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Paratore

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(54) **HAND HELD USER COMPUTER INTERFACE**

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(52) **U.S. Cl.** **361/680; 361/681; 345/168; 235/145**

(58) **Field of Search** 361/680-682, 361/683; 341/22; 345/168-172, 905; 235/145; 400/489, 682, 691, 692, 693; 312/208.1, 208.4; 364/708.1

(56) **References Cited**

U.S. PATENT DOCUMENTS

5,103,376	4/1992	Blonder	361/822
5,224,060	6/1993	Ma	364/708
5,241,303	8/1993	Register et al.	340/706
5,268,816	12/1993	Abell, Jr. et al.	361/729
5,276,589	1/1994	Bartlett et al.	361/681
5,375,076	* 12/1994	Goodrich et al.	361/680
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Primary Examiner—Leo P. Picard

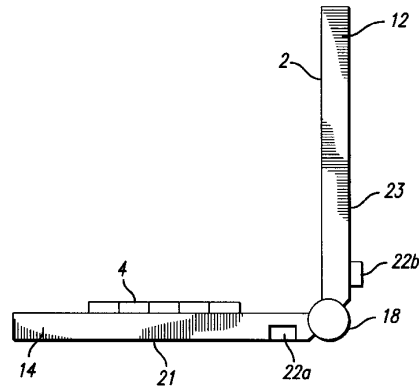
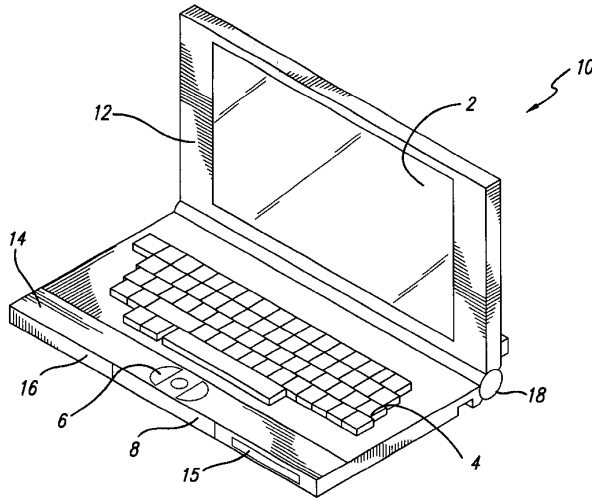
Assistant Examiner—Hung Van Duong

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(57) **ABSTRACT**

A hand held user computer interface is capable of being automatically switched between a keyboard input mode and a pen input mode. When the computer is pivoted to the pen input mode, the keyboard is automatically disabled allowing the user to grip the keyboard without concern about accidentally hitting a key. The hand held computer comprises a display portion pivotally connected to a keyboard portion by a hinge. In the keyboard input mode, the display portion is at an angle with respect to the keyboard portion. The keyboard portion is pivotable to a position underneath the display portion so that the display portion overlies the keyboard portion and faces upwards to form a comfortable writing surface. The rotation of the keyboard is detected and the computer automatically switches mode to disable the keyboard portion and activate the pen input mode. Thus, no manual knob or switch control is needed to change from keyboard input mode to pen input mode or vice versa. The hand held computer eliminates interference from the keyboard portion while in the pen input mode. The keyboard may then be used for easy gripping and keeping control. As a result, the computer design can be made small and light.

17 Claims, 3 Drawing Sheets



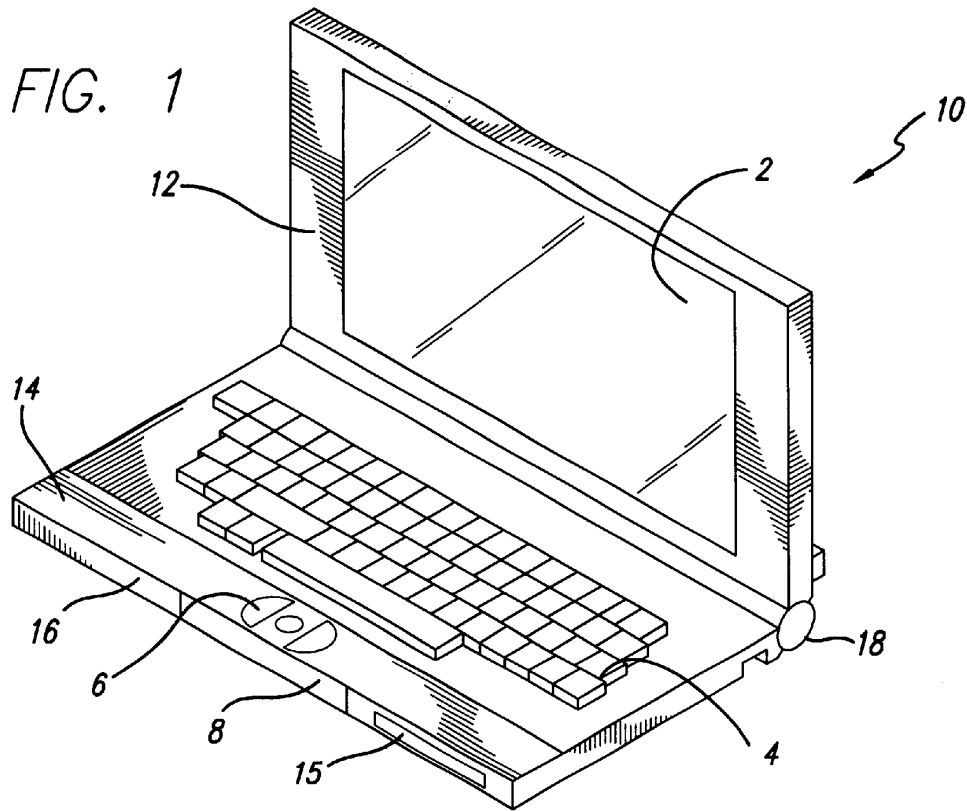


FIG. 2

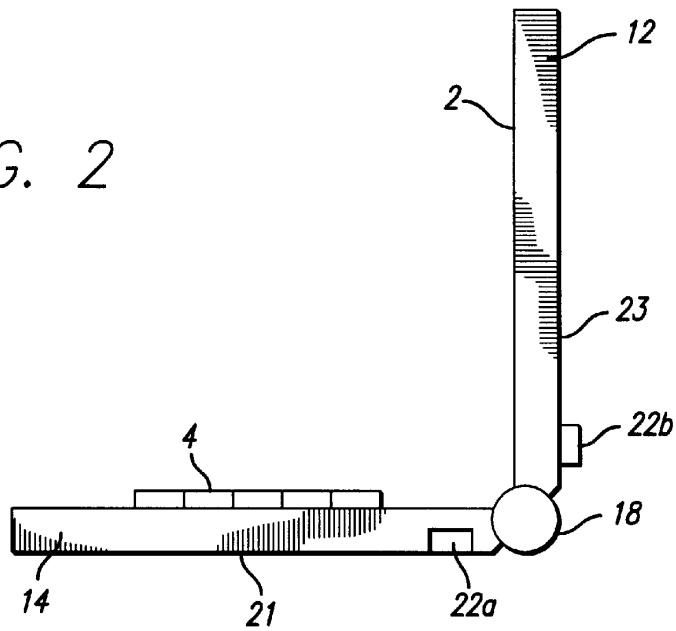


FIG. 3

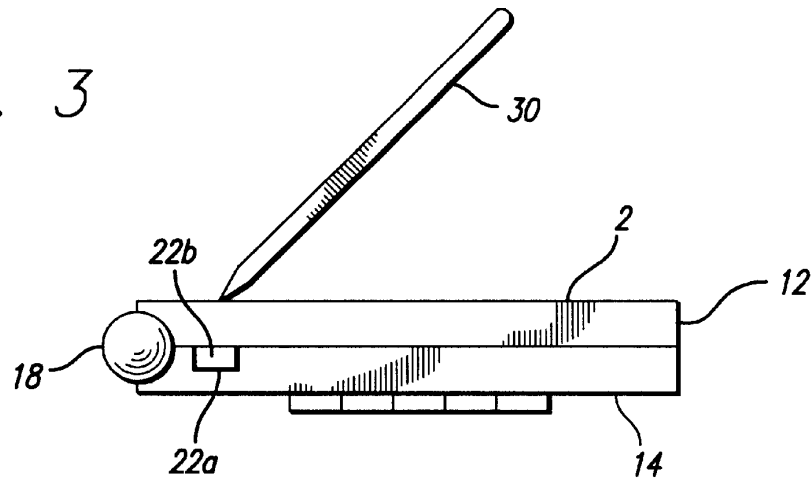
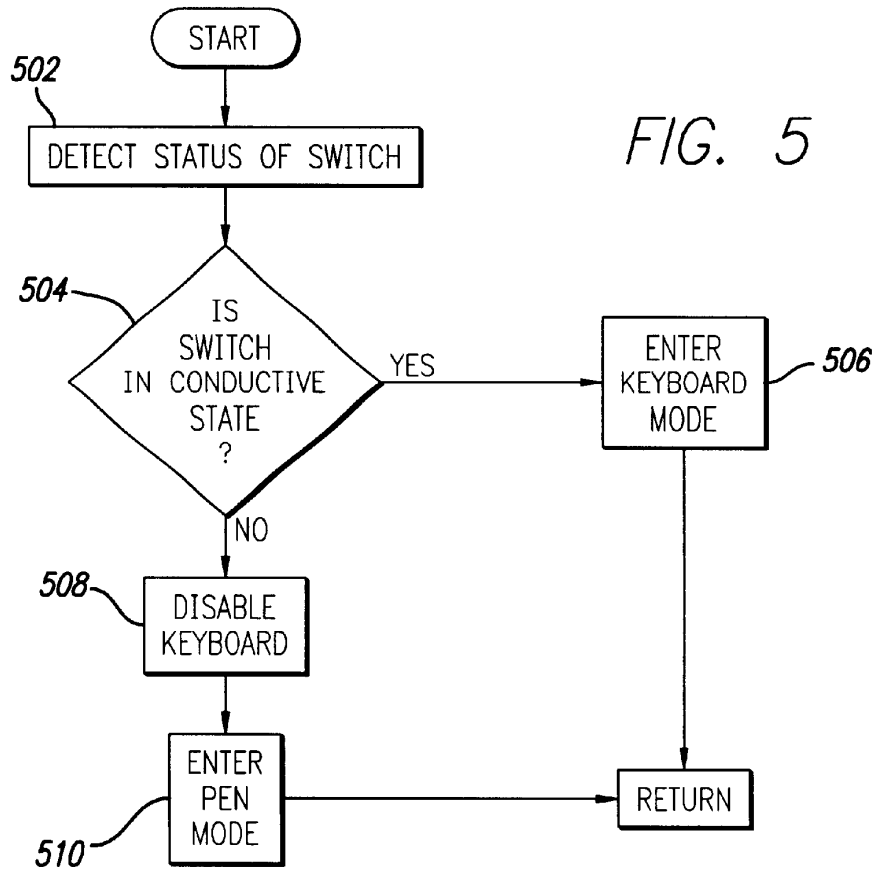


FIG. 5



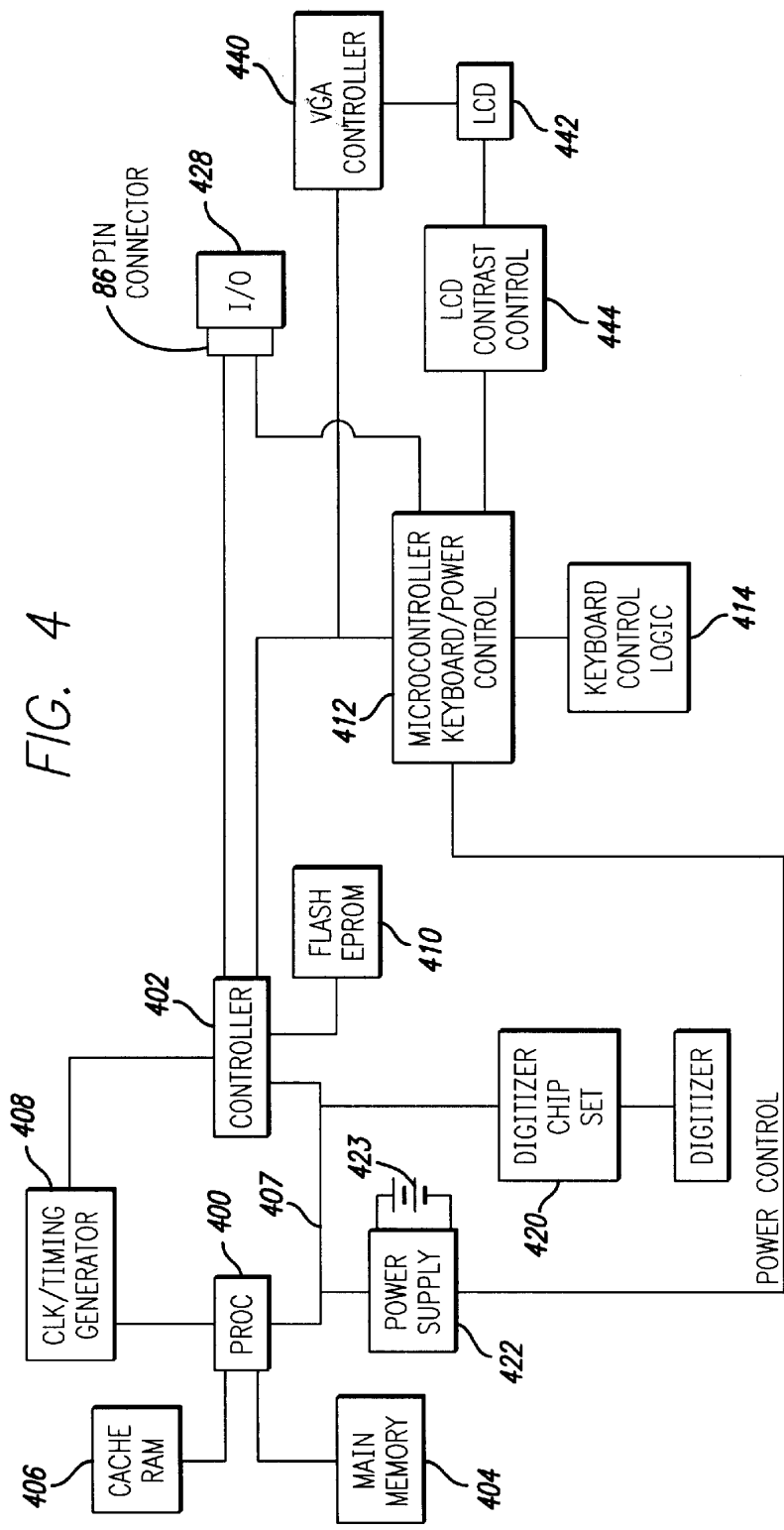


FIG. 4

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HAND HELD USER COMPUTER INTERFACE

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates to computer systems, and particularly to hand held computers that are practical for data entry through either a keyboard input arrangement or a pen input arrangement.

2. Description of Related Art

A variety of hand held computers such as laptops and palm-top computers have become very popular and are widely used for both business and personal activities. Hand held computers typically include a keyboard portion hinged to a display portion. While user input to computing devices has been generally through a keyboard and mouse, pen computer capability (using recognition of handwritten inputs by a pen acting upon a display surface) is desirable for certain types of hand held computers, especially in mobile tasks that require a more limited extent of textual input. Mobile users often must enter data while standing, holding the computer in one hand (with the display open and firmly supported), and the pen in the other. In a sitting position, it should also be possible to use the pen with one hand while balancing the computer on the user's knee, leaving one hand free. In a particular setting, for example, hand held computers are used in business meetings for note taking purposes. Since the clicking of a keyboard may be disruptive in the meeting, a pen input arrangement allows the user to use the computer as electronic paper, thus avoiding disruptions in the meeting. Another advantage of pen computers is that non-textual information, such as drawings, graphs, or diagrams, may be recorded.

It has been recognized that a keyboard/pen arrangement would benefit many applications and users. Many hand held computers use a keyboard/pen arrangement for data entry, such as disclosed in U.S. Pat. No. 5,268,816 to Abell, and U.S. Pat. No. 5,276,589 to Bartlett. It is known in the art to use dual position display screens for keyboard/pen arrangements. When the display screen is in its substantially vertical position, the keyboard is disposed in a substantially horizontal position so that a user may view the display screen when using the keyboard to enter data. When data is to be entered through a graphics pen, the display screen is disposed in a substantially horizontal position, and the keyboard is disposed in a substantially vertical position. An example of such a system is disclosed in U.S. Pat. No. 5,103,376 to Blonder.

A problem with the known keyboard/pen computer arrangements is that the keyboard/mouse portion of the computer stays active and gets in the way when a user is entering data using a graphics pen. The user has to be careful not to hit a key accidentally, which would input erroneous data; therefore, the user cannot use the keyboard portion as a grip to keep the computer steady when using the graphics pen. This leads to computer designs that are larger in size and heavier in order to reduce the need for gripping. Since it is desired to keep the weight and size of a hand held computer to a minimum so that a user can carry the computer more easily, this increased weight and size is therefore not desirable. Another drawback of these devices is that the pen input is not automatically activated. Instead, a manual knob or a switch is needed to activate the keyboard/mouse input or the pen input.

Accordingly, a need exists to provide a simple and light-weight keyboard/pen computer interface such that the com-

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puter switches mode automatically to disable or activate the keyboard when appropriate. It would be further desirable to provide a keyboard/pen computer interface in which the keyboard does not interfere with the use of the computer when it is in a pen input mode.

SUMMARY OF THE INVENTION

In accordance with the teachings of this invention, a hand held user computer interface is provided. The hand held user computer interface can be automatically switched between a keyboard input mode and a pen input mode. When the computer is pivoted to the pen input mode, the keyboard is automatically disabled allowing the user to grip the keyboard without concern about accidentally hitting a key, thus allowing the computer design to be small and light-weight.

More particularly, the hand held computer comprises a display portion pivotally connected to a keyboard portion by a hinge. In the keyboard input mode, the display portion is substantially in a non-coplanar position with respect to the keyboard portion. The keyboard portion is rotatable about the hinge all the way around to a position in which the keyboard portion is underneath the display portion. When the keyboard portion is pivoted, the motion is detected and the computer automatically switches mode to disable the keyboard portion and activate the pen input mode. Thus, no manual knob or switch control is needed to change from keyboard input mode to pen input mode or vice versa. The hand held computer thereafter operates as an electronic notepad eliminating interference from the keyboard portion while the computer is in the pen input mode. The disabled keyboard may then be used for easy gripping of the computer, which results in a smaller and lighter computer.

A more complete understanding of the hand held user computer interface will be afforded to those skilled in the art, as well as a realization of additional advantages and objects thereof, by a consideration of the following detailed description of the preferred embodiment. Reference will be made to the appended sheets of drawings which will first be described briefly.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a perspective view of a hand held computer according to an embodiment of the present invention.

FIG. 2 is a side view of a hand held computer in a keyboard input position according to an embodiment of the present invention.

FIG. 3 is a side view of a hand held computer in a pen input position according to an embodiment of the present invention.

FIG. 4 shows a simplified schematic diagram of an exemplary electronic organization of internal hardware for a keyboard and pen input computer.

FIG. 5 shows a flowchart of a process for recognizing a keyboard input mode or a pen input mode according to an embodiment of the present invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

The present invention provides a hand held user computer interface that satisfies the need for a computer that can automatically be switched between a keyboard input mode and a pen input mode, thus avoiding interference by the keyboard when the computer is in the pen input mode and allowing the overall computer design to be small and light weight. In the detailed description that follows, it should be

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