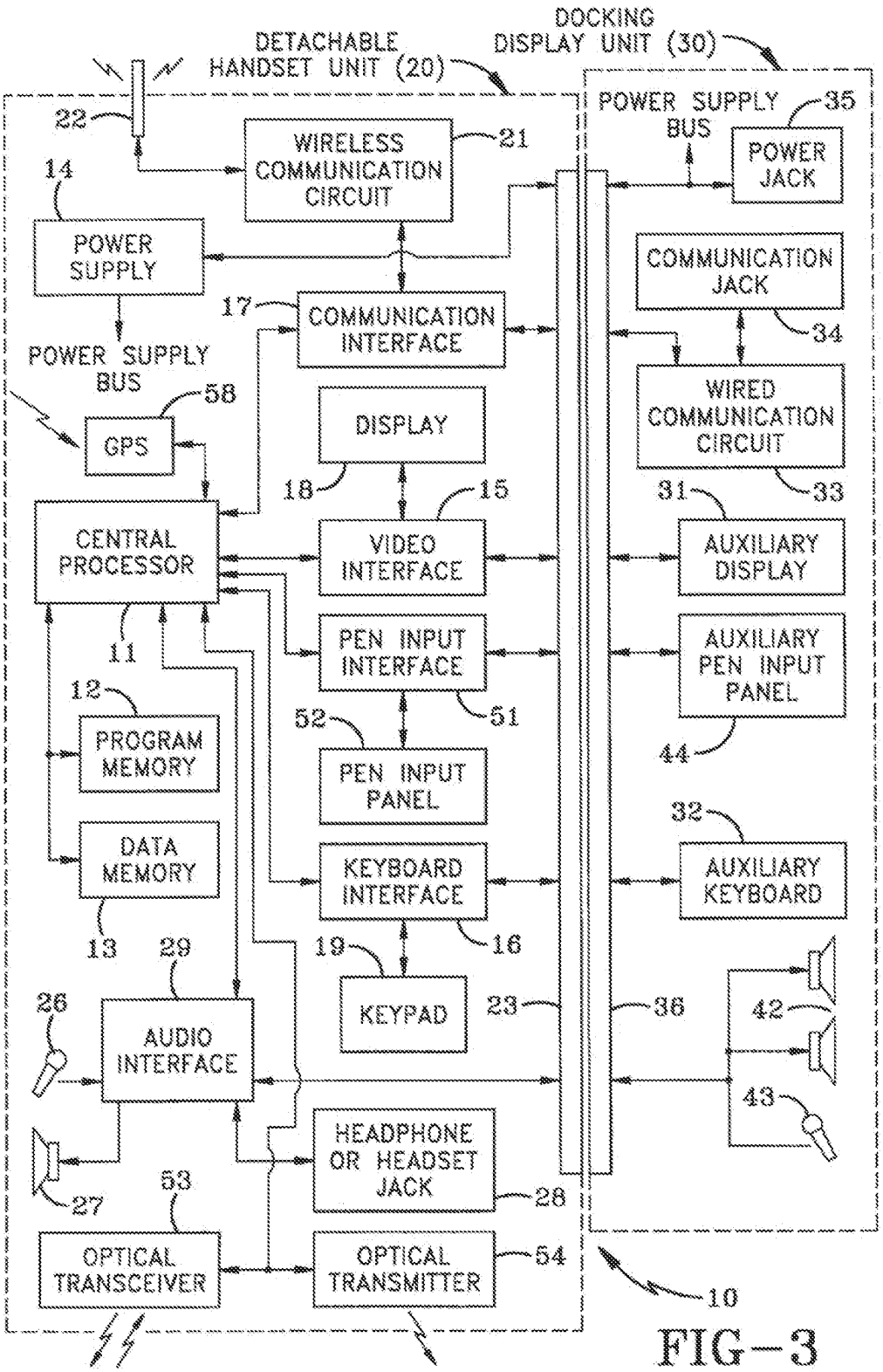

DETACHABLE HANDSET UNIT (20)
DOCKING DISPLAY UNIT (30)
22
WIRELESS COMMUNICATION CIRCUIT
21
14
POWER SUPPLY
17
COMMUNICATION INTERFACE
POWER SUPPLY BUS
58
GPS
DISPLAY
18
15
CENTRAL PROCESSOR
VIDEO INTERFACE
11
PEN INPUT INTERFACE
12
PROGRAM MEMORY
52
51
PEN INPUT PANEL
DATA MEMORY
KEYBOARD INTERFACE
13
29
19
16
KEYPAD
26
AUDIO INTERFACE
23
HEADPHONE OR HEADSET JACK
28
27
53
OPTICAL TRANSCEIVER
OPTICAL TRANSMITTER
54
10
POWER SUPPLY BUS
35
POWER JACK
COMMUNICATION JACK
34
WIRED COMMUNICATION CIRCUIT
33
31
AUXILIARY DISPLAY
AUXILIARY PEN INPUT PANEL
44
32
AUXILIARY KEYBOARD
36
42
43

FIG-3

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US00/09188

A. CLASSIFICATION OF SUBJECT MATTER
IPC(7) :G06F 7/50
US CL :708/109
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. : 708/109; 379/95.1; 455/556,566,11.1,404

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)
WEST

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 5,189,632 A (PAAJANEN et al) 23 February 1993, abstract, figures 1a and 2a, col.1 lines 25-68, col.2 line 29 through col.3 line 18	1-16
Y	US 5,754,962 A (GRIFFIN) 19 May 1998, abstract, figures 1 and 2, col.2 lines 9-59	1-16

☐ Further documents are listed in the continuation of Box C. ☐ 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
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"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
12 JUNE 2000	06 JUL 2000
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 John E. Breene Telephone No. (703) 305-9790

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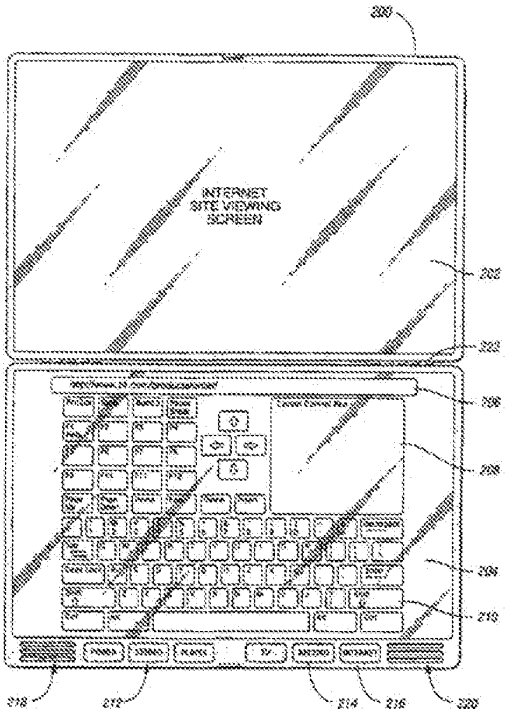
(54) Title: PERSONAL DIGITAL ASSISTANT WITH MULTIPLE DISPLAYS



(57) Abstract: An electronic device (200) having a plurality of displays (202, 204) connected by a folding coupling, such as a hinge (222) includes at least one display (204) that may be configured for receiving input and/or providing output to a user. The displays are preferably physically discrete but may be controlled to function as a single display with respect to scrolling text, etc. Each display may be separated into multiple display areas by an appropriate overlay or other suitable separation if desired. The displays may be of any conventional type such as an active matrix, LCD and/or a variety of touch pads or panels. The device is usable as a PDA for exchanging email or browsing the Internet but may also be configured for variety of functions including a calculator, audio/video player/recorder, and the like.

WO 00/79372 A1

Before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments.

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.

PERSONAL DIGITAL ASSISTANT WITH MULTIPLE DISPLAYS

TECHNICAL FIELD

The present invention relates to a portable electronic device having multiple displays with at least two displays coupled by a foldable connector such as a hinge.

BACKGROUND ART

Personal digital assistants (PDAs) have become increasingly sophisticated as microprocessor and memory technology has made low-power hand-held computing devices readily available at prices consumers are willing to pay. Currently available PDAs typically include a touch-sensitive LCD screen which functions as both an input and output device to receive data/commands from a user and display requested information. Some PDAs also include a dedicated input area which may be used for entering data and commands that may recognize letters, numbers, or other characters. A detachable cover may be provided to protect the display and/or dedicated input area from unwanted scratches, dirt, and entry of unintended data/commands while the PDA power is on.

Designers of hand-held computing devices, such as PDAs, must balance the user's desire to maximize usefulness and functionality of the device while maintaining a portable and attractive form factor. As features are added, the devices may become more difficult to use as input and output buttons, switches, dials, and displays become smaller and denser to maintain or reduce the overall package size while providing a device which is large enough for hand-held use and small enough to carry in a pocket or purse, for example. As such, it is desirable to provide an efficient user interface that effectively utilizes available surfaces for input and output functions without detracting from the functionality or appearance.

Wireless communication technology incorporated into hand-held computing devices, such as PDAs, has afforded users the opportunity to "stay

connected" while away from their desk or office. Infrared (IR), radio-frequency (RF), cellular, and satellite communication allow users to receive email, exchange business cards, synchronize appointment schedules, and browse the Internet, for example. While these features may be available for hand-held computing devices, their use is limited by the display capabilities of the devices. In particular, the limited size of the display screens on hand-held computing devices typically requires reformatting of the information by the supplier, and/or ongoing manipulation of the display by the user in the form of paging and/or scrolling up, down, left, and right.

DISCLOSURE OF INVENTION

Thus, it is an object of the present invention to provide a hand-held computing device having multiple display screens.

Another object of the present invention is to provide a PDA having at least two display screens connected by a foldable coupling, such as a hinge.

A further object of the present invention is to provide a hand-held computing device having at least two displays with at least one being selectively configurable as an input and/or output device.

Another object of the present invention is to provide a hand-held computing device having multiple discrete displays functioning as a single continuous display.

A still further object of the present invention is to provide a hand-held computing device having at least two LCD displays connected by a hinge.

Another object of the present invention is to provide a hand-held computing device having multiple displays for enhanced Internet functionality.

In carrying out the above objects and other objects, features, and advantages of the present invention, a hand-held computing device includes a housing having a first display, a processor, and a memory with the processor being

in communication with the first display and the memory, and a cover connected to the housing by a foldable coupling wherein the cover includes a second display in communication with the processor which generates output signals to display information on the first and second displays.

According to the invention, there is provided an electronic device having a plurality of displays connected by a folding coupling, such as a hinge. At least one of the displays may be configured for receiving input and/or providing output to a user. The displays are preferably physically discrete but may be controlled to function as a single display with respect to scrolling text, etc. Each display may be separated into multiple display areas by an appropriate overlay or other suitable separation means if desired. The displays of the present invention may be of any conventional type such as an active matrix, liquid crystal display (LCD) and/or a variety of touch pads or panels. The displays may, of course, also be monochromatic, color, or any other suitable type depending upon the application.

The electronic device is preferably powered by a conventional power system which may include, for example, rechargeable batteries (alkaline, lithium, etc.) and/or a direct power coupling such as an alternating current (AC) line via conventional AC/DC adapter (internal or external). Depending upon the application, the electronic device may also be powered by conventional non-rechargeable batteries or any other suitable power source, such as solar power, for example. The electronic device preferably uses one or more processors or central processing units (CPUs), the selection of which will depend on the functions desired for the electronic device. Processors such as, for example, the Intel® family of processors including any of the Pentium ® or Celeron® processors may be included in the electronic device to selectively configure the multiple displays as input and/or output devices.

The present invention includes a number of advantages relative to prior art PDAs. For example, the present invention provides a portable electronic device with sufficient display area to reduce the necessity to constantly page/scroll through data for common tasks such as reading email or browsing the Internet. The configurable nature of one or more displays makes efficient use of the available

surfaces to maintain an acceptable form factor while providing ease of use through touch-sensitive panels within a display and/or externally accessible buttons.

The above advantages, and other advantages, objects, and features of the present invention are readily apparent from the following detailed description of the best mode for carrying out the invention when taken in connection with the accompanying drawings.

BRIEF DESCRIPTION OF DRAWINGS

FIGURE 1 illustrates a personal digital assistant having multiple displays connected by a foldable coupling, such as a hinge, for one embodiment according to the present invention;

FIGURE 2 illustrates a hand-held computing device with multiple displays connected by a hinge configured as a computer in one embodiment according to the present invention;

FIGURE 3 illustrates a hand-held computing device with multiple displays connected by a hinge configured as a calculator in one embodiment according to the present invention;

FIGURE 4 illustrates another embodiment of a hand-held computing device with multiple displays connected by a hinge configured as a calculator according to the present invention;

FIGURE 5 illustrates an alternative PDA having dual displays connected by a hinge configured for Internet browsing according to one embodiment of the present invention;

FIGURE 6 illustrates another embodiment of a hand-held computing device having multiple displays configured for display of a digital video according to one embodiment of the present invention;

FIGURE 7 illustrates another embodiment of a hand-held computing device with dual displays connected by a hinge configured as a computer for receiving a digital data module to configure the device for Internet browsing according to one embodiment of the present invention;

FIGURE 8 illustrates a hand-held computing device having dual displays connected by a hinge which is configurable as a computer with an appropriate computer module according to one embodiment of the present invention;

FIGURE 9 is a block diagram illustrating various internal components of a hand-held computing device with multiple displays according to the present invention;

FIGURE 10 illustrates a hand-held computing device with multiple displays configured as an audio player for streaming audio, stored audio, or radio broadcast listening according to one embodiment of the present invention;

FIGURE 11 illustrates an alternative embodiment of a hand-held electronic device with dual displays connected by a hinge for displaying digital video according to one embodiment of the present invention;

FIGURE 12 illustrates a hand-held electronic device with multiple displays connected by a hinge configured in a television mode according to one embodiment of the present invention;

FIGURE 13 illustrates a hand-held electronic device with multiple displays connected by a hinge configured as a recorder according to one embodiment of the present invention;

FIGURE 14 illustrates a hand-held electronic device with multiple displays connected by a hinge with an optional external antenna for exchanging information according to one embodiment of the present invention;

FIGURE 15 illustrates various input/output ports and controls for a hand-held electronic device with multiple displays connected by a hinge according to one embodiment of the present invention; and

FIGURE 16 is a block diagram illustrating operation of a system and/or method for exchanging data with a hand-held electronic device with multiple displays according to the present invention.

BEST MODE FOR CARRYING OUT THE INVENTION

Referring now to Figure 1, a personal digital assistant having multiple displays connected by a foldable coupling, such as a hinge, according to one embodiment of the present invention is shown. Portable electronic device 20 includes a housing 22 having a first display 24 and a cover 26 having a second display 28. Cover 26 is connected to housing 22 by a foldable coupling indicated generally by reference numeral 30. In one embodiment, foldable coupling 30 includes at least one hinge 32 which connects housing 22 to cover 26. Device 20 preferably includes input means 34 for selectively controlling functionality of the device. In the embodiment illustrated in Figure 1, input means 34 preferably includes a plurality of directional keys 36, a power key 38, and an enter key 40. As will be appreciated by those of ordinary skill in the art, input means 34 may also include one or more touch-sensitive input devices, dials, switches, and the like.

Portable electronic device 20 preferably includes a processor (best illustrated in Figure 9) in communication with first display 24, second display 28, and input means 34 via appropriate foldable electrical connecting means which extends through foldable coupling 30 to connect at least one of the displays to the processor. In one embodiment, electrical communications means extends between housing 22 and cover 26 through at least one hinge 32 and is preferably, but not necessarily, hidden within at least one hinge 32.

As described in greater detail below, displays 24 and 28 may be selectively configured by the processor to perform various functions including input and/or output functions. For example, as illustrated in Figure 1, display 28 is

selectively configured to provide electronic data, such as an appointment schedule 42, for viewing by a user. One or more of the multiple displays may be selectively configured with several portions having similar or different functions in keeping with the present invention. For example, display 24 as illustrated in Figure 1 includes a first portion 44 configured to display various menu items 50 and a second portion 46 which displays various command or function keys such as keyboard keys 48. Display 24 may include a physical overlay to separate various portions of the screen. Alternatively, portions 44 and 46 may be separated by displaying separating lines or blacking out a portion of the display electronically.

Displays 24 and 28 are preferably discrete displays and may utilize any conventional technology including LCD screens, active matrix displays, and the like. Likewise, displays 24 and 28 may be mono-grammatic or color. With the displays selectively configured as illustrated in Figure 1, the hinged design of the present invention permits the display of approximately twice the amount of information relative to a conventional electronic organizer or PDA. As illustrated in Figure 1, displays 24 and 28 may provide different input and/or output functions. Alternatively, the processor may control displays 24 and 28, or adjacent portions thereof, to function as a single continuous display with text scrolling between the bottom of display 28 to the top of display 24, for example. In addition, when functioning as an input device, displays 24 and 28 are preferably touch-sensitive or utilize appropriate touch-sensitive sensing technology associated with housing 22 and cover 26 to detect user input or responding to displayed menus 50 or keys 48.

As described above, the present invention overcomes the limitations associated with conventional electronic organizers which utilize a single display and reduces the frequency of paging and/or scrolling required to view electronic information such as when reading email or browsing the Internet. As will be appreciated by one of ordinary skill in the art, the flexibility afforded by multiple displays allows device 20 to be implemented with an acceptable form factor for hand-held use while maintaining functionality and usefulness. Depending upon the particular application or mode of operation, displays 24 and 28 may operate independently or may function cooperatively as a single display. For example, display 28 may be maintained while the user performs various functions associated

with display 24. While functioning under separate control, display 28 may be paged or scrolled separately from display 24. When using electronic device 20 to browse the Internet, display 24 may be used to display a website while display 28 provides a separate list of links associated with a particular website, for example.

Referring now to Figure 2, a hand-held computing device with multiple displays connected by at least one hinge configured as a computer according to one embodiment of the present invention is shown. Device 70 includes a housing 72 having a base portion 74 connected to a cover portion 76 by a plurality of hinges 78, 80. Base portion 74 includes at least one display 82 connected by hinges 78, 80 to at least one additional display 84 in cover portion 76. As illustrated in Figure 2, base portion 74 and/or cover portion 76 may include multiple displays or display sections. For example, base portion 74 includes a dedicated input/output section indicated generally by reference numeral 86. Dedicated input/output section 86 may include one or more physical buttons 88 in addition to an alphanumeric display 90. Physical buttons 88 may have dedicated functions or may be selectively configurable by the processor to implement soft keys, for example. When implemented as soft keys, physical keys 88 preferably include an associated display section for each physical key.

Display 82 and/or display 84 may include one or more sections or portions configurable for a particular function. For example, as illustrated in Figure 2, display 82 includes a cursor control portion 92 which is separated from a keyboard portion 96 by an electronically displayed border 94. Cursor control portion 92 may be operated with a finger or stylist to control movement of an associated cursor displayed on screen 82 and/or screen 84. Likewise, cursor control portion 92 may be used to select or "click" items highlighted by a cursor. In one embodiment, display 82 also includes directional control keys 98 which may also be used to control cursor position or movement.

Cover portion 76 of housing 72 may also include a plurality of physical keys 100 used to control display 82, display 84, and/or the function of device 70. For example, physical keys 100 may include a power switch 102 and one or more function or mode keys 104, 106, and 108 which may be used to select an

operating mode for device 70. In the example illustrated in Figure 2, button 104 functions as a soft key with its associated function displayed on display 82 or display 84. The associated function is selectively configurable depending upon the mode of operation of device 70. Button 106 corresponds to a dedicated function which selects a computer configuration for device 70 while button 108 corresponds to a dedicated function key which selects the calculator mode of operation for device 70. Screen control keys 110 may be used to page or scroll information on display 82 and/or display 84. These keys may include a slow or single page forward key 112 and a fast or multiple page forward key 114, for example. Similar keys may be provided for paging/scrolling in the opposite direction as illustrated in Figure 2.

Referring now to Figure 3, a hand-held computing device with multiple displays connected by a hinge configured as a calculator according to one embodiment of the present invention is shown. A portable hand-held electronic device 118 includes a first display 120 which may include first portion 122, second portion 124, and third portion 126 separated by a physical overlay 128. In this embodiment, first portion 122 provides a display for graphical and/or statistical output when electronic device 118 is used in a calculator mode or configuration. Overlay 128 may be selectively removed in some embodiments to provide greater flexibility. The second portion 124 of display 120 may be used to display the contents of one or more registers or memories, for example. Likewise, third portion 126 may be used to display a current output, for example.

Preferably, hand-held portable electronic device 118 includes a second display 130 having a first portion 132 and a second portion 134 separated by overlay 136 which forms a part of the base portion 144 of housing 146. Cover portion 148 of housing 146 is preferably connected to base portion 144 via one or more foldable coupling means 148. Coupling means may be formed of any foldable material which preferably is capable of carrying electrical connection means which provide an electrical connection between the processor (not specifically illustrated), display 120 and display 130.

In the embodiment illustrated in Figure 3, display 130 disposed within base portion of housing 146 is selectively configurable to display one or more function keys 138 and a numeric keypad 140. Function keys 138 and numeric keypad 140 are preferably touch-sensitive and may be activated by the user's finger or a stylus, for example.

The portable hand-held electronic device 118 preferably includes a plurality of dedicated function keys, indicated generally by reference numeral 142, which may include a dedicated numeric keypad 150, a paging key 152, and an enter key 154, for example. In addition, the cover portion may also include one or more dedicated and/or selectively programmable keys 156 which control paging, scrolling, and/or the configuration or function of device 118.

Figure 4 illustrates another embodiment of a hand-held computing device with multiple displays connected by a hinge configured as a calculator according to the present invention. Device 160 preferably includes a first screen 162 disposed within top portion 164 and a second display 166 disposed within bottom portion 168. Display 162 preferably includes a number of configurable display areas including area 170 for graphical and/or statistical outputs when using device 160 as a calculator. In addition, display areas 172, 174, 176 and 178 may be used to display various registers or memories, for example. Likewise, display area 180 may be used to display a particular result. Display areas 170-180 are preferably part of a single monolithic display 162 and are separated by separating means 182 which are preferably also generated by display 162. In this example, separating means 182 include various lines, boxes, etc. to separate the various functional areas of display 162. Display 162 and display 166 are preferably connected by a plurality of hinges 184. Unlike the device illustrated in Figure 3, the device illustrated in Figure 4 includes only a single dedicated function key 186 which operates as a power key in this embodiment.

Display 166 is preferably configured to display a plurality of function keys 188, a numeric keypad 190, and a second set of function keys 192. Display keys 188, 190, and 192 are preferably touch-sensitive and may be activated using a stylus, for example. Displays 162 and 166 preferably utilize conventional touch-

sensitive technology which may be incorporated into the display and/or into the surrounding housing. As will be appreciated by one of ordinary skill in the art, device 160 may be a dedicated device which performs a single function, such as that of a calculator, organizer, or the like. Alternatively, the device may be configurable as explained in greater detail below.

Referring now to Figure 5, an alternative PDA having dual displays connected by a hinge configured for Internet browsing according to one embodiment of the present invention is shown. PDA 200 includes a first display 202 which may be used for viewing an Internet website, for example. In addition, device 200 includes a display 204 which may include a number of display windows or portions selectively configurable as input or output devices. In this embodiment, display 204 may include an address window 206 which displays any current command or address. In this regard, address window 206 provides an input means for accessing the Internet. In addition, a cursor control pad 208 may be used as an input device to control a cursor displayed on screen 202. In addition, screen 204 may include a touch-sensitive keypad 210 and various other selectively configurable input keys depending upon the particular application and/or mode of operation of device 200. Likewise, cursor control pad 208 and keypad 210 are representative of input means for accessing the Internet.

Dedication function keys 212 provide various functions which may be selectively reconfigured by the processor of PDA 200. Function keys may include a dedicated "record" function 214, Internet function 216, and the like. Preferably, PDA 200 includes at least one speaker 218. An additional speaker and/or microphone 220 may be provided for stereo listening and/or recording.

As with the embodiments of the present invention illustrated and described with reference to Figures 1-4, display 202 and display 204 are preferably connected via a foldable coupling 222 which is preferably one or more hinges. By using multiple displays connected by a foldable coupling, such as hinges, the present invention provides a personal digital system which can be used for browsing the Internet, sending and receiving e-mail, and the like. More efficient utilization of the available surface area provides a functional device with a portable, hand-held form

factor. As will be recognized by one of ordinary skill in the art, device 200 may include or incorporate various types of multimedia functionality such as telephone, cable, satellite, and/or other wireless communication functions.

Figure 6 illustrates another embodiment of a hand-held computing device having multiple displays configured for display of a digital video according to one embodiment of the present invention. Device 230 includes a first display 232 disposed within cover 234 and a second display 236 disposed within base 238. Cover 234 and base 238 are connected by a foldable coupling which includes hinges 240 and 242. Base 238 includes a power switch 244 and a plurality of speakers 246,248. Display 236 is configured to provide various input function keys 250 and an output display 252.

For the embodiment of Figure 6, PDA 230 may be used to view digital movies, for example. Display 232 functions as a video output screen to display the digital video information, while display 236 functions as an input/output device to control display 232 and/or the function of device 230. Of course, function keys 250 may replaced by one or more dedicated and/or selectively programmable keys disposed within cover 234 and/or base 238.

Referring now to Figure 7, an alternative embodiment of a hand-held computing device with dual displays connected by at least one hinge configured as a computer for receiving a digital data module to configure the device for Internet browsing according to one embodiment of the invention is shown. Device 260 includes a first display 262 connected by hinges 264 to a second display 266. Device 260 preferably includes a port 268 for receiving a computer-readable storage medium 270 which may be used to configure device 260 or provide digital information for viewing, listening, etc. Preferably, computer-readable storage medium 270 is selectively removable and includes data and/or instructions executable by the processor of device 260 to control the functionality of the device and/or provide data for manipulation or display.

Device 260 preferably includes stereo speakers 272 and a dedicated power switch 274. In addition, display 266 preferably includes various viewing

function keys 276, an alphanumeric keyboard 278, user programmable function keys 280, an address window 282, a cursor control pad 284, and directional keys 286. As with the embodiments illustrated in Figures 1-6, the embodiment illustrated in Figure 7 may have the keyboard and control function keys of display 266 interchanged with the viewing screen of display 262 without departing from the spirit or scope of the present invention.

Figure 8 illustrates a hand-held computing device having dual displays connected by a hinge which is configurable as a computer with an appropriate computer module according to one embodiment of the present invention. Device 300 includes a first display 302 connected to a second display 304 by at least one hinge 306. A port 308 is provided for receiving a computer-readable storage medium or module 310 to provide data and/or instructions to configure device 300. As illustrated in the embodiment of Figure 7, port 308 may be positioned in base 312 and/or cover 314 depending upon the particular application.

Referring now to Figure 9, a block diagram illustrating various internal components of a hand-held computing device for use as a PDA with multiple displays according to the present invention is shown. PDA 330 includes a base 332 and cover 334 having displays 336 and 337, respectively. The multiple displays are preferably connected by a foldable coupling, such as a hinge 338, which may conceal electrical connection means 340. PDA 330 may include a programmable function module 342 which includes a computer-readable storage medium for storing data and/or instructions for processor/memory 344. As such, function module 342 is in selective communication with processor/memory 344 by inserting into an appropriate port in PDA 330.

Processor/memory 344 also preferably communicates with various inputs/outputs and controls 346 which may include a transceiver for wirelessly transmitting and receiving digital data as described in greater detail below. Primary drive 348 is in communication with processor/memory 344 via a conventional address/data bus. Primary drive 348 may include any of a number of known computer-readable storage media for persistent or permanent storage of data and instructions used by processor/memory 344 to selectively configure PDA 330 for

various modes as described and illustrated in the Figures. Depending upon the particular processor utilized, a fan 352 may be provided for proper cooling of the electronic components within cover 334 and/or base 332.

Displays 337 and 336 preferably include corresponding input/output driver circuitry 354 and 356, respectively, in communication with processor/memory 344. The input/output drivers are used to generate the appropriate signals to drive the displays and/or portions of the displays which may include touch-sensitive areas as described herein. As such, processor/memory 344 may be used to selectively configure display 336 and/or display 337 as an input and/or output device. For example, display 336 may be configured as an input device using driver 356 supplied with appropriate commands/signals by processor/memory 344 to display a keypad or keyboard on display 336. Input/output driver 356 is operable to detect a touch from the user and/or pointing device, such as a stylus, and generate appropriate signals to be processed by the software stored in processor/memory module 344 and/or function module 342. Display 337 may be selectively configured with one or more input and output areas with input/output driver 354 used to generate appropriate signals corresponding to the programmed functions.

As also illustrated in Figure 9, PDA 330 may include an appropriate latching mechanism 362 with a corresponding receiver or receptacle 364 to maintain the hinged base 332 and cover 334 in a closed position. These latching means may be implemented using a mechanical latch, a magnetic and metal latch, or the like. Preferably, any magnetic device is positioned a sufficient distance based on its electromagnetic field to avoid interference with computer-readable storage media in function module 342, primary drive 348, and various other electronic components.

PDA 330 preferably includes a conventional power supply system which includes a power adapter 358 in communication with a power storage device, such as battery 350. In addition, a power switch 360 controls activation of device 330 and is preferably in communication with battery 350 and processor/memory 344. Battery 350 preferably provides a low voltage DC power source for PDA 330 and may be implemented using conventional battery technology including rechargeable and disposable batteries and/or combinations thereof. For example, battery 350 may

include one or more nickel-cadmium or lithium ion batteries, alkaline batteries, and the like. Power receptacle 358 may also include an internal adapter/converter to convert AC power to DC power for supply to PDA 330 and/or to recharge battery 350. Of course, an external transformer or converter may be used with a simple jack represented by block 358.

With continuing reference to Figure 9, block 346 provides an interface to selectively exchange information with one or more devices similar to device 330, for example. In one embodiment, block 346 represents a physical data port capable of receiving an appropriate cable to exchange information with a base unit, another PDA, a computer, or the like. Alternatively, or in combination, block 346 may also include a transceiver for wirelessly transmitting and receiving data. Any of the conventional wireless technologies may be utilized in keeping with the present invention. For example, infrared (IR), radio-frequency (RF), optical, and various other communication strategies may be utilized. Likewise, device 330 may be utilized in a cellular, satellite, or other wireless network to transmit and receive information necessary for various functions such as sending/receiving e-mail, browsing the Internet, downloading or viewing/listening to video/audio files, and the like.

Function modules 342 may control the function of PDA 330 or may include digital information to be played/displayed by PDA 330. For example, in one embodiment, a function module 342 includes software and associated data to selectively configure PDA 330 to operate as a calculator. Another function module 342 may be used to selectively configure PDA 330 to operate as a digital video player, for example. Those of ordinary skill in the art will recognize various other functions which may be performed by providing a removable function module such as illustrated in Figure 9.

Referring now to Figure 10, a hand-held computing device with multiple displays configured as a digital audio player for streaming audio, stored audio and/or radio broadcast playing and recording according to one embodiment of the present invention is shown. PDA 400 includes a first display 402 and second display 404 connected via hinges 406. Display 402 is preferably disposed within

cover 408, while display 404 is preferably disposed within base 410. PDA 400 is preferably selectively configurable as a personal digital entertainment device which may be used for listening to digital audio with a graphical representation depicted in area 416 of display 404 and may include corresponding video output on display 402.

PDA 400 may include one or more physical keys 412 used to provide control of displays 402 and 404 and/or as to control the function of device 400. Keys 412 may be dedicated keys with fixed functions and/or soft keys with programmable functions based on the device configuration. Alternatively, base 410 or cover 408 may include one or more keys which are user programmable. Display 404 also includes function keys 418 to control the volume of speakers 414 and tuning of the PDA 400 to select an appropriate address or radio station, for example. In addition, various display windows 420 may be used to provide the user with associated information such as the date, time, radio station or address, and the like. Device 400 may also include a graphic equalizer with associated control keys 422.

Figure 11 illustrates an alternative embodiment of a hand-held electronic device with dual displays connected by a hinge for displaying digital video according to one embodiment of the present invention. Device 450 includes a first screen 452 which may function as a video output screen, for example, and a second screen or display 454 which may provide associated inputs and/or outputs, for example. Displays 452 and 454 are preferably connected by a plurality of hinges 456. Display 454 is preferably selectively configured by the processor to display various user information in associated output windows such as window 458. In addition, display 454 displays representations of function buttons or keys 460 with associated information or labels 462. For example, buttons 460 are preferably touch-sensitive and provide forward and reverse tracks or channels, and volume control, for example. Informational displays or labels 462 are not touch-sensitive and provide information relative to touch-sensitive display buttons 460. In addition, display 454 may include combined labels/touch-sensitive buttons 468. Device 450 may also include physical buttons 464 and preferably includes stereo speakers 466 to provide audio output to the user.

Figure 12 illustrates a hand-held electronic device with multiple displays connected by a hinge configured in a television mode according to one embodiment of the present invention. Device 500 preferably includes a base portion 502 with associated display 504 and a cover portion 506 with an associated display 508. Preferably, base portion 502 and cover portion 506 are connected by one or more hinges 510. Display 504 may be selectively configured to display various controls and provide information to the user. Likewise, display 508 may be used to provide controls for either of the displays 504,508, but is preferably used to provide video output for television viewing. As such, control and information provided on display 504 may include various television controls and informational displays. For example, portion 512 of display 504 may be used to display the current channel with portions 514 having a numeric keypad which is touch-sensitive to change channels or select another address or site for viewing. Likewise, various controls are provided to set the date and time, control the channel, and/or control the volume. Of course, various other menus and/or controls may be selectively provided based on a current operating mode of device 500. For example, various screen controls to control the video output provided on screen 508 may be provided on display 504 and/or on a portion of display 508.

Figure 13 illustrates a hand-held electronic device with multiple displays connected by a foldable coupling with the device configured as a recorder according to one embodiment of the present invention. The recording mode illustrated in Figure 13 provides representative functions for recording a video and/or audio input. Device 550 preferably includes a video output screen 552 connected by hinges 554 to a touch-sensitive input/output screen 556. Input/output screen 556 preferably includes various keys or buttons 558 and corresponding informational displays 560 associated with recording input signals received via an appropriate cable and/or wirelessly. Device 550 may include one or more physical buttons 562 which may have dedicated and/or programmable functions. Device 550 preferably includes one or more speakers 564 and a latch 566 with associated receiver 568 for keeping the device 550 in a closed and secured position when not in use.

Figure 14 illustrates a hand-held electronic device with multiple displays connected by a hinge with an optional external antenna for exchanging information according to one embodiment of the present invention. Device 600 includes a first display 602 connected to a second display 604 via one or more hinges 606. An optional external antenna 608 is provided for wirelessly receiving and/or transmitting information to another PDA, a base station, a computer, a wireless network, a satellite, a cellular network, or the like. Of course, depending upon the particular communication strategy utilized, an internal antenna may also be used without departing from the spirit or scope of the present invention.

Figure 15 provides a side view illustrating a portable hand-held electronic device for use as a PDA according to the present invention. Device 650 is illustrated in the folded or closed position. Device 650 preferably includes a variety of inputs/outputs which may be positioned in base portion 652 and/or cover portion 654. A port or slot 656 for receiving a computer-readable storage medium may be contained in base portion 652 or cover portion 654. Conventional computer-readable storage media including floppy disks, flash memory, CD-ROMs, and the like may be utilized with device 650. Slot or port 656 may be adapted to receive one or more modules to drive corresponding computer-readable storage media such as floppy disks and CD-ROMs.

Device 650 may include various other inputs such as nine-pin port 658 to exchange information with other devices. Of course, input/output ports having various other form factors and complying with various standards may also be provided. For example, a parallel port, a fire-wire port, a USB port, and the like may be provided. Preferably, device 650 includes stereo output jacks 660 which provide audio signals to appropriately sized speakers and/or headphones. In addition, a power jack 662 may be provided. Dial 664 may be used for a dedicated or programmable input function. For example, dial 664 may be used to control the volume, the screen contrast for one or more displays, and/or to cycle through menus displayed on the multiple displays of device 650.

Referring now to Figure 16, a block diagram illustrating operation of a system and/or method for exchanging data with a hand-held electronic device with

multiple displays according to the present invention is shown. System 700 may include a computer 702 which receives data from a download service 704 via a dedicated or dial-up connection 706. Download service 704 may be accessed by a dial-up connection using a modem, by a cable modem connection, DSL connection, satellite link, or the like. Computer 702 may be used to temporarily store digital information or may act simply as a conduit to pass digital information from download service 704 to portable hand-held digital device 708 which is connected to computer 702 via an appropriate link 710. Device 708 may connect to computer 702 using an appropriate cable connected to a serial port, parallel port, USB port, or the like. In addition, device 708 may connect to computer 702 using a wireless connection and transmit signals via infrared, radiowave, satellite, and the like.

System 700 may also transfer digital information to a computer-readable storage medium as represented by block 712. The computer-readable storage medium may include a CD-ROM, digital versatile disk (DVD), flash memory, and the like. The computer-readable storage medium is subsequently loaded into the hand-held device as illustrated and described above.

Alternatively, the PDA may connect directly to a download service 704 as represented by block 714. Similar to the connection to computer 702, the device connects directly to a server hosted by the download service using a cable connection through a serial port, parallel port, or the like. Alternatively, a wireless connection may be established using infrared, radiowave, satellite, etc.

As illustrated and described above using various representative embodiments, the present invention provides a PDA which may be selectively configurable in various operating modes to play/record video and/or audio, read/write e-mail, browse the Internet, and the like, or may contain only dedicated functions, such as a PDA, calculator, Internet browsing device, or the like. The use of multiple displays connected by a foldable coupling, such as a hinge, provides an acceptable form factor, while improving the display area and reducing the otherwise necessary screen manipulations including scrolling and paging. As such, the present invention provides a hand-held device which facilitates portable Internet access with increased functionality.

While embodiments of the invention have been illustrated and described, it is not intended that these embodiments illustrate and describe all possible forms of the invention. Rather, the words used in the specification are words of description rather than limitation, and it is understood that various changes may be made without departing from the spirit and scope of the invention. One of ordinary skill in the art will recognize that the features or functions described in any given embodiment are adaptable to all embodiments shown and other embodiments within the scope of the invention.

WHAT IS CLAIMED IS:

1. A hand-held portable electronic device capable of being used as a personal digital assistant, the hand-held device comprising:

a housing having a first display, a processor, and a memory, the processor being in communication with the first display and the memory;

a cover connected to the housing by a foldable coupling, the cover including a second display in communication with the processor, wherein the processor generates output signals to display information on at least one of the first and second displays;

input means in communication with the processor for selectively controlling functionality of the device; and

means for establishing an electrical connection between the processor, the input means, and the first and second displays.

2. The portable electronic device of claim1 wherein at least one of the first and second displays is selectively configurable by the processor to function as a touch-sensitive input device.

3. The portable electronic device of claim 1 wherein at least one of the first and second displays includes a first portion for displaying information to the user and a second portion for receiving input from the user.

4. The portable electronic device of claim 1 wherein the foldable coupling comprises at least one hinge connecting the cover to the housing.

5. The portable electronic device of claim 1 wherein at least one of the first and second displays comprises an LCD screen.

6. The portable electronic device of claim 1 wherein at least one of the first and second displays comprises an active matrix display.

7. The portable electronic device of claim 1 wherein the input means comprises a plurality of buttons positioned within the housing or the cover and in

communication with the processor for controlling information displayed on at least one of the first and second displays.

8. The portable electronic device of claim 1 wherein the housing includes a transceiver in communication with the processor for wirelessly transmitting and receiving data.

9. The portable electronic device of claim 1 wherein the processor is operative to display images depicting a numeric keypad on at least one of the first and second displays.

10. The portable electronic device of claim 1 wherein the processor is operative to display images depicting an alphanumeric keypad on at least one of the first and second displays.

11. The portable electronic device of claim 1 wherein the processor is operative to provide Internet access functions.

12. The portable electronic device of claim 1 wherein at least one of the first and second displays is configured to provide an Internet viewing area.

13. The portable electronic device of claim 1 wherein at least one of the first and second displays includes at least a portion configured to provide an Internet access input means.

14. The portable electronic device of claim 1 wherein one of the first and second displays includes a first portion for displaying information to the user while another of the first and second displays includes a second portion for generating signals based on user input.

15. The portable electronic device of claim 1 wherein the processor is operative to display text or images on the first and second displays such that the first and second displays function as a single display.

16. The portable electronic device of claim 1 wherein the processor is operative to scroll text between a bottom portion of the second display and a top portion of the first display.

17. The portable electronic device of claim 1 wherein the housing includes a port for receiving a computer readable storage medium containing data and/or instructions useable by the processor to selectively reconfigure at least one of the first and second displays.

18. The portable electronic device of claim 1 further comprising a removable computer readable storage medium containing configuration data and/or instructions useable by the processor to selectively reconfigure at least one of the first and second displays.

19. The portable electronic device of claim 1 wherein the housing includes at least one connector for selectively receiving a cable to exchange data with a computer.

20. The portable electronic device of claim 1 wherein the housing or the cover includes a plurality of cursor control keys in communication with the processor for providing directional signals in response to a user's touch.

21. The portable electronic device of claim 1 wherein the processor is operative to selectively configure the first and second displays for horizontal or vertical viewing in response to a corresponding command received from the user.

22. A portable wireless electronic device comprising:

a housing including a base portion and a cover portion connected to the base portion by at least one hinge;

a transceiver disposed within the housing and in communication with an antenna for selectively receiving transmitted signals and selectively transmitting signals;

a first display disposed within the base portion of the housing;

a second display disposed within the cover portion of the housing;

a processor disposed within the housing and in communication with the transceiver, the first display, and the second display, the processor including memory having stored data representing instructions for configuring the first display to selectively display keys for receiving commands from a user, and for configuring the second display to selectively display information based on commands received from the keypad and/or information received from the transceiver, wherein at least a portion of the first display is selectively reconfigured by the processor to display information received from the transceiver such that the portion of the first display and the second display operate as a single continuous display.

23. The portable wireless electronic device of claim 22 wherein the first and second displays comprise first and second regions of a flexible monolithic screen.

24. The portable wireless electronic device of claim 22 wherein at least one of the first and second displays comprises an LCD screen.

25. The portable wireless electronic device of claim 22 wherein the housing includes a plurality of keys for entry of user data or commands.

26. The portable wireless electronic device of claim 22 wherein at least one of the first and second displays comprises an active matrix display.

27. The portable wireless electronic device of claim 22 wherein the processor is operative to scroll text between a bottom portion of the second display and a top portion of the first display.

28. The portable wireless electronic device of claim 22 further comprising a disk drive disposed within the housing and in communication with the processor to selectively store and retrieve data.

29. The portable wireless electronic device of claim 22 wherein the processor is operative to display images depicting a numeric keypad on at least one of the first and second displays.

30. The portable wireless electronic device of claim 22 wherein the processor is operative to display images depicting an alphanumeric keypad on at least one of the first and second displays.

31. The portable wireless electronic device of claim 22 wherein the processor is operative to access the Internet.

32. The portable wireless electronic device of claim 22 wherein at least one of the first and second displays provides an Internet viewing area.

33. The portable wireless electronic device of claim 22 wherein at least one of the first and second displays includes at least a portion for providing input means to access the Internet.

34. A hand-held electronic organizer for use as a personal digital assistant, the hand-held electronic organizer comprising:

a housing having a first display, a processor, and a memory, the processor being in communication with the first display and the memory;

a cover connected to the housing by a plurality of hinges, the cover including a second display in communication with the processor via an electrical connector hidden within at least one of the plurality of hinges, wherein the processor generates output signals to display information on at least one of the first and second displays based at least in part on input received from a user.

35. The hand-held electronic organizer of claim 34 wherein at least one of the first and second displays is selectively configurable by the processor to display information corresponding to functions which may be activated by the user touching the display.

36. The hand-held electronic organizer of claim 34 wherein at least one of the first and second displays includes a physical overlay defining a first portion for displaying information to the user and a second portion for receiving input from the user.

37. The hand-held electronic organizer of claim 34 wherein at least one of the first and second displays comprises an LCD screen.

38. The hand-held electronic organizer of claim 34 wherein at least one of the first and second displays comprises an active matrix display.

39. The hand-held electronic organizer of claim 34 further comprising:

a plurality of buttons positioned within the housing or the cover and in communication with the processor for controlling functioning of the electronic organizer.

40. The hand-held electronic organizer of claim 39 wherein the housing includes a transceiver in communication with the processor for wirelessly transmitting and receiving data.

41. The hand-held electronic organizer of claim 40 wherein the processor is operative to display images depicting a numeric keypad on at least one of the first and second displays.

42. The hand-held electronic organizer of claim 40 wherein the processor is operative to display images depicting an alphanumeric keypad on at least one of the first and second displays.

43. The hand-held electronic organizer of claim 40 wherein the processor is operative to provide Internet access functions.

44. The hand-held electronic organizer of claim 40 wherein at least one of the first and second displays is operative to provide an Internet viewing area.

45. The hand-held electronic organizer of claim 40 wherein at least one of the first and second displays includes at least a portion which functions as an Internet access input means.

46. The hand-held electronic organizer of claim 34 wherein the processor is operative to display text or images on the first and second displays such that the first and second displays function as a single display to reduce the frequency of scrolling and/or paging when viewing electronic data.

47. The hand-held electronic organizer of claim 42 wherein the processor is operative to scroll text between a bottom portion of the second display and a top portion of the first display.

48. The hand-held electronic organizer of claim 47 wherein the housing includes a port for receiving a computer readable storage medium containing data and/or instructions useable by the processor to selectively reconfigure at least one of the first and second displays.

49. The hand-held electronic organizer of claim 47 further comprising a removable computer readable storage medium containing configuration data and/or instructions useable by the processor to selectively reconfigure at least one of the first and second displays.

50. The hand-held electronic organizer of claim 49 wherein the housing includes at least one connector for selectively receiving a cable to exchange data with a computer.

51. The hand-held electronic organizer of claim 34 wherein the housing or the cover includes a plurality of cursor control keys in communication with the processor for providing directional signals in response to a user's touch.

52. The hand-held electronic organizer of claim 51 wherein the processor is operative to selectively configure the first and second displays for

horizontal or vertical viewing in response to a corresponding command received from the user.

53. A portable hand-held electronic device for use as a personal digital assistant, the device comprising:

a housing having a base portion and a cover portion connected by a foldable coupling;

a plurality of electronic displays with at least one of the plurality of electronic displays disposed within the base portion of the housing and at least one of the plurality of electronic displays disposed within the cover portion of the housing;

a processor disposed within the housing and in communication with the plurality of displays, the processor generating signals to selectively configure the plurality of displays as input and/or output devices for receiving information from a user and displaying information to a user, respectively.;

a transceiver disposed within the housing and in communication with the processor, the transceiver for selectively wirelessly transmitting and receiving digital information;

at least one communication port disposed within the housing and in communication with the processor for exchanging information with a computer;

a plurality of buttons located in the housing and in communication with the processor, the plurality of buttons in communication with the processor and selectively configurable by the processor to control at least one of the plurality of displays and/or functioning of the device; and

a removable computer readable storage medium engageable with the housing to be in selective communication with the processor, the computer readable storage medium including stored data representing instructions executable by the processor to selectively configure the device.

54. The portable hand-held electronic device of claim 53 wherein the processor is operative to selectively configure the plurality of displays for horizontal or vertical viewing in response to a corresponding command received from the user.

55. The portable hand-held electronic device of claim 53 wherein the processor selectively configures at least two of the plurality of displays to function as a single display.

56. The portable hand-held electronic device of claim 55 wherein the processor selectively configures the at least two displays to scroll text between adjacent displays.

57. The portable hand-held electronic device of claim 53 wherein the foldable coupling comprises at least one hinge.

58. The portable hand-held electronic device of claim 53 further comprising foldable electrical connecting means for connecting at least one of the plurality of displays to the processor through the foldable coupling between the base portion and the cover portion.

59. The portable hand-held electronic device of claim 53 wherein at least one of the plurality of displays comprises an LCD screen.

60. The portable hand-held electronic device of claim 53 wherein at least one of the plurality of displays comprises:

a first portion for displaying touch activated buttons;

a second portion separated from the first portion by a physical overlay, the second portion being configured to function as a cursor control touch pad.

61. The portable hand-held electronic device of claim 53 wherein the processor is operative to display a numeric keypad on at least one of the plurality of displays.

62. The portable hand-held electronic device of claim 53 wherein the processor is operative to display an alphanumeric keypad on at least one of the plurality of displays.

63. The portable hand-held electronic device of claim 53 wherein the processor is operative to provide Internet access functions.

64. The portable hand-held electronic device of claim 53 wherein at least one of the plurality of displays functions as an Internet viewing area.

65. The portable hand-held electronic device of claim 53 wherein at least one of the plurality of displays includes at least a portion which functions as an Internet access input means.

66. A hand-held portable electronic device capable of being used as a personal digital assistant, the hand-held device comprising:

a housing having a first display, a processor, and a memory, the processor being in communication with the first display and the memory;

a cover connected to the housing by a foldable coupling, the cover including a second display in communication with the processor, wherein the processor generates output signals to display information on at least one of the first and second displays;

input means in communication with the processor for selectively controlling functionality of the device;

means for establishing an electrical connection between the processor, the input means, and the first and second displays; and

wherein the processor is operative to provide Internet browsing functions.

67. The portable electronic device of claim 66 wherein at least one of the first and second displays is configured to provide an Internet viewing area.

68. The portable electronic device of claim 67 wherein at least one of the first and second displays includes at least a portion configured to provide an Internet access input means.

69. The portable electronic device of claim 68 wherein at least one of the first and second displays is selectively configurable by the processor to function as a touch-sensitive input device.

70. The portable electronic device of claim 68 wherein at least one of the first and second displays includes a first portion for displaying information to the user and a second portion for receiving input from the user.

71. The portable electronic device of claim 68 wherein the foldable coupling comprises at least one hinge connecting the cover to the housing.

72. The portable electronic device of claim 68 wherein at least one of the first and second displays comprises an LCD screen.

73. The portable electronic device of claim 68 wherein at least one of the first and second displays comprises an active matrix display.

74. The portable electronic device of claim 68 wherein the input means comprises a plurality of buttons positioned on the housing or the cover and in communication with the processor for controlling information displayed on at least one of the first and second displays.

75. The portable electronic device of claim 68 wherein the housing includes a transceiver in communication with the processor for wirelessly transmitting and receiving data.

76. The portable electronic device of claim 68 wherein the processor is operative to display images depicting a numeric keypad on at least one of the first and second displays.

77. The portable electronic device of claim 68 wherein the processor is operative to display images depicting an alphanumeric keypad on at least one of the first and second displays.

78. The portable electronic device of claim 68 wherein at least one of the first and second displays is configured to provide an Internet viewing area.

79. The portable electronic device of claim 68 wherein at least one of the first and second displays includes at least a portion configured to provide an Internet access input means.

80. The portable electronic device of claim 68 wherein one of the first and second displays includes a first portion for displaying information to the user while another of the first and second displays includes a second portion for generating signals based on user input.

81. The portable electronic device of claim 68 wherein the processor is operative to display text or images on the first and second displays such that the first and second displays function as a single display.

82. The portable electronic device of claim 68 wherein the processor is operative to scroll text between a bottom portion of the second display and a top portion of the first display.

83. The portable electronic device of claim 68 wherein the housing includes a port for receiving a computer readable storage medium containing data and/or instructions useable by the processor to selectively reconfigure at least one of the first and second displays.

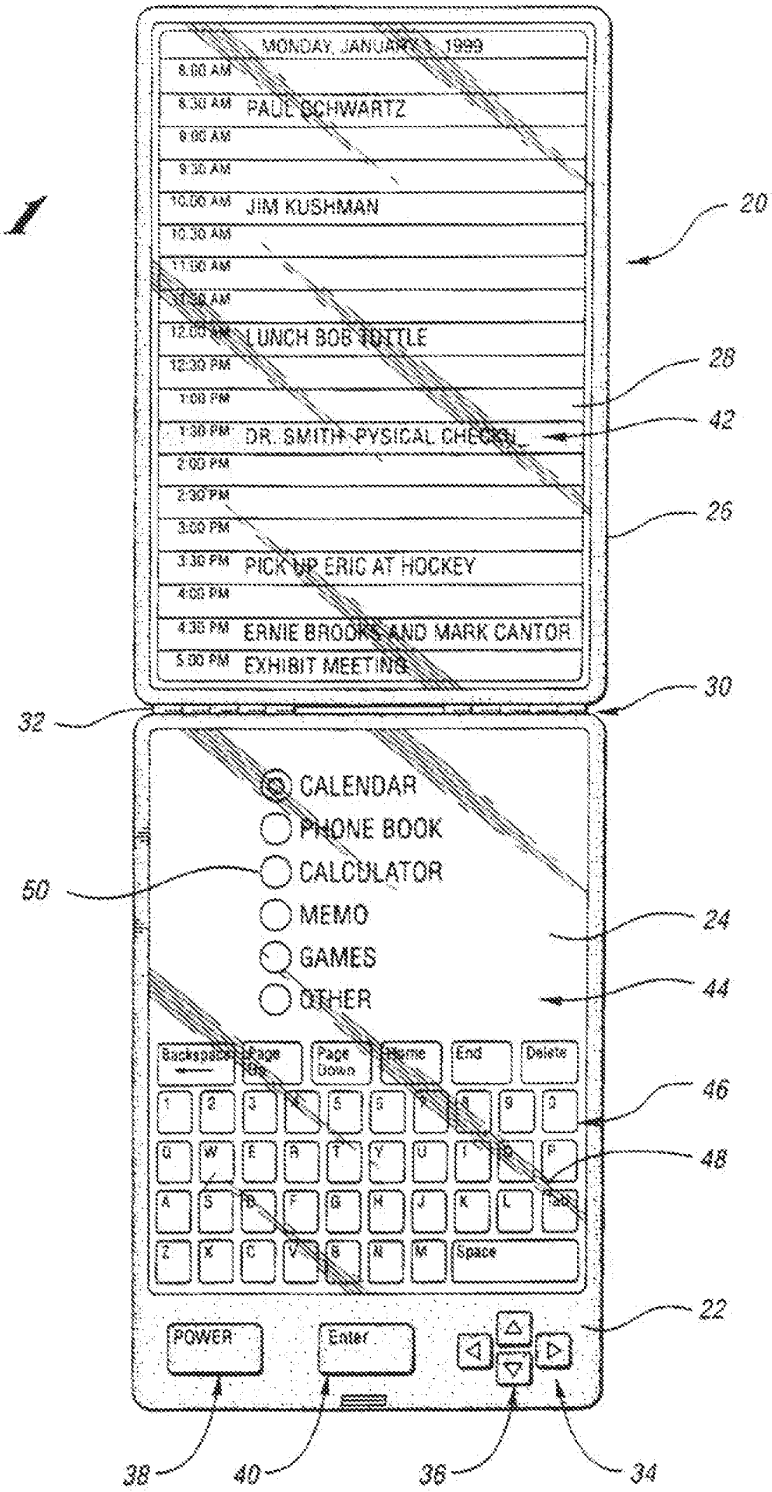
84. The portable electronic device of claim 68 further comprising a removable computer readable storage medium containing configuration data and/or instructions useable by the processor to selectively reconfigure at least one of the first and second displays.

85. The portable electronic device of claim 68 wherein the housing includes at least one connector for selectively receiving a cable to exchange data with a computer.

86. The portable electronic device of claim 68 wherein the housing or the cover includes a plurality of cursor control keys in communication with the processor for providing directional signals in response to a user's touch.

87. The portable electronic device of claim 68 wherein the processor is operative to selectively configure the first and second displays for horizontal or vertical viewing in response to a corresponding command received from the user.

Fig. 1


MONDAY, JANUARY 3, 1999
8:00 AM
8:30 AM PAUL SCHWARTZ
9:00 AM
9:30 AM
10:00 AM JIM KUSHMAN
10:30 AM
11:00 AM
12:00 PM LUNCH BOB TUTTLE
12:30 PM
1:00 PM
1:30 PM DR. SMITH PYSICAL CHECKUP
2:00 PM
2:30 PM
3:00 PM
3:30 PM PICK UP ERIC AT HOCKEY
4:00 PM
4:30 PM ERNIE BROOKS AND MARK CANTOR
5:00 PM EXHIBIT MEETING
CALENDAR
PHONE BOOK
CALCULATOR
MEMO
GAMES
OTHER
Backspace
Page Up
Page Down
Home
End
Delete
Space
POWER
Enter
20
22
24
26
28
30
32
34
36
38
40
42
44
46
48
50

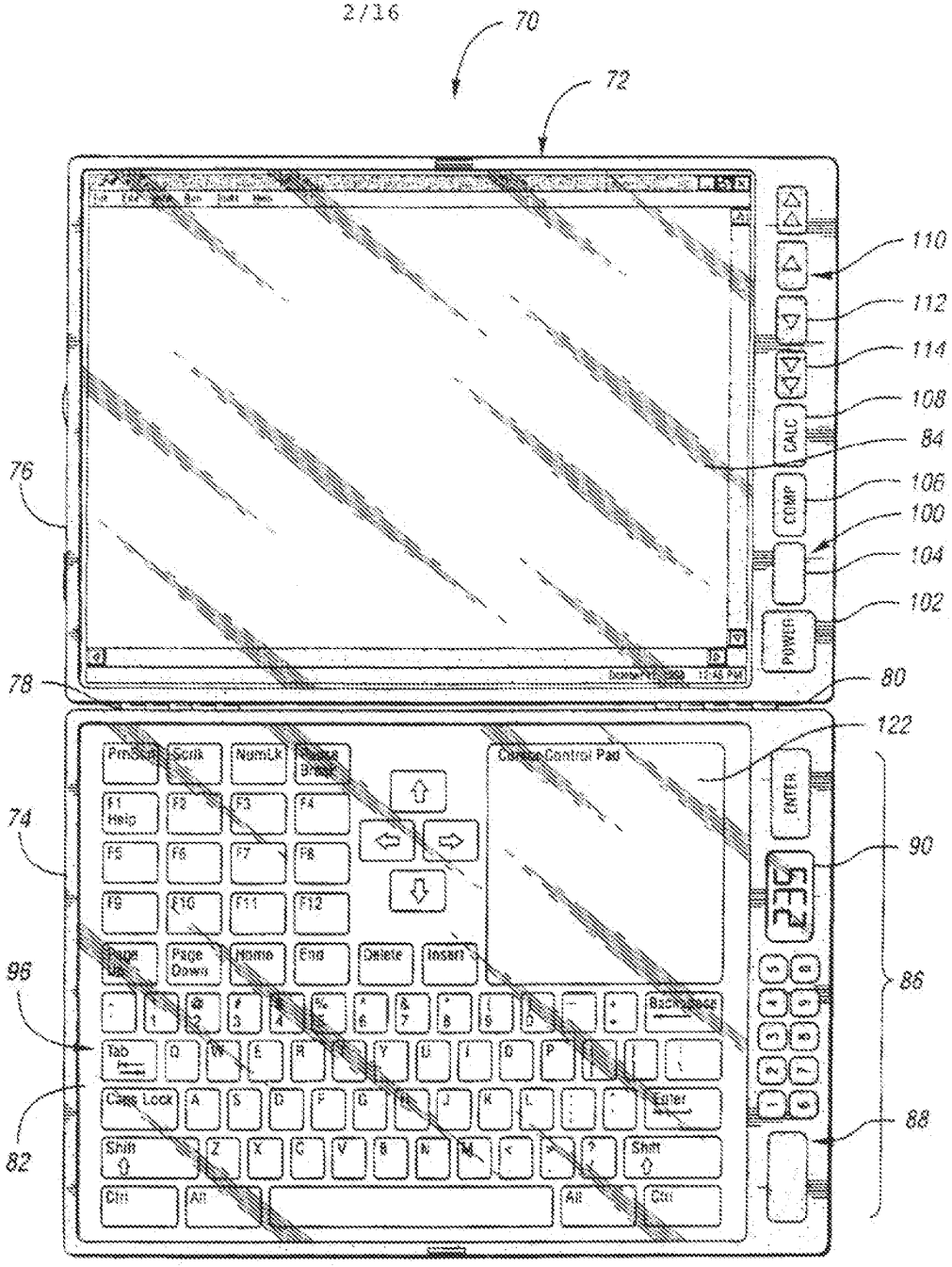

70
72
110
112
114
108
84
106
100
104
102
76
78
80
122
74
90
96
86
82
88
CALC
COMP
POWER
ENTER
Cursor Control Pad

Fig. 2

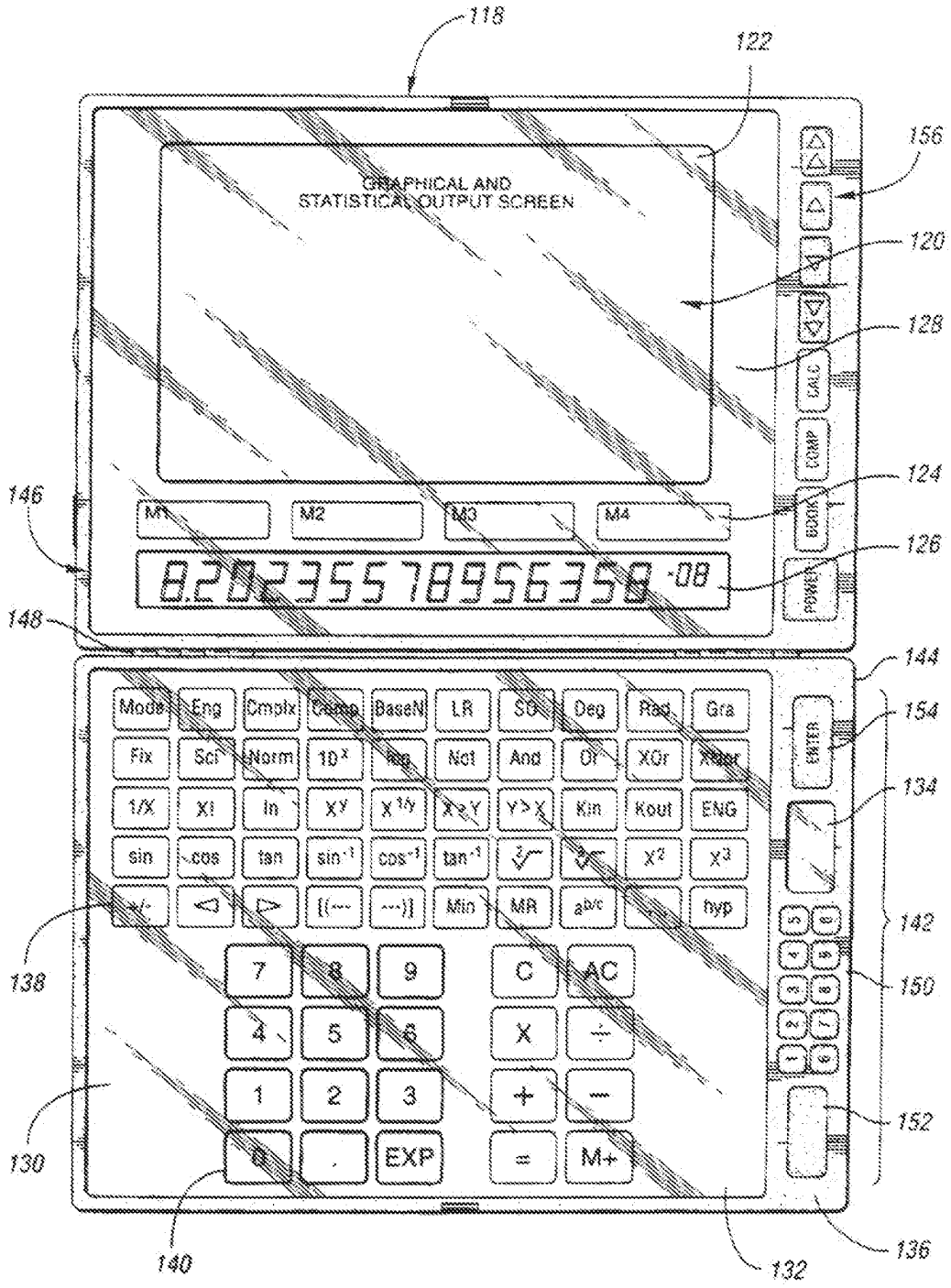

118
122
156
GRAPHICAL AND
STATISTICAL OUTPUT SCREEN
120
128
124
126
146
148
144
154
134
142
150
138
130
152
140
132
136
M1
M2
M3
M4
8.2023557895635B -08
Mode
Eng
Cmplx
Comp
BaseN
LR
SD
Deg
Rad
Gra
Fix
Sci
Norm
10^x
Neg
Not
And
Or
XOr
XNor
1/X
X!
ln
X^y
X^1/y
X≥Y
Y>X
Kin
Kout
ENG
sin
cos
tan
sin^-1
cos^-1
tan^-1
hyp
Min
MR
7
8
9
C
AC
4
5
6
X
÷
1
2
3
+
−
0
.
EXP
=
M+
CALC
COMP
POWER
ENTER

Fig. 3

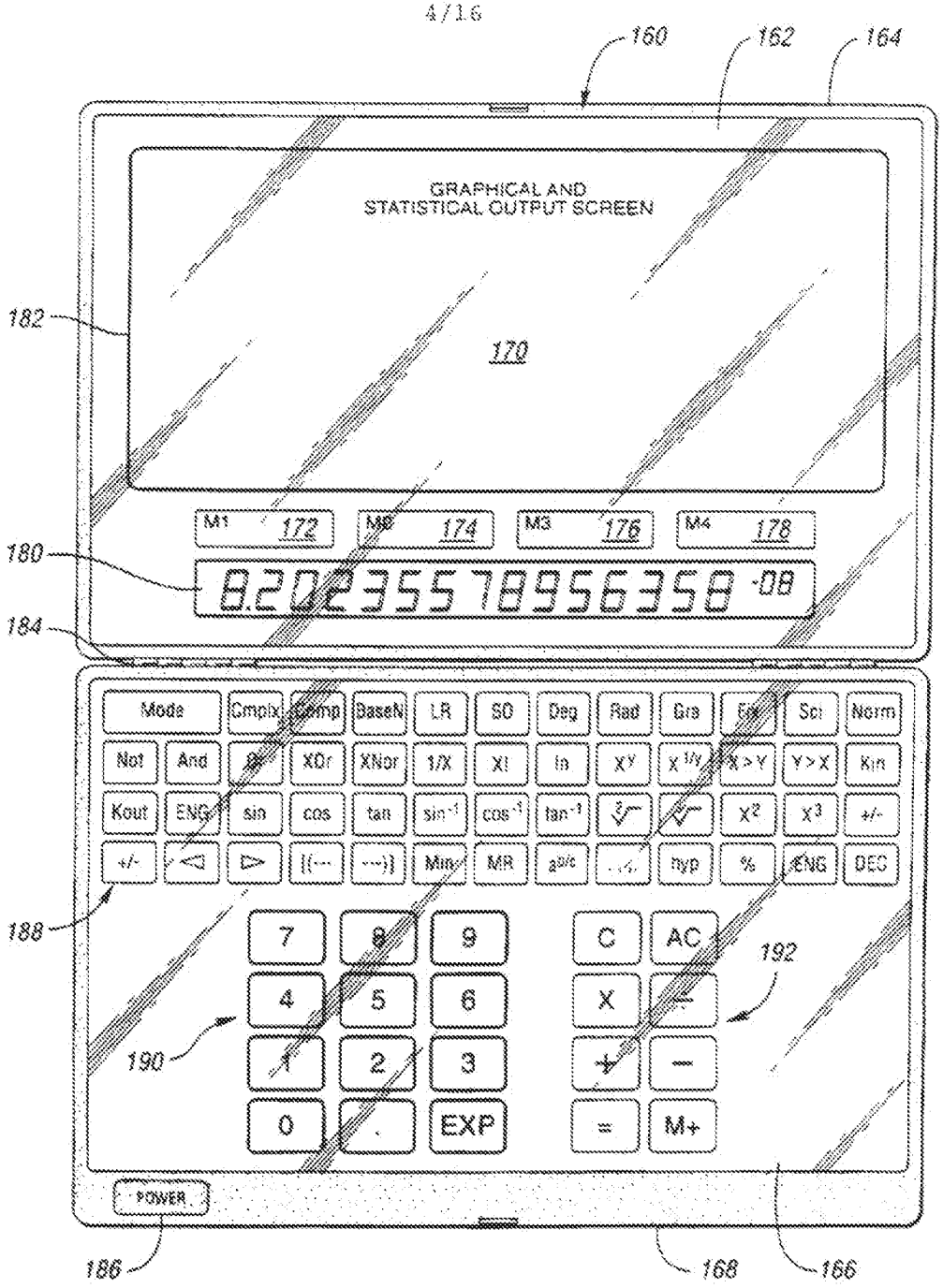

160
162
164
GRAPHICAL AND
STATISTICAL OUTPUT SCREEN
182
170
M1 172
M2 174
M3 176
M4 178
180
8.202355789563580 -08
184
Mode
Cmplx
Comp
BaseN
LR
SD
Deg
Rad
Gra
Fix
Sci
Norm
Not
And
Or
XOr
XNor
1/X
X!
ln
X^Y
X^1/Y
X>Y
Y>X
Rnd
Kout
ENG
sin
cos
tan
sin-1
cos-1
tan-1
X^2
X^3
+/-
+/-
hyp
%
ENG
DEG
MR
Min
188
7
8
9
4
5
6
1
2
3
0
.
EXP
C
AC
X
÷
+
−
=
M+
190
192
POWER
186
168
166

Fig. 4

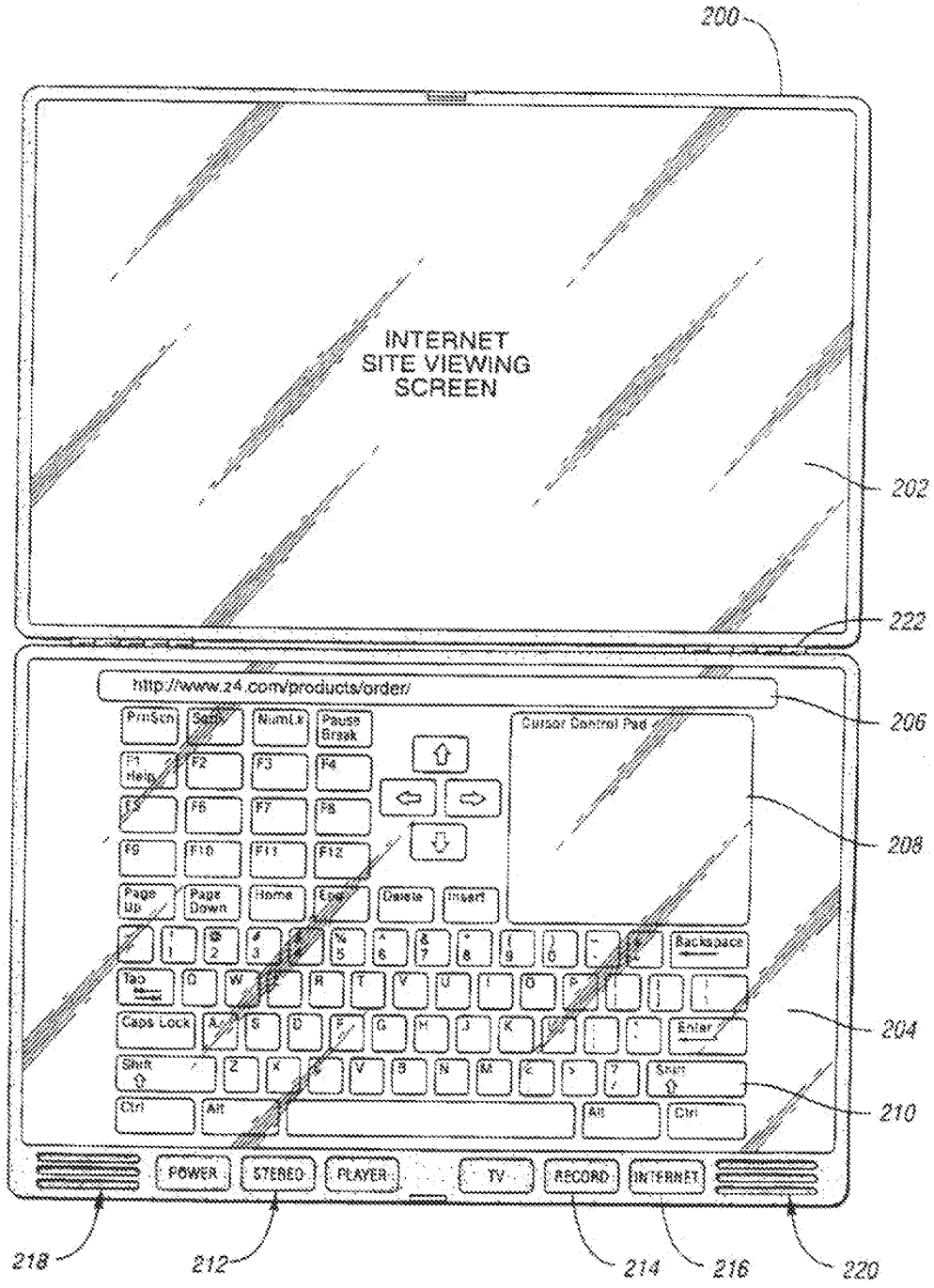

200
INTERNET
SITE VIEWING
SCREEN
202
222
http://www.z4.com/products/order/
206
Cursor Control Pad
208
204
210
POWER
STEREO
PLAYER
TV
RECORD
INTERNET
218
212
214
216
220

Fig. 5

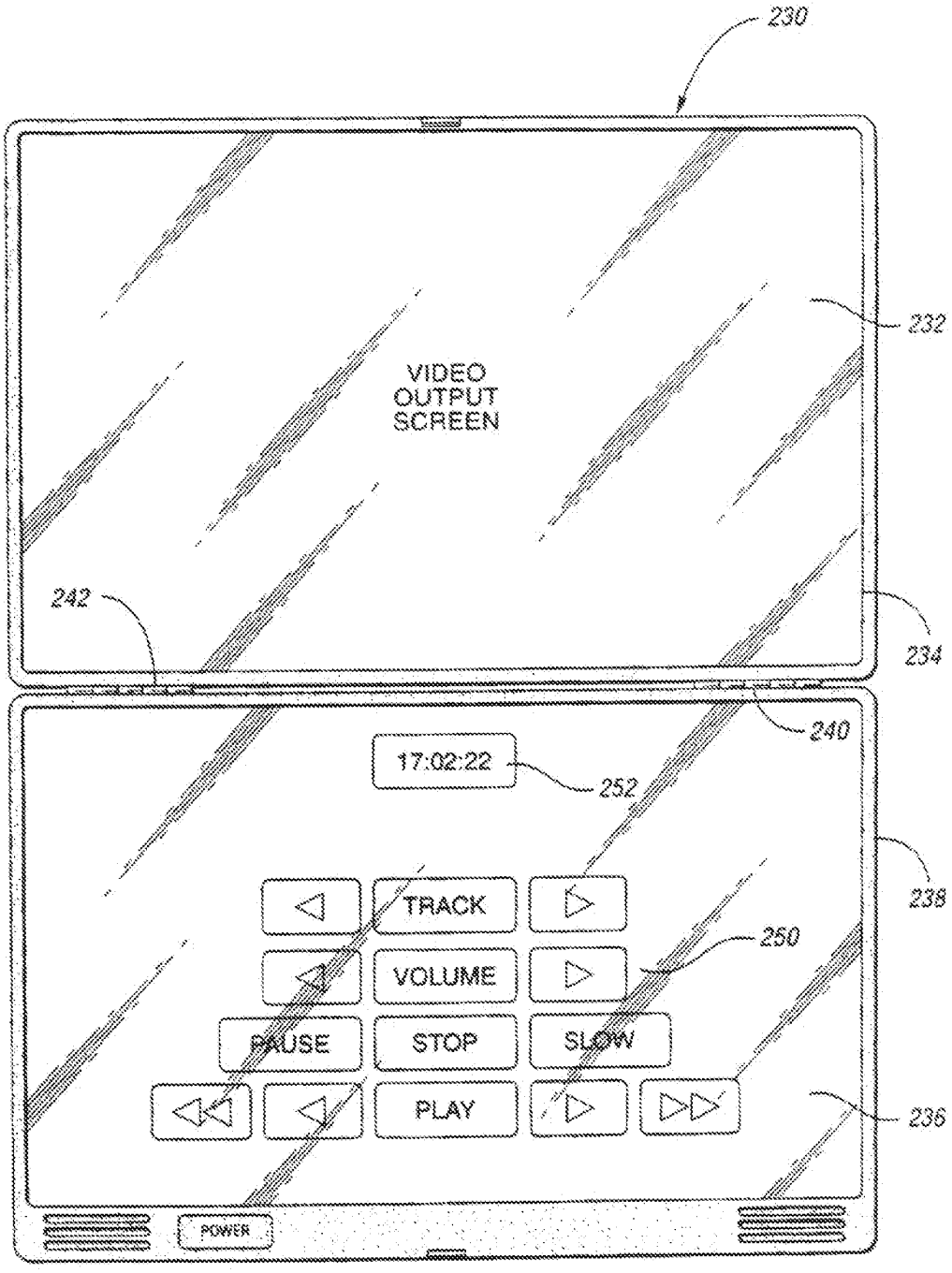

230
VIDEO
OUTPUT
SCREEN
232
242
234
240
17:02:22
252
238
TRACK
VOLUME
250
PAUSE
STOP
SLOW
PLAY
236
POWER

Fig. 6

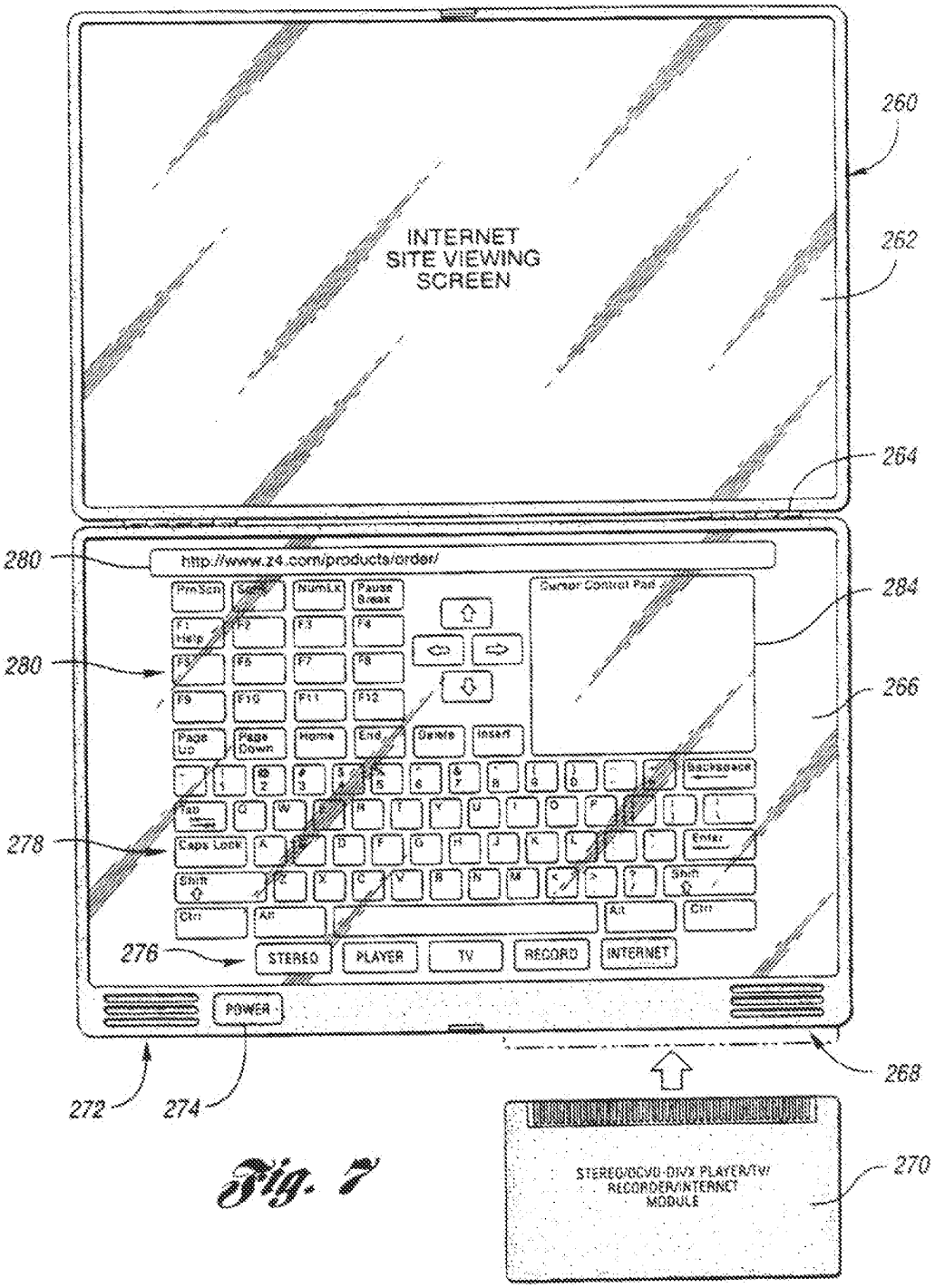
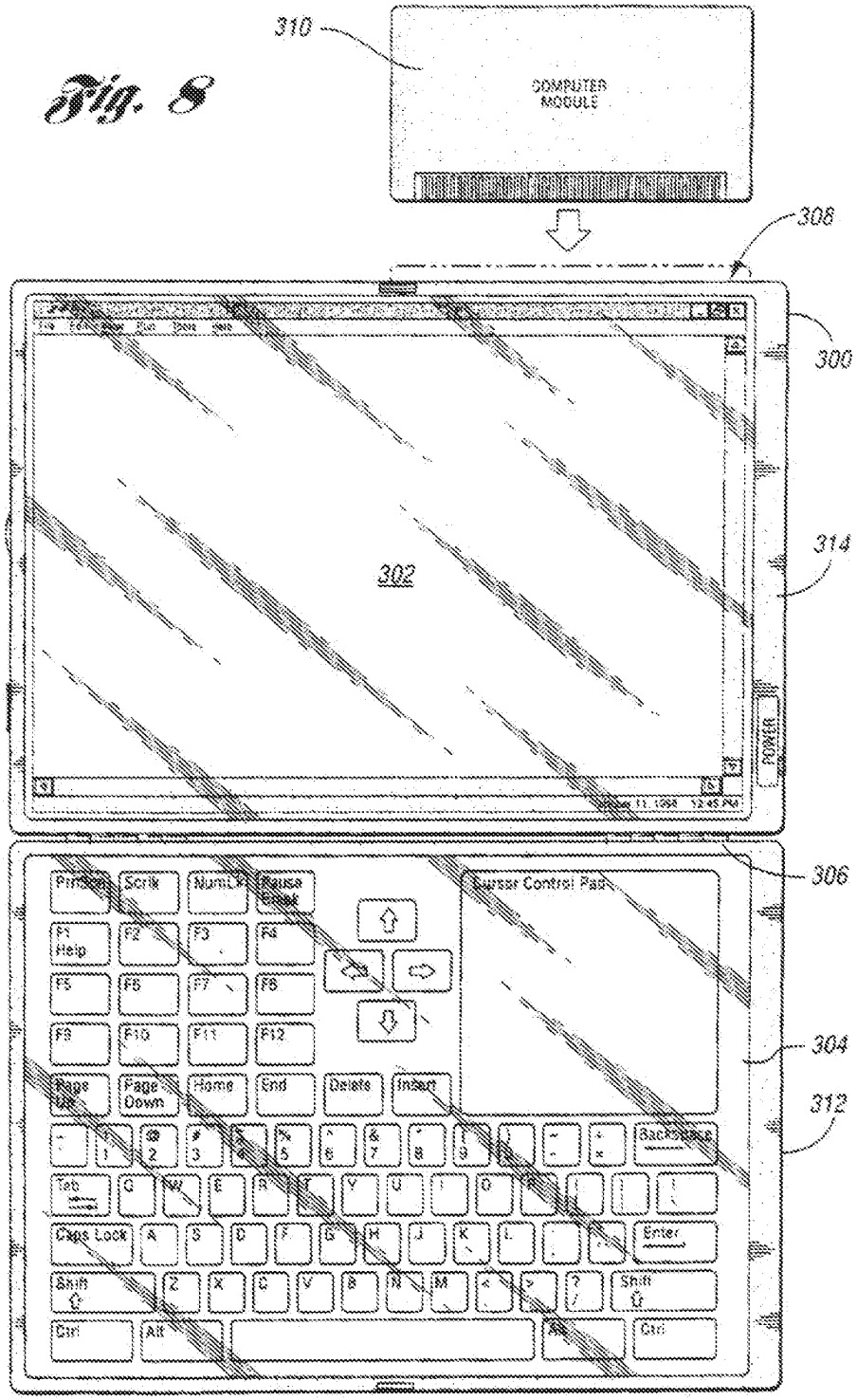

INTERNET
SITE VIEWING
SCREEN
260
262
264
280
http://www.z4.com/products/order/
280
284
266
278
276
STEREO
PLAYER
TV
RECORD
INTERNET
POWER
272
274
268
STEREO/DCVD-DIVX PLAYER/TV/
RECORDER/INTERNET
MODULE
270

Fig. 7

Fig. 8



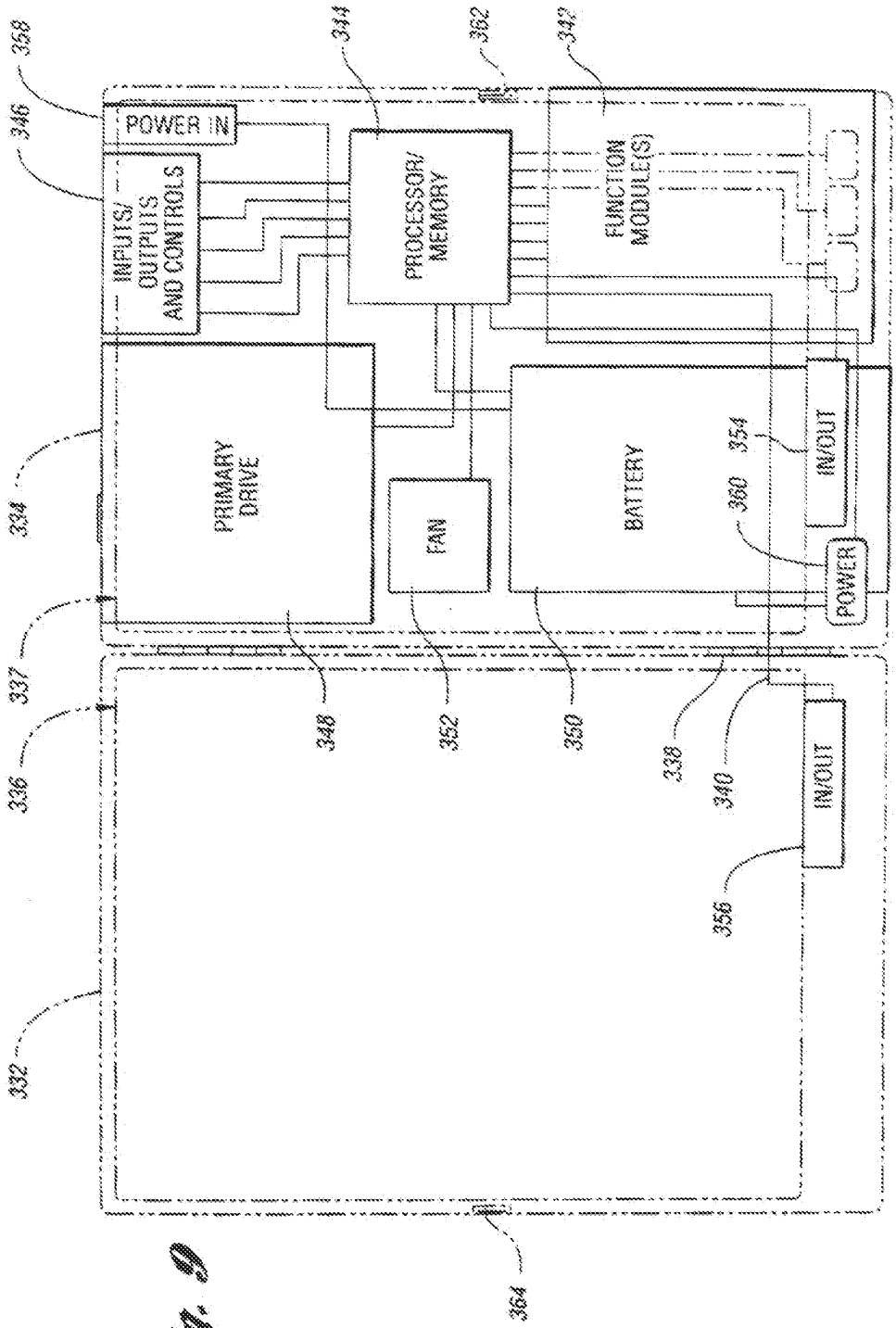

358
346
344
362
342
POWER IN
INPUTS/ OUTPUTS AND CONTROLS
PROCESSOR/ MEMORY
FUNCTION MODULE(S)
334
PRIMARY DRIVE
FAN
BATTERY
354
360
IN/OUT
POWER
337
336
348
352
350
338
340
IN/OUT
356
332
364

Fig. 9

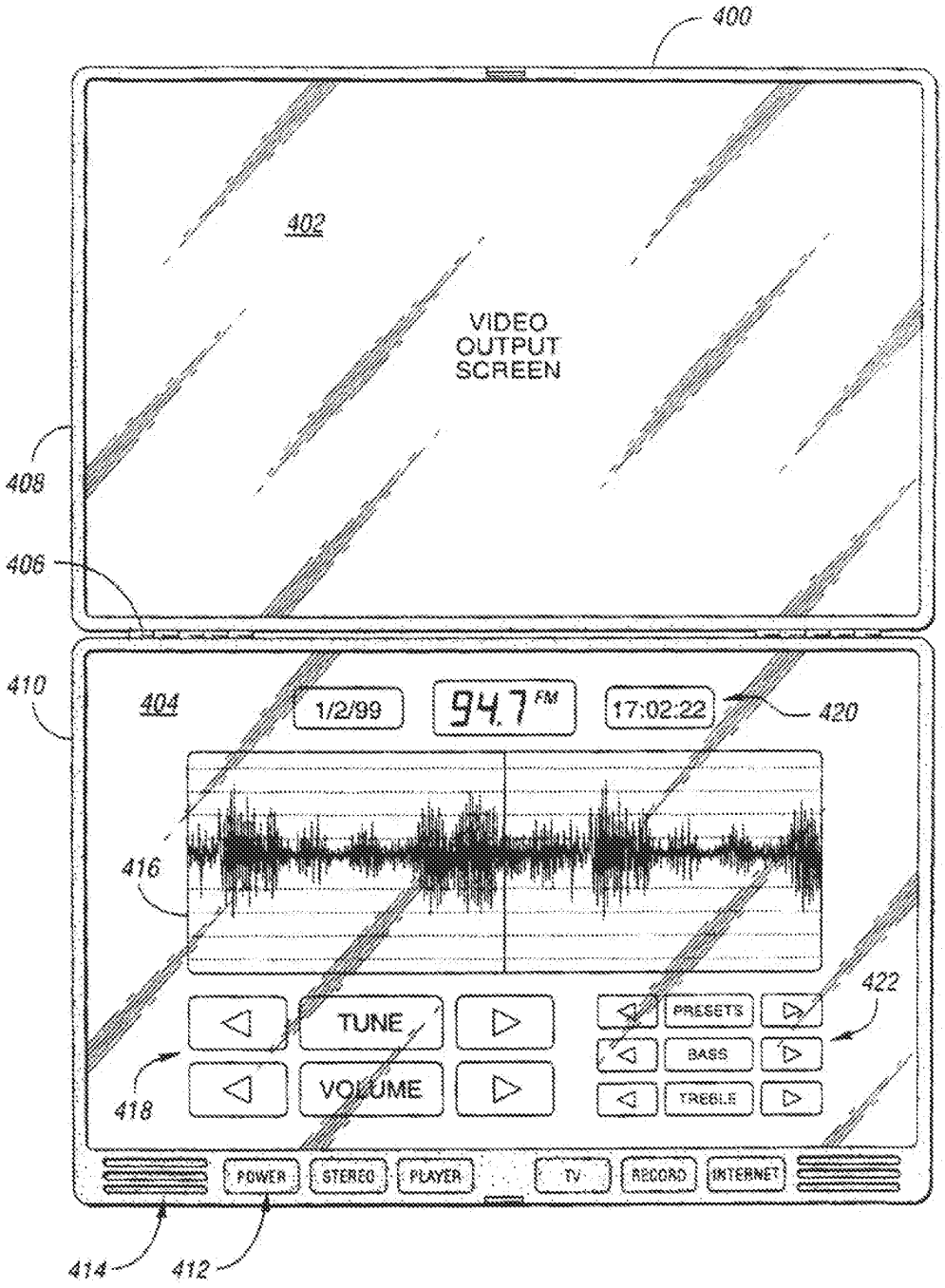

400
402
VIDEO
OUTPUT
SCREEN
408
406
410
404
1/2/99
94.7 FM
17:02:22
420
416
422
TUNE
VOLUME
PRESETS
BASS
TREBLE
418
POWER
STEREO
PLAYER
TV
RECORD
INTERNET
414
412

Fig. 10

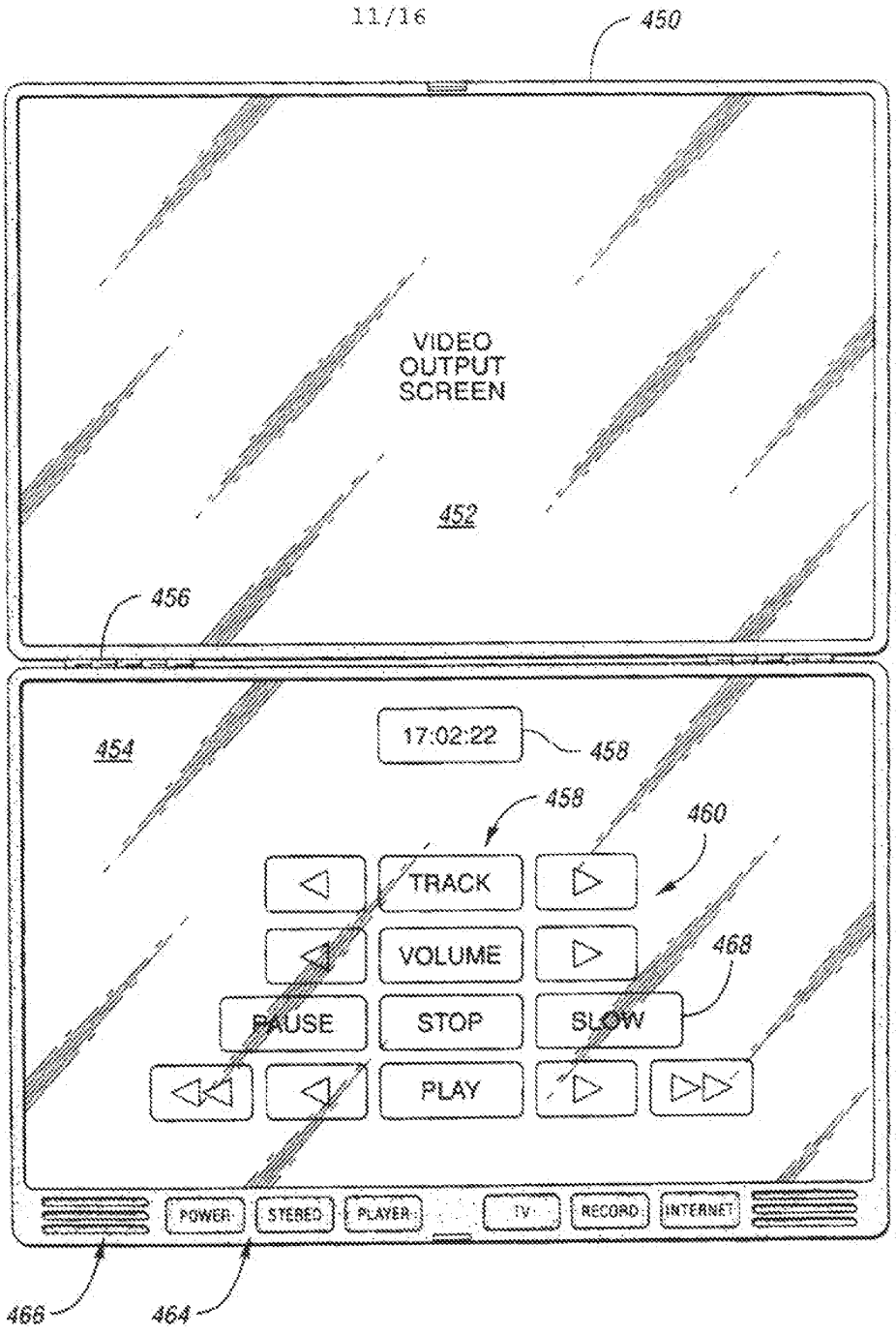

450
VIDEO
OUTPUT
SCREEN
452
456
454
17:02:22
458
458
460
TRACK
VOLUME
468
PAUSE
STOP
SLOW
PLAY
POWER
STEREO
PLAYER
TV
RECORD
INTERNET
466
464

Fig. 11

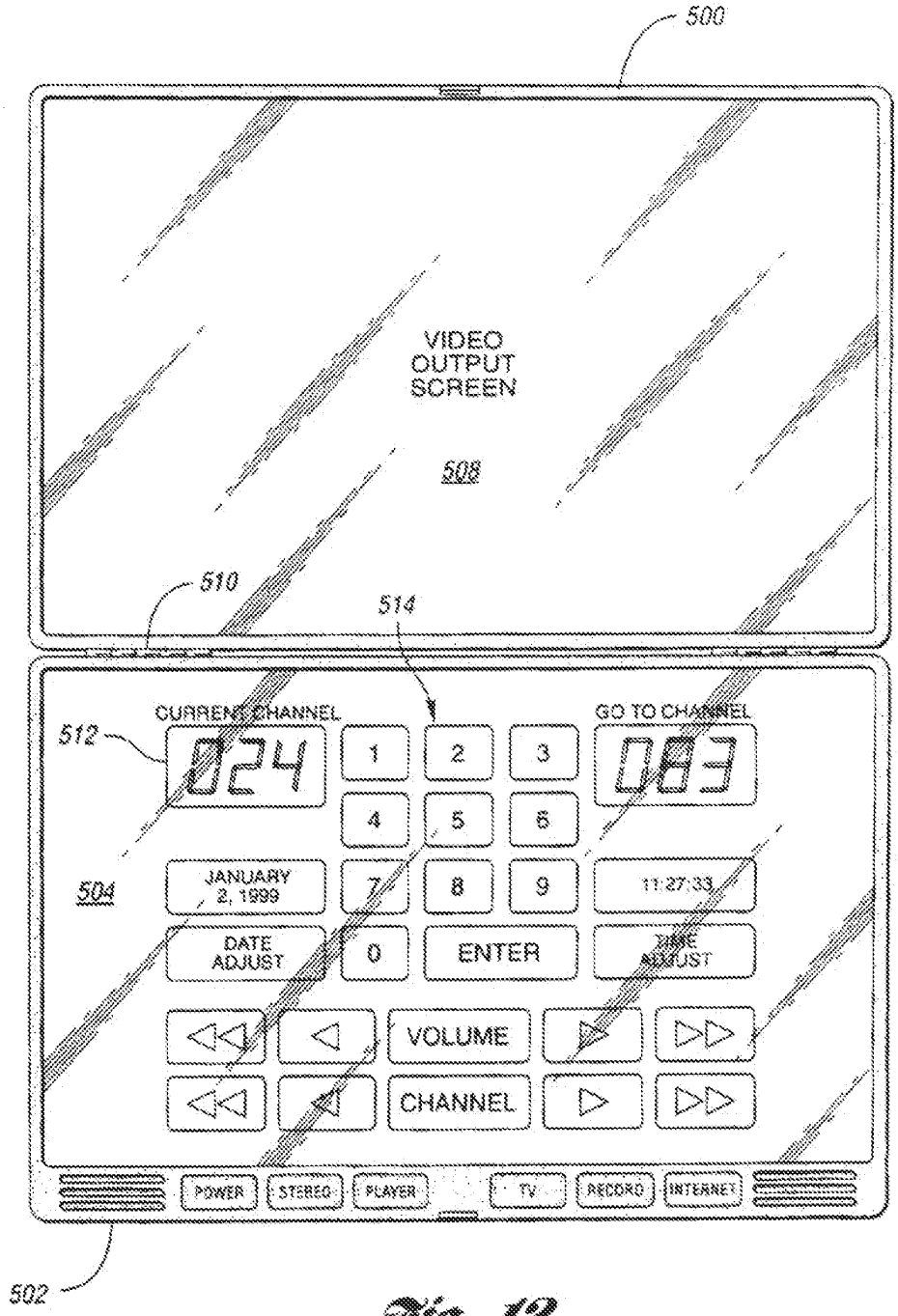

500
VIDEO
OUTPUT
SCREEN
508
510
514
CURRENT CHANNEL
GO TO CHANNEL
512
024
083
1
2
3
4
5
6
504
JANUARY
2, 1999
7
8
9
11:27:33
DATE
ADJUST
0
ENTER
TIME
ADJUST
VOLUME
CHANNEL
POWER
STEREO
PLAYER
TV
RECORD
INTERNET
502

Fig. 12

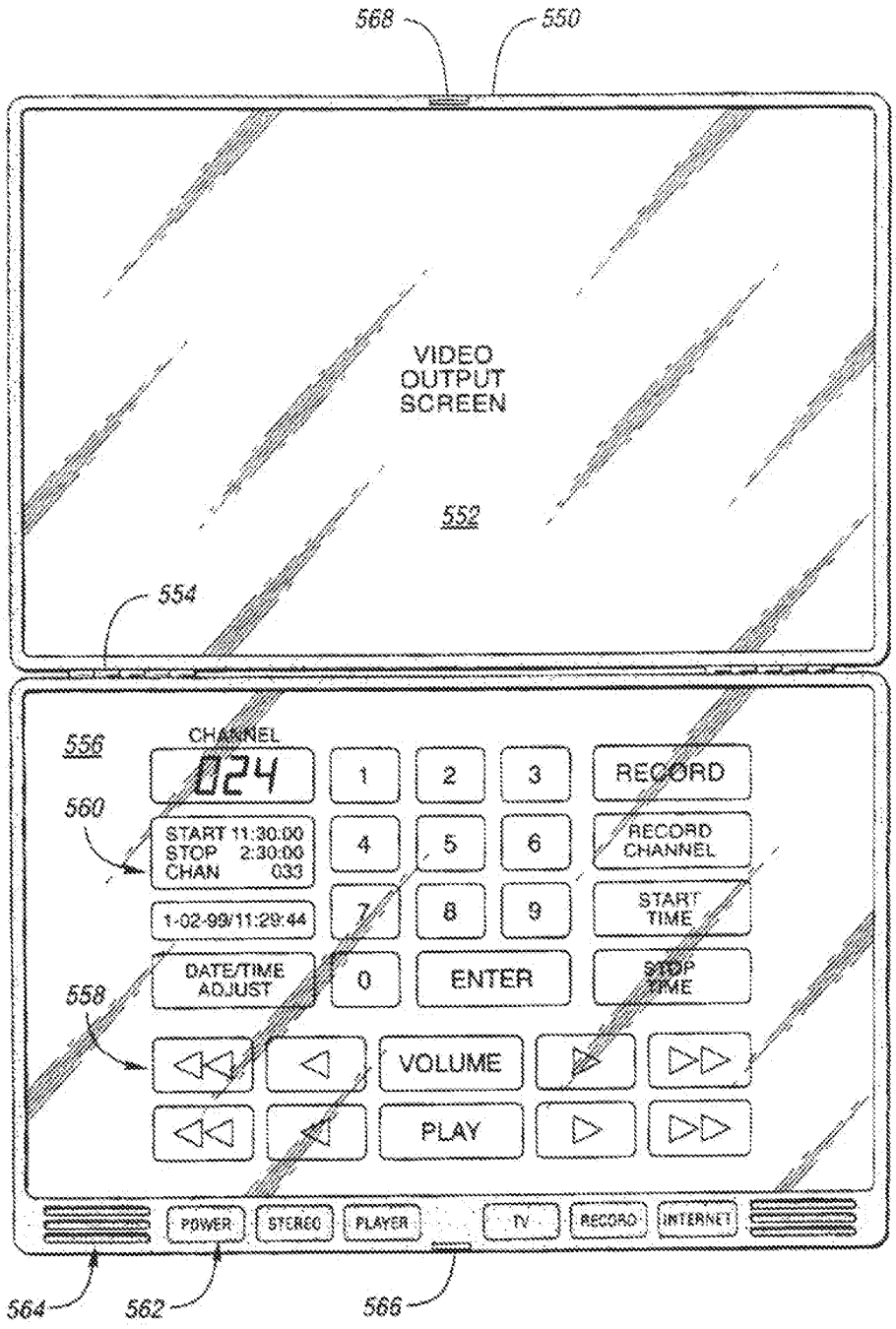
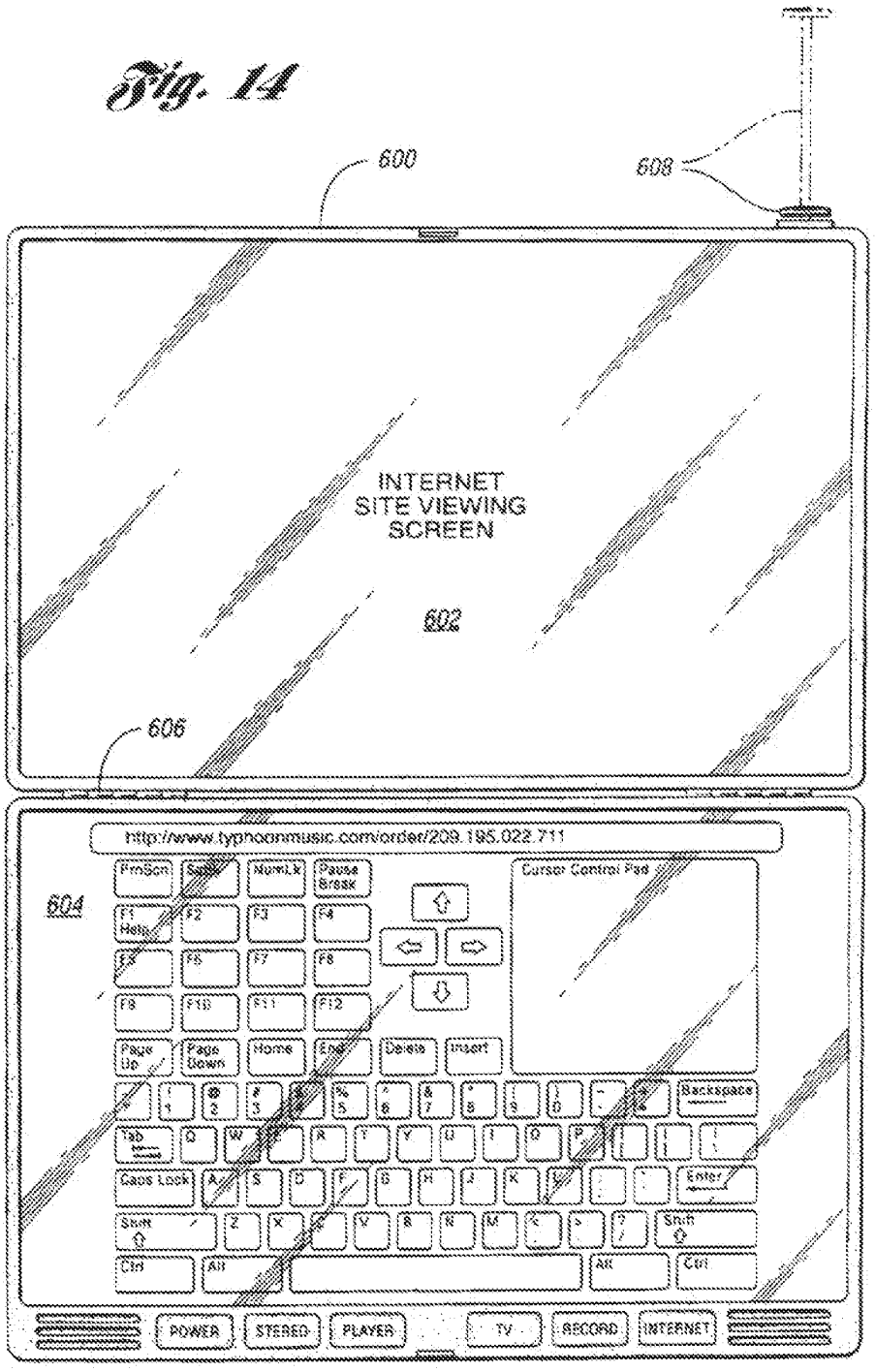

568
550
VIDEO OUTPUT SCREEN
552
554
556
CHANNEL
024
560
START 11:30:00
STOP 2:30:00
CHAN 033
1-02-99/11:29:44
DATE/TIME ADJUST
558
1
2
3
RECORD
4
5
6
RECORD CHANNEL
7
8
9
START TIME
0
ENTER
STOP TIME
VOLUME
PLAY
POWER
STEREO
PLAYER
TV
RECORD
INTERNET
564
562
566

Fig. 13

Fig. 14


600
608
INTERNET
SITE VIEWING
SCREEN
602
606
604
http://www.typhoonmusic.com/order/209.195.022.711
Cursor Control Pad
POWER
STEREO
PLAYER
TV
RECORD
INTERNET