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(54) **ELECTRONIC DEVICE WITH HIDDEN KEYBOARD**

ELEKTRONISCHES GERAET MIT VERSTECKTER TASTATUR

DISPOSITIF ELECTRONIQUE AVEC CLAVIER DISSIMULE

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(56) References cited:
US-A- 5 128 662 **US-A- 5 278 779**
US-A- 5 440 502 **US-A- 5 494 447**
US-A- 5 644 469 **US-A- 5 712 760**
US-A- 5 821 881

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Description

by the dependent claims.

BACKGROUND OF THE INVENTION**BRIEF DESCRIPTION OF THE DRAWINGS****1. Field of the Invention**5 **[0007]**

[0001] The described invention relates to an electronic device providing a display output and allowing input via a keyboard or keypad.

Figure 1 shows one embodiment of an electronic device in a read only mode.

Figure 2 shows one embodiment of an electronic device in a full I/O mode.

Figure 3 shows one embodiment of the display portion of the present invention.

Figure 4 shows one embodiment of a base portion corresponding to the display portion of Figure 3.

Figure 5 shows an embodiment of electrically connecting the display portion to the base portion of the electrical device using a flexible connector.

Figure 6 shows an embodiment of mechanically connecting the display portion to the base portion using a sliding mechanical guide.

Figures 7A and 7B show an embodiment of a device that includes a display portion coupled to a base portion via a rod that allows the display portion to rotatably move to reveal the keyboard.

Figures 8A - 8C show different views of an embodiment of mechanically connecting the display portion to the base portion using an arm. Figures 8A and 8B are side views. Figure 8C is a top view.

2. Description of Related Art

[0002] Electronic devices employing display outputs include personal digital assistants (PDA's), palm PC's (such as the Palm Pilot device manufactured by 3COM), still and video cameras, two-way pagers, and so forth. In many cases, a few navigation buttons are used to allow a user to maneuver through displayed data. These electronic devices, however, may have real estate (i.e., area) limitations that may not allow for both a keyboard/

[0003] If a device has real estate constraints and needs both a keyboard/keypad and a display, a compromise is made. One solution is to use a touch screen LCD to allow the input of text as well as to display images. If keyboard input is desired, a virtual keyboard is displayed on the touch screen LCD. A user can then input information via the virtual keyboard. However, this limits the portion of the touch screen LCD that can be used for displaying images (because a virtual keyboard is also being displayed).

[0004] A hinged device as in US-A-5 644 469, US-A-5 712 760, US-A-5 278 779, US-A-5 128 662 including a display output on one side and a keyboard on the other side is an alternate solution. This type of device allows both input from the keyboard, and simultaneous display of data and/or images. However, when the hinged device is closed, the user can no longer view displayed information from the display output. Further alternative solutions are disclosed in US-A-5440502 which shows a display surface which may be latched over a keyboard and US-A-5821881 which discloses a keyboard which is slidable into position over a display. A further device is disclosed in US-A-5494447 which shows a device having a keyboard located in a base in which the base is electrically connected by an arm to a display, the arm being slidably located within both the base and the display so that the display may be mounted over the keyboard in a face down position or in a face up position and in which the display may be coplanar with the keyboard.

DETAILED DESCRIPTION

[0008] An electronic device having a display that is capable of concealing a keyboard is disclosed. In a "read mode," the display is visible to a user, but the display conceals the keyboard. This mode allows easy access to data and images via the display. When the display is moved to a "full I/O (input/output) mode," the display is still visible to a user, but the display no longer conceals the keyboard. This mode allows the user to input information via the keyboard as well as view information output from the display.

[0009] Figure 1 shows a prior art example of an electronic device 10 having a display 20 and maneuver buttons 22. A user is able to view information on the display 20, and the maneuver buttons 22 allow limited input for scrolling through data. The information displayed may comprise pictorial information (images) or textual information (names, appointments, etc.)

[0010] The "read mode" of the present invention acts the same as that of the prior art Figure 1. This read mode allows the user to conveniently access information and images from the electronic device 10.

[0011] Figure 2 shows one embodiment of the present invention in its "full I/O mode." This mode is achieved by moving the display 20 so that it no longer conceals a keyboard/keypad 24. The keyboard/keypad 24 may provide a full character set including all letters, numbers and special characters such as that of a typewriter or

SUMMARY OF THE INVENTION

[0005] According to this invention there is provided a device as claimed in claim 1 herein.

[0006] Preferred features of the invention are defined

computer keyboard; or the keyboard/keypad 24 may provide a simplified character set such as the keypad of a touch-tone telephone. The term keyboard will be used to denote a full character set keyboard, or any subset of a full character set keyboard in which selection of a particular button corresponds to the input of a character (alphanumeric or special character). In both the read mode and the full I/O mode, the display output is visible to the user.

[0012] Figure 3 shows one embodiment of the display portion 30 of the present invention, and figure 4 shows one embodiment of a corresponding base portion 32 of the present invention. In this embodiment, the display portion 30 and base portion 32 include several electrical contacts 40 that provide an electrical connection between the display portion 30 and the base portion 32.

[0013] In one embodiment, the display portion 30 is a liquid crystal display (LCD), and the base portion 32 houses a processor, memory, and power source (batteries). However, in an alternative embodiment, the processor, memory and/or power source could be moved into the display portion. The power source could also be provided externally.

[0014] In one embodiment, the display portion 30 is coupled to the base portion 32 via a serial connection, such as an SPI* serial bus or an I²C* serial bus, which are well-known serial connections. (SPI is a serial bus developed by Motorola Incorporated as a peripheral interconnect standard. I²C is a serial bus developed by Philips Semiconductor.)

[0015] Figure 5 shows another embodiment of electrically connecting the display portion 30 to the base portion 32 of the electrical device 10. In this embodiment, a flexible connector such as a ribbon cable 42 is connected between the display portion 30 and the base portion 32. A mechanical guide 46 such as grooves along the edges 44 of the base portion 32 (or display portion 30) is used to allow the display portion 30 to slidably move between the read mode and the full I/O mode. Rollers or ball bearings may be employed to allow freer movement within the mechanical guides. In one embodiment, the topside of the display portion 30 raises as its bottomside is moved within the mechanical guides to reveal the keyboard, as shown in Figure 6.

[0016] Figures 7A and 7B show an alternative embodiment of a device that includes a display portion 30 coupled to a base portion 32 via a rod 50 that allows the display portion 30 to rotatably move to reveal the keyboard 24. The display portion 30 may employ a curved side to allow rotatable movement. An electrical connection between the display portion 30 and the base portion 32 may be routed through the rod 50.

[0017] Figures 8A-8C show an alternative embodiment of mechanically connecting the display portion 30 to the base portion 32 using an arm 60. The arm 60 is bendable and swivels in various directions to allow the display portion 30 to be placed in different positions. An

* Third party names and marks are property of their respective owners.

electrical connection from the display portion 30 to the base portion 32 is routed internal to the arm 60.

[0018] Figure 8A shows a side view of the device having extendable arm 60. In its read mode, the device's display portion 30 fits within the base portion 32 as shown by the dotted lines. The display portion 30 can also be extended upwards and rotated so that the display faces the user, as shown in Figure 8B. Figure 8C shows a top view of the display portion 30 that has been extended outward and then rotated about pivot 62.

[0019] In one embodiment, contacts or sensors detect the position of the display portion 30 in order to present information to a user with the correct viewing orientation. For example, in the full I/O position of Figure 7B, the device would need to display information using an orientation that is opposite to that of the read mode of Figure 7A. Similarly, the device shown in Figures 8A-8C would need to detect the orientation of the display portion 30. This could be done by detecting the angle of rotation of the pivot points of the arm 60.

[0020] The present invention allows input via keyboard to a variety of different devices. For example, in one embodiment, a transmitter is added to communicate signals corresponding to characters input into the device via the keyboard, such as in a two-way pager or a cellular telephone application. In another embodiment, an optical system is added to capture one or more images, such as in a still or video camera application.

[0021] Thus, an electronic device having a display that conceals a keyboard is disclosed. The specific arrangements and methods described herein are merely illustrative of the principles of this invention. Numerous modifications in form and detail may be made without departing from the scope of the described invention. Although this invention has been shown in relation to a particular embodiment, it should not be considered so limited. Rather, the described invention is limited only by the scope of the appended claims.

Claims

1. A device comprising:

a keyboard (24) to enter data into the device;
a display (30) having a viewing surface to display information; and
a sliding mechanism (46) to couple the display with the keyboard,

wherein the display may be located in a first position in which the display hides the keyboard, and the display may be located in a second full input/output position in which the entire keyboard is exposed to allow entry of data,

wherein the viewing surface is visible to a user in the first position and the second full input/output position,

wherein in the second full input/output position the viewing surface of the display is substantially coplanar with an operating surface of the keyboard, and

wherein the display is mechanically and electrically coupled with the keyboard in the first position and the second full input/output position, **characterised by** a plurality of sliding mechanisms (46) including a first sliding mechanism on a first side of the display and a second sliding (46) mechanism on a second side of the display.

2. The device of claim 1, further comprising a base (32) that includes the keyboard and that is mechanically and electrically connected with the display. 15
3. The device of claim 1 or 2, wherein the keyboard includes a majority of a total number of keys that are available to enter data. 20
4. The device of claim 1 or 2, wherein the keyboard includes substantially all of a total number of keys that are available to enter data. 25
5. The device of any preceding claim, wherein the display hides substantially all of a total number of keys that are available to enter data when located in the first position. 30
6. The device of any preceding claim, wherein movement of the display from the first position to the second full input/output position maintains the viewing surface substantially coplanar with the operating surface. 35
7. The device of claim 1, wherein a sliding mechanism of the plurality includes a protrusion of the display that has a length that is at least a majority of a shortest length of the display and a coupling groove in the base. 40
8. The device of claim 2, wherein a sliding mechanism of the plurality includes a groove in the display that has a length that is at least a majority of a shortest length of the display and a coupling protrusion of the base. 45
9. The device of any preceding claim, wherein the plurality of sliding mechanism include at least three sliding mechanisms. 50
10. The device of claim 2, wherein the plurality of sliding mechanisms include a sliding mechanism having a portion on the display to contact and slide against a portion on the base to provide an electrical connection. 55
11. The device of claim 1, wherein the device does not

include an arm to move the display between the first position and the second position.

12. The device of claim 2, wherein the device does not include a ball joint to pivot the display relative to the base.
13. The device of claim 1, further comprising a transmitter to wirelessly communicate signals corresponding to characters input into the device via the keyboard.
14. The device of claim 13, wherein the device is a two-way pager.
15. The device of claim 13, wherein the device is a cellular telephone.
16. The device of claim 2, wherein the plurality of sliding mechanisms comprises a sliding means to couple the display to the base.
17. The device of claim 2, further comprising an electrical contact means to provide electrical contact between the display and the base.
18. The device of claim 2, wherein the base comprises a processor, a memory and a power source.

Patentansprüche

1. Vorrichtung, die folgendes umfasst:

eine Tastatur (24) zur Eingabe von Daten in die Vorrichtung;
eine Anzeige (30) mit einer Betrachtungsoberfläche zum Anzeigen von Informationen; und
einen Schiebemechanismus (46) zum Koppeln der Anzeige mit der Tastatur,

wobei die Anzeige an einer ersten Position angeordnet sein kann, an der die Anzeige die Tastatur verdeckt, und wobei die Anzeige an einer zweiten, vollständigen Eingabe-Ausgabe-position angeordnet sein kann, an der die ganze Tastatur frei liegt, so dass Daten eingegeben werden können,

wobei die Betrachtungsoberfläche für einen Benutzer an der ersten Position und der zweiten vollständigen Eingabe-Ausgabe-Position sichtbar ist,

wobei die Betrachtungsoberfläche der Anzeige an der zweiten vollständigen Eingabe-Ausgabe-Position im Wesentlichen koplanar ist mit einer Betriebsoberfläche der Tastatur, und

wobei die Anzeige mechanisch und elektrisch mit der Tastatur an der ersten Position und an der zweiten vollständigen Eingabe-Ausgabe-Position

- gekoppelt ist, **gekennzeichnet durch** eine Mehrzahl von Schiebemechanismen (46), mit einem ersten Schiebemechanismus auf einer ersten Seite der Anzeige und mit einem zweiten Schiebemechanismus (46) auf einer zweiten Seite der Anzeige. 5
2. Vorrichtung nach Anspruch 1, wobei diese ferner eine Basis (32) umfasst, welche die Tastatur aufweist, und die mechanisch und elektrisch mit der Anzeige verbunden ist. 10
3. Vorrichtung nach Anspruch 1 oder 2, wobei die Tastatur einen Großteil der gesamten Anzahl von für die Eingabe von Daten zur Verfügung stehenden Tasten aufweist. 15
4. Vorrichtung nach Anspruch 1 oder 2, wobei die Tastatur im Wesentlichen alle Tasten einer gesamten Anzahl von für die Eingabe von Daten zur Verfügung stehenden Tasten aufweist. 20
5. Vorrichtung nach einem der vorstehenden Ansprüche, wobei die Anzeige im Wesentlichen alle Tasten einer gesamten Anzahl von Tasten verdeckt, die für die Eingabe von Daten zur Verfügung stehen, wenn sich die Anzeige an der ersten Position befindet. 25
6. Vorrichtung nach einem der vorstehenden Ansprüche, wobei die Bewegung der Anzeige aus der ersten Position an die zweite vollständige Eingabe-Ausgabe-Position die Betrachtungsoberfläche im Wesentlichen koplanar zu der Basisoberfläche hält. 30
7. Vorrichtung nach Anspruch 1, wobei ein Schiebemechanismus der Mehrzahl von Schiebemechanismen einen Vorsprung der Anzeige aufweist, der eine Länge aufweist, die zumindest einem Großteil einer kürzesten Länge der Anzeige und einer Kopplungsrille in der Basis entspricht. 35 40
8. Vorrichtung nach Anspruch 2, wobei ein Schiebemechanismus der Mehrzahl von Schiebemechanismen eine Rille in der Anzeige aufweist, die eine Länge aufweist, die zumindest dem Großteil einer kürzesten Länge der Anzeige und eines Kopplungsvorsprungs der Basis entspricht. 45
9. Vorrichtung nach einem der vorstehenden Ansprüche, wobei die Mehrzahl von Schiebemechanismen mindestens drei Schiebemechanismen aufweist. 50
10. Vorrichtung nach Anspruch 2, wobei die Mehrzahl von Schiebemechanismen einen Schiebemechanismus mit einem Abschnitt an der Anzeige umfasst, der einen Abschnitt an der Basis berührt und an diesem gleitet, so dass eine elektrische Verbindung vorgesehen wird. 55
11. Vorrichtung nach Anspruch 1, wobei die Vorrichtung keinen Arm aufweist, um die Anzeige zwischen der ersten Position und der zweiten Position zu bewegen.
12. Vorrichtung nach Anspruch 2, wobei die Vorrichtung kein Kugelgelenk zum Schwenken der Anzeige im Verhältnis zu der Basis aufweist.
13. Vorrichtung nach Anspruch 1, wobei diese ferner einen Sender umfasst, um kabellos Signale zu übertragen, die den Zeichen entsprechen, die über die Tastatur in die Vorrichtung eingegeben werden.
14. Vorrichtung nach Anspruch 13, wobei es sich bei der Vorrichtung um eine Zweiweg-Rufanlage handelt.
15. Vorrichtung nach Anspruch 13, wobei es sich bei der Vorrichtung um ein Mobiltelefon handelt.
16. Vorrichtung nach Anspruch 2, wobei die Mehrzahl von Schiebemechanismen eine Schiebereinrichtung umfasst, um die Anzeige mit der Basis zu koppeln.
17. Vorrichtung nach Anspruch 2, wobei die Vorrichtung ferner eine elektrische Kontakteinrichtung umfasst, um einen elektrischen Kontakt zwischen der Anzeige und der Basis vorzusehen.
18. Vorrichtung nach Anspruch 2, wobei die Basis einen Prozessor, einen Speicher und eine Stromversorgung umfasst.

Revendications

1. Dispositif comprenant :

un clavier (24) pour entrer des données dans le dispositif ;
un écran (30) ayant une surface de visualisation pour afficher des informations ; et
un mécanisme coulissant (46) pour coupler l'écran au clavier,

dans lequel l'écran peut être positionné dans une première position dans laquelle l'écran dissimule le clavier, et l'écran peut être positionné dans une seconde position d'entrée/de sortie totale dans laquelle le clavier tout entier est exposé pour permettre la saisie de données,

dans lequel la surface de visualisation est visible pour un utilisateur dans la première position et dans la seconde position d'entrée/de sortie totale,

dans lequel dans la seconde position d'en-

trée/de sortie totale, la surface de visualisation de l'écran est sensiblement coplanaire avec une surface opérationnelle du clavier, et

dans lequel l'écran est mécaniquement et électriquement couplé au clavier dans la première position et la seconde position d'entrée/de sortie totale, **caractérisé par** une pluralité de mécanismes coulissants (46) comprenant un premier mécanisme coulissant sur un premier côté de l'écran et un second mécanisme coulissant (46) sur un second côté de l'écran.

2. Dispositif selon la revendication 1, comprenant en outre une base (32) qui comprend le clavier et qui est mécaniquement et électriquement connectée à l'écran.

3. Dispositif selon la revendication 1 ou 2, dans lequel le clavier comprend une majorité d'un nombre total de touches qui sont disponibles pour saisir des données.

4. Dispositif selon la revendication 1 ou 2, dans lequel le clavier comprend sensiblement la totalité d'un nombre total de touches qui sont disponibles pour saisir des données.

5. Dispositif selon l'une quelconque des revendications précédentes, dans lequel l'écran dissimule sensiblement la totalité d'un nombre total de touches qui sont disponibles pour saisir des données lorsqu'il est positionné dans la première position.

6. Dispositif selon l'une quelconque des revendications précédentes, dans lequel le mouvement de l'écran de la première position à la seconde position d'entrée/de sortie totale maintient la surface de visualisation sensiblement coplanaire avec la surface de fonctionnement.

7. Dispositif selon la revendication 1, dans lequel un mécanisme coulissant de la pluralité comprend une saillie de l'écran qui a une longueur qui est au moins une majorité d'une longueur minimale de l'écran et une rainure d'accouplement dans la base.

8. Dispositif selon la revendication 2, dans lequel un mécanisme coulissant de la pluralité comprend une rainure dans l'écran qui a une longueur qui est au moins une majorité d'une longueur minimale de l'écran et une saillie d'accouplement de la base.

9. Dispositif selon l'une quelconque des revendications précédentes, dans lequel la pluralité de mécanismes coulissants comprend au moins trois mécanismes coulissants.

10. Dispositif selon la revendication 2, dans lequel la

pluralité de mécanismes coulissants comprend un mécanisme coulissant ayant une partie sur l'écran pour entrer en contact et coulisser contre une partie sur la base pour fournir une connexion électrique.

11. Dispositif selon la revendication 1, dans lequel le dispositif ne comprend pas de bras pour déplacer l'affichage entre la première position et la seconde position.

12. Dispositif selon la revendication 2, dans lequel le dispositif ne comprend pas de joint à bille pour pivoter l'écran par rapport à la base.

13. Dispositif selon la revendication 1, comprenant en outre un émetteur pour transmettre sans fil les signaux correspondant aux caractères saisis dans le dispositif via le clavier.

14. Dispositif selon la revendication 13, dans lequel le dispositif est un pager bidirectionnel.

15. Dispositif selon la revendication 13, dans lequel le dispositif est un téléphone cellulaire.

16. Dispositif selon la revendication 2, dans lequel la pluralité de mécanismes coulissants comprend des moyens coulissants pour coupler l'écran à la base.

17. Dispositif selon la revendication 2, comprenant en outre des moyens de contact électriques pour fournir un contact électrique entre l'écran et la base.

18. Dispositif selon la revendication 2, dans lequel la base comprend un processeur, une mémoire et une source d'alimentation.

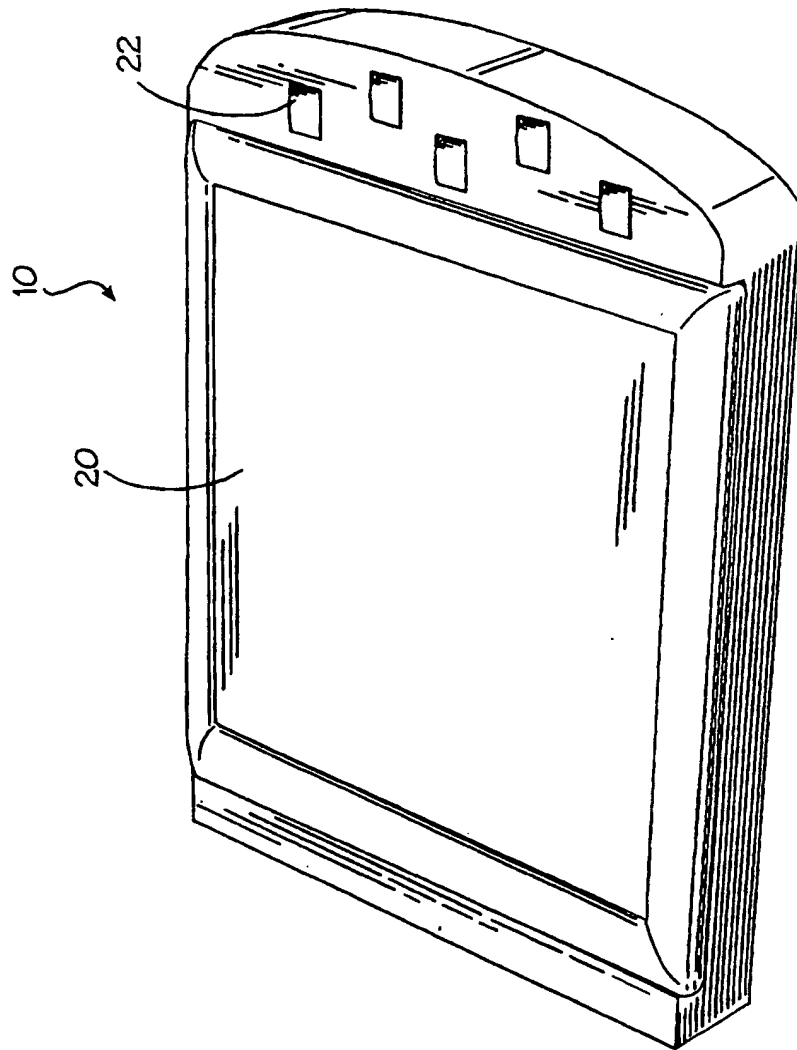


Fig. 1

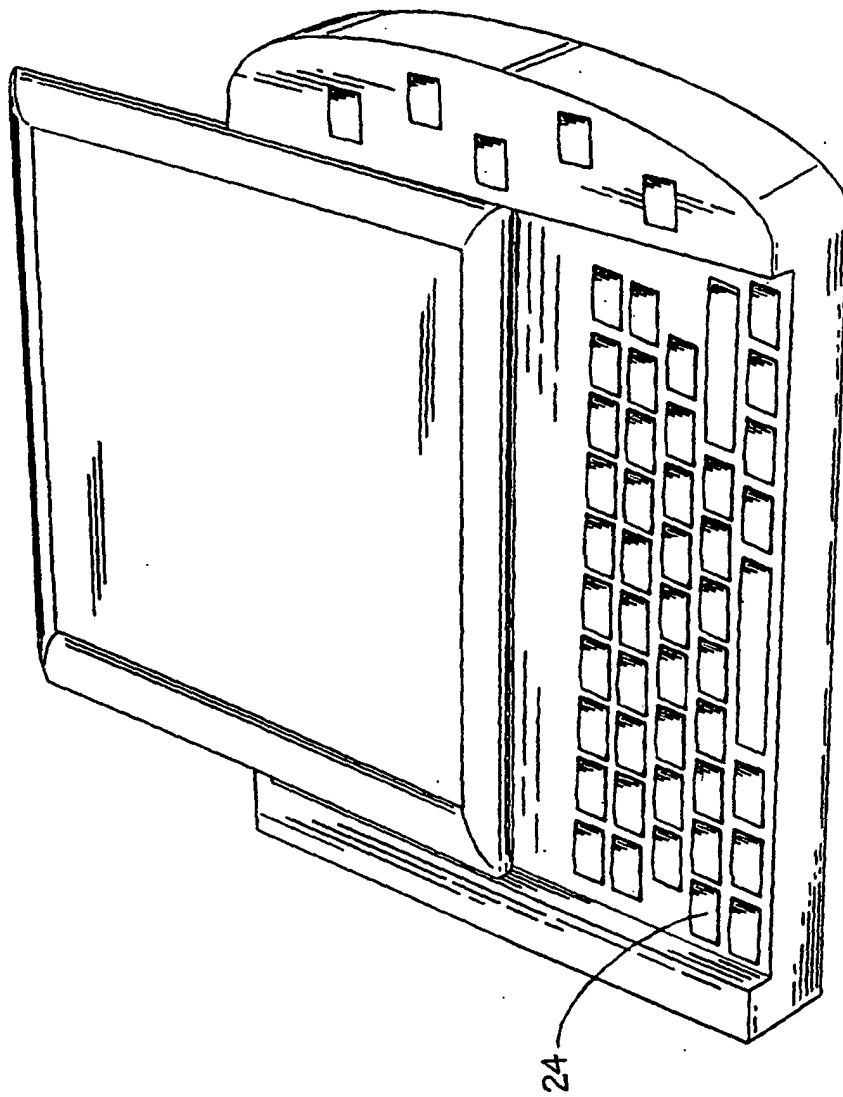


Fig. 2

Fig. 3

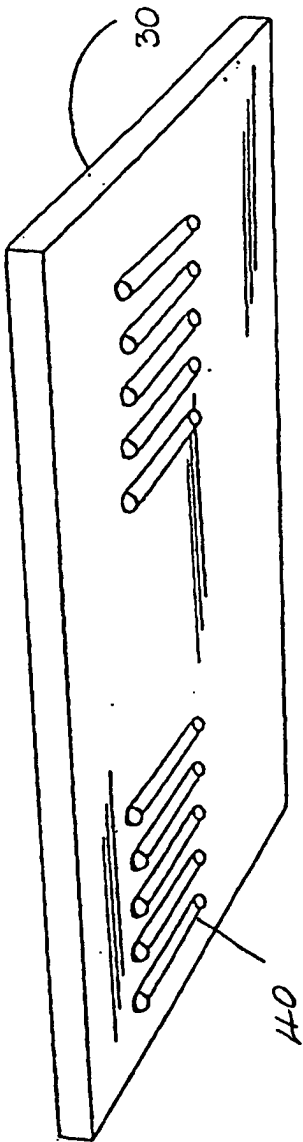
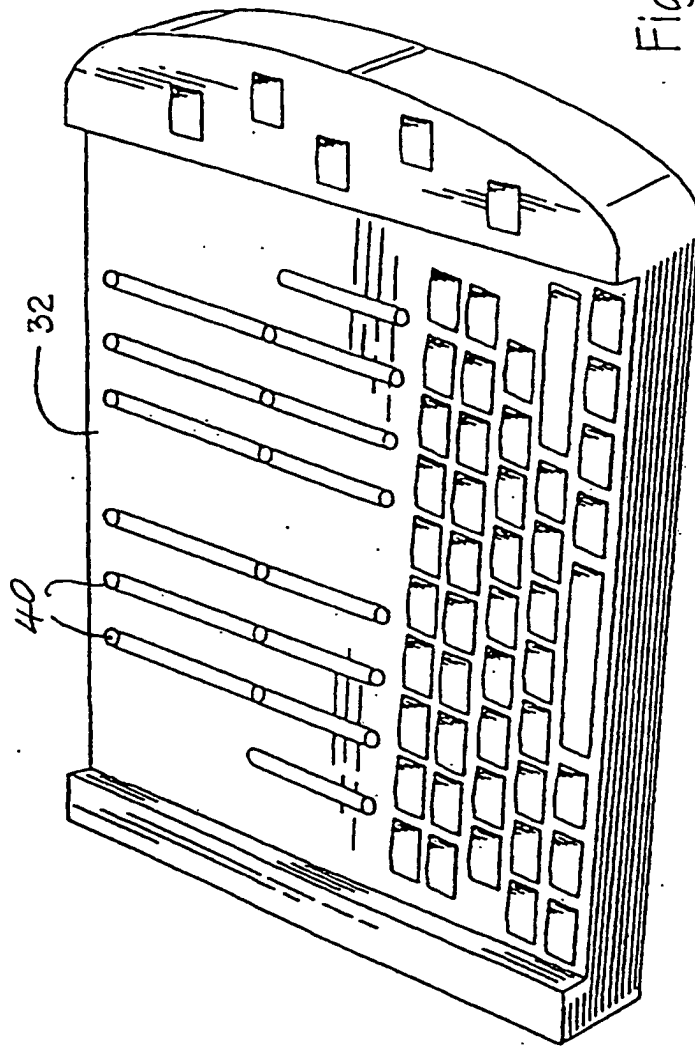


Fig. 4



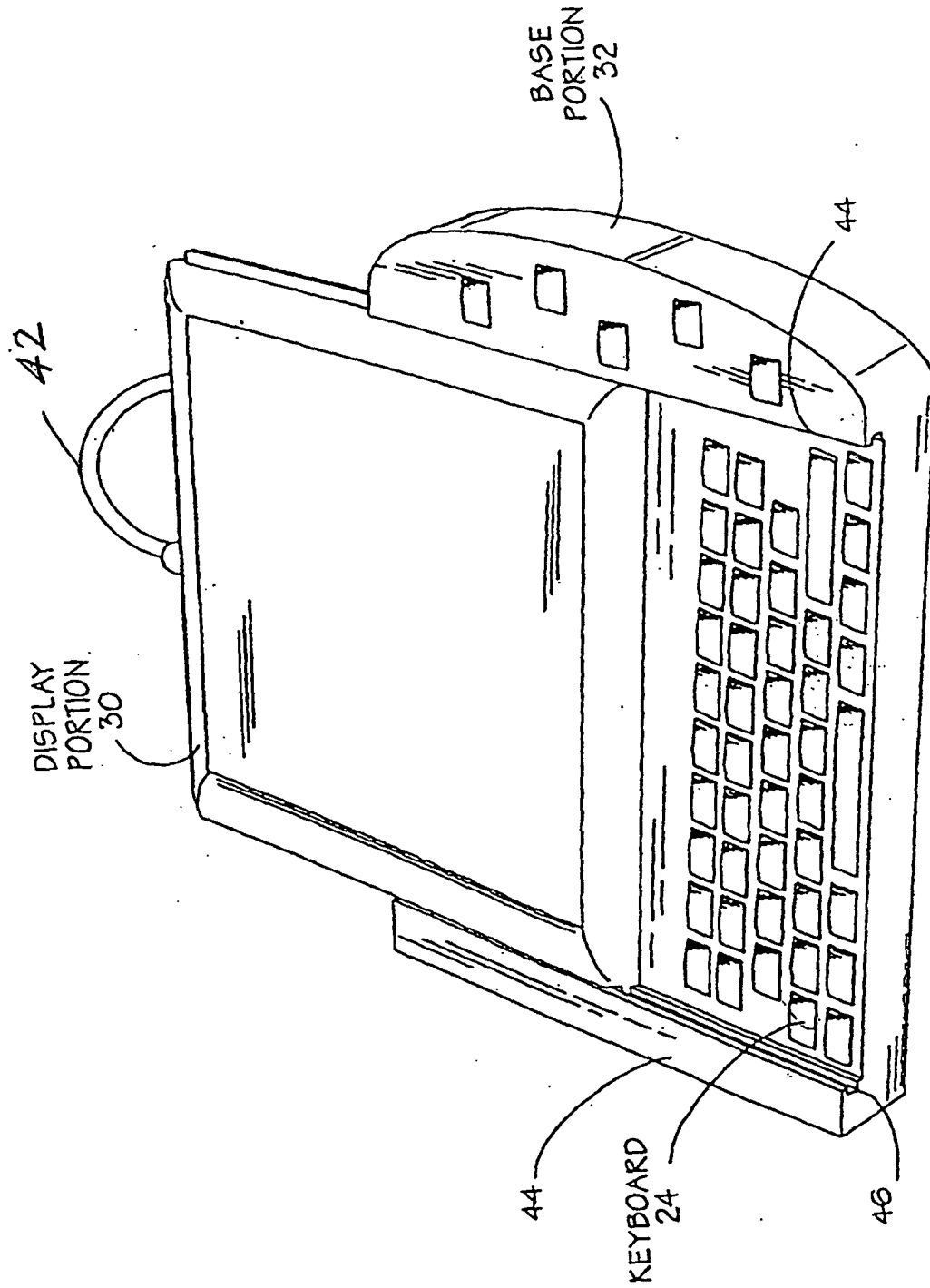


Fig. 5

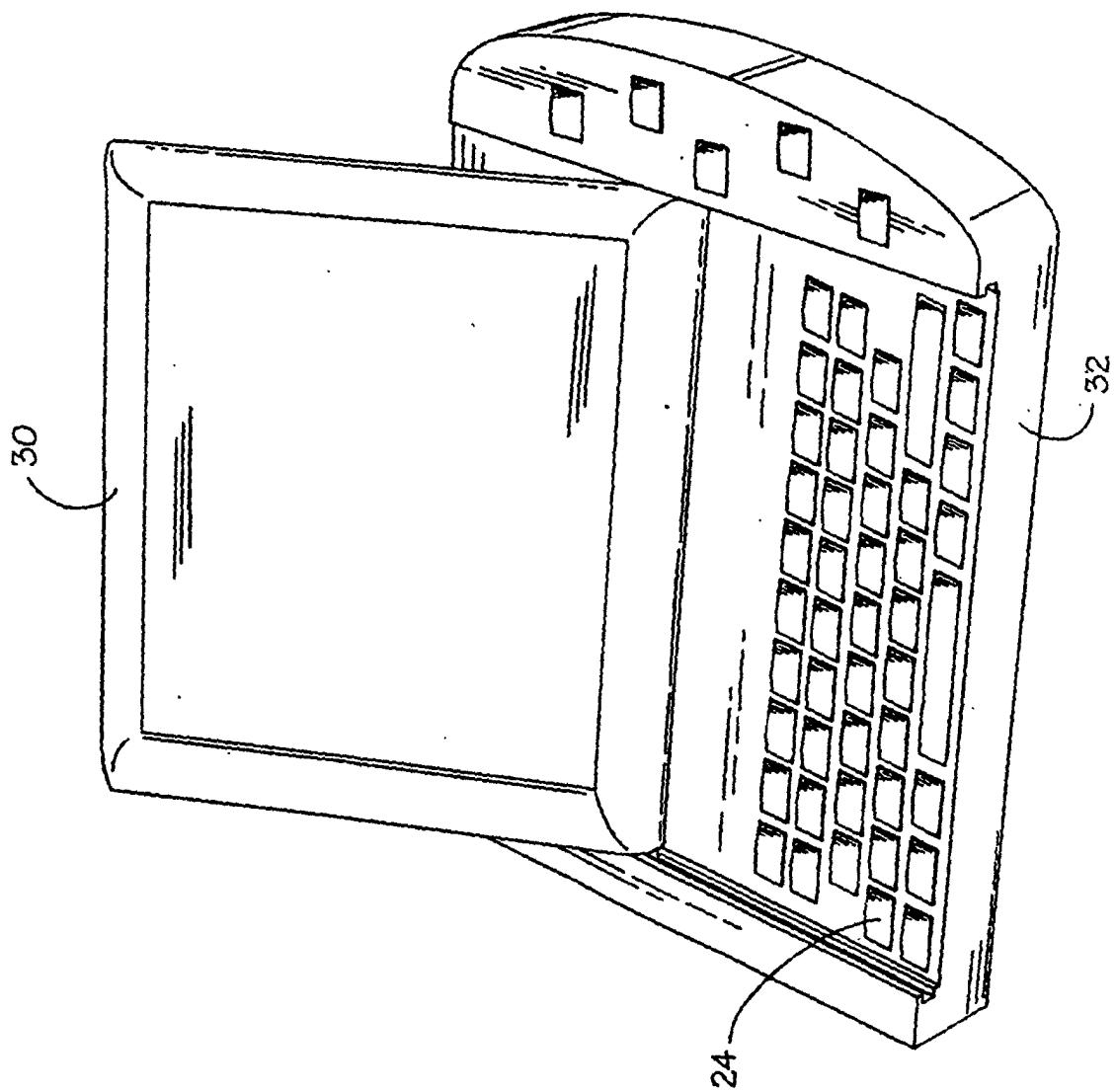
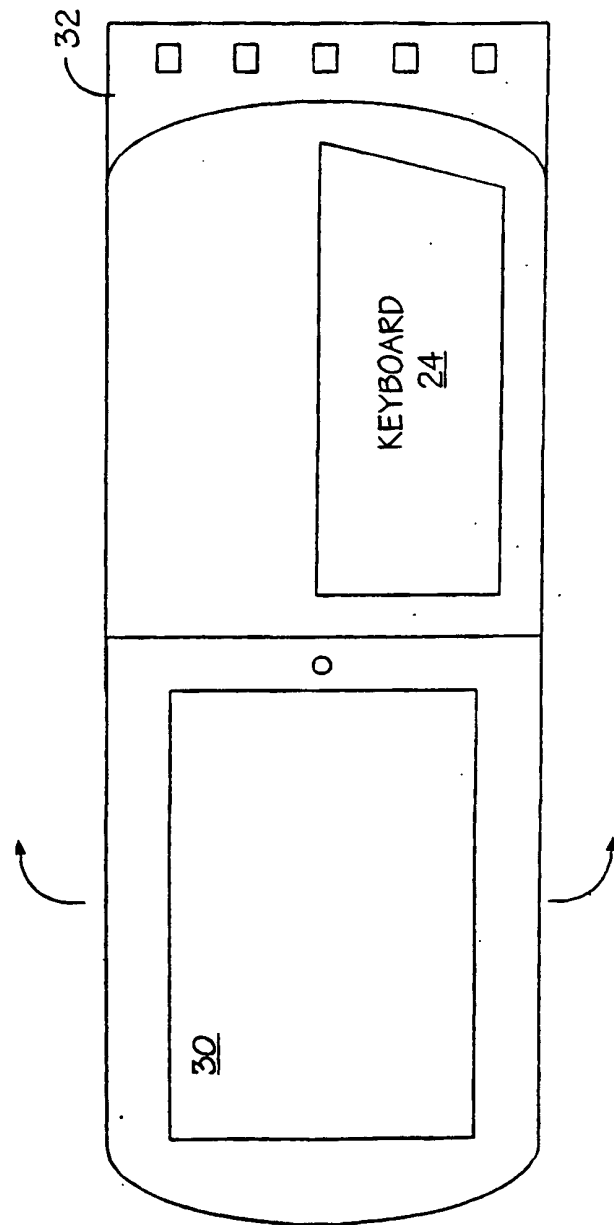
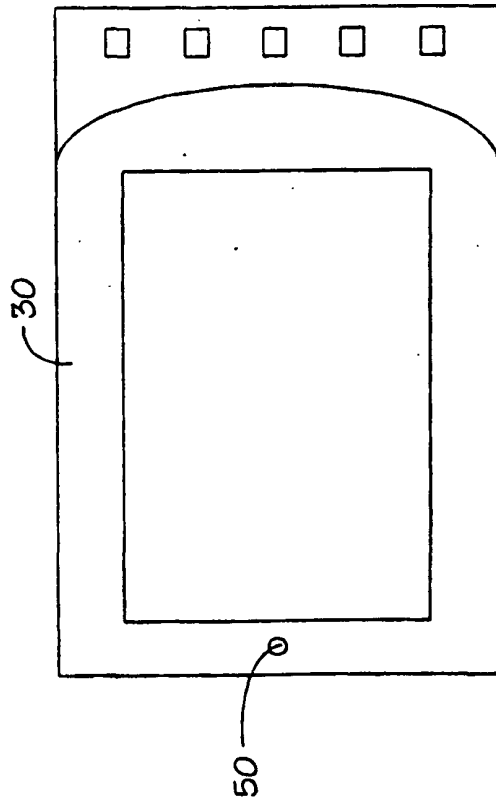


Fig. 6



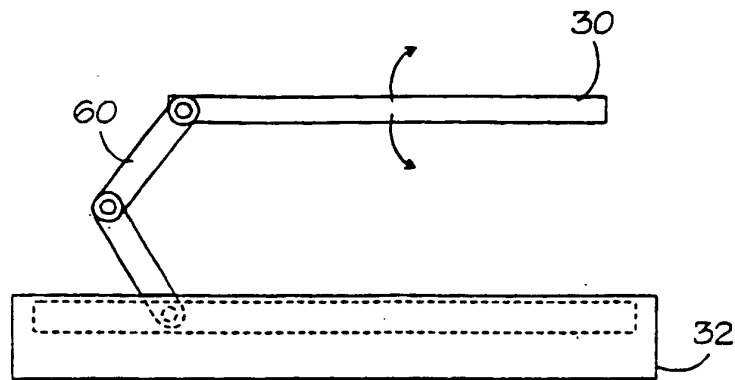


Fig. 8A

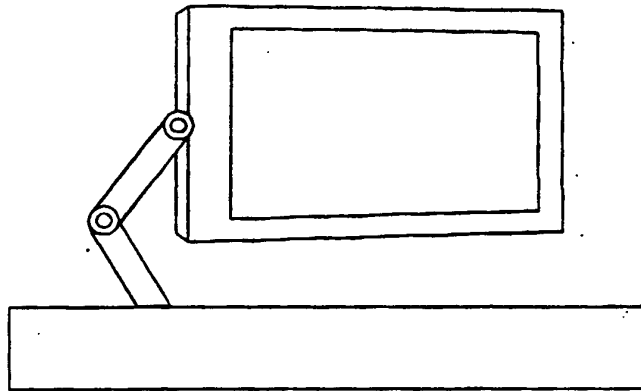


Fig. 8B

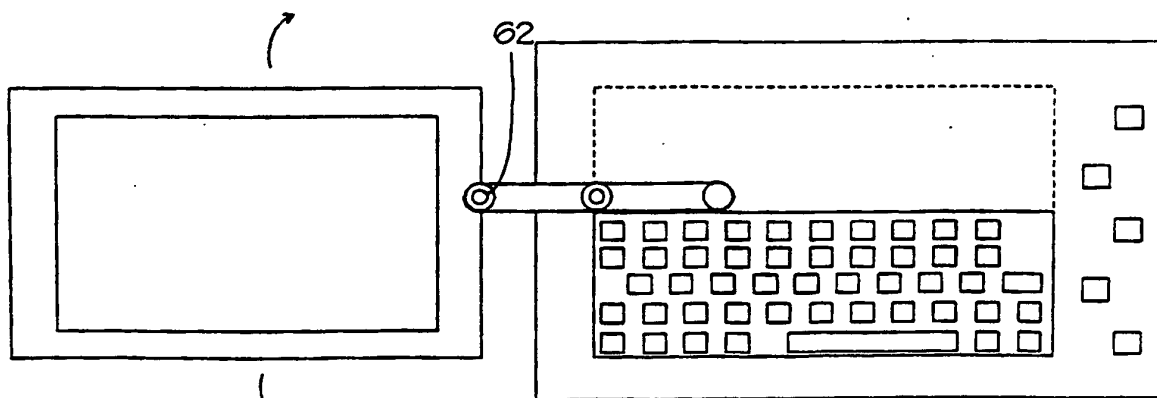


Fig. 8C