FOLDABLE DISPLAY, INPUT DEVICE PROVIDED WITH THE DISPLAY AND FOLDABLE KEYBOARD, AND PERSONAL COMPUTER PROVIDED WITH THE INPUT DEVICE

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates to a foldable display with superior portability, an input device provided with the foldable display and a foldable keyboard with superior portability and good operationality during operation, and a personal computer provided with the input device. More specifically, the present invention relates to an input device and a personal computer provided with a display constructed to be foldable in correspondence with a folded state of a keyboard, whereby enhancing portability of the input device and the personal computer for carrying, achieving good operationality equivalent to a desktop type input device and personal computer during use, and further enabling a stably folding operation of the display over a long period of time.

2. Description of Related Art

Heretofore, there have been proposed various types of portable electronic devices each including an input operating part, for example, a foldable keyboard, and a foldable display.

For example, Japanese patent unexamined publication No. Hei 10-293624 discloses a portable electronic device including a first unit mounting a display part and a second unit constructing an input operating part, wherein the first and second units are rotatably connected through a connecting part and the second unit includes a main part and two sub parts foldably connected with both sides of the main part through two connecting parts (See JP-A-10/293624, on page 2 and FIGS. 1 through 3).

In such portable electronic device, the main part and the sub parts are horizontally arranged during use, thereby providing a wide area as an inputting part and, on the other hand, the sub parts are folded on the main part through the connecting parts during nonuse, thereby enhancing the portability.

Furthermore, International patent publication No. WO99/34348 discloses a portable electronic device constructed such that a main unit of the device is coupled in an openable and closable relation with a cover through coupling means such as a hinge, and a flexible liquid crystal display panel integrally including a touch-sensitive input operating part is fixed over the main unit and the cover (See WO99/34348, on page 9 and FIGS. 1 through 3).

During use of this portable electronic device, a desired input operation is performed by means of the touch-sensitive input operating part provided in the display panel. During nonuse, when the cover is closed, a bent part of the display panel is caused to enter clearance grooves formed in the main unit and the cover near the coupling means, while ensuring a large curvature. Accordingly, it is possible to prevent damage and deterioration due to the folding operation of the flexible liquid crystal display panel.

In the portable electronic device disclosed in JP-A-10/293624, however, the two sub parts in the input operating part are constructed foldable to be superposed on the main part through the connecting parts, whereas the first unit including the display part is designed in itself not to be foldable. Thus, the size of the electronic device depends on the size of the first unit. This is still insufficient to further improve the portability of the electronic device and enhance the downsizing of the whole electronic device.

In the portable electronic device disclosed in WO99/34348, the touch-sensitive input operating part and the display part are constructed by a single flexible liquid crystal display panel, and this panel is fixedly laid over the main unit and the cover so that the panel is folded when the cover is closed during nonuse. The touch-sensitive input operating part itself is generally formed flat, which is very poor in operationality as compared with a keyboard on which a plurality of keys are arranged. In addition, the touch-sensitive input operating part itself is not foldable, so that the size of this input operating part is determined depending on the size of the flexible liquid crystal display panel. Similarly to the above case, it is still insufficient to further improve the portability of the portable electronic device and to downsize the whole device. The bent portion of the display panel is caused to enter the clearance grooves when the cover is closed, thereby preventing damage and deterioration due to the folding operation of the display panel. When bending (folding) operations of the display panel are repeated over a long time, the display panel would often become liable to automatically bend with a fold line, which causes corrugations in the panel. Consequently, it is still insufficient to stably bend or fold the flexible liquid crystal display panel.

SUMMARY OF THE INVENTION

The present invention has been made in view of the above circumstances and has an object to overcome the above problems and to provide a foldable display in correspondence with a folded state of a foldable keyboard, an input device including the display, and a personal computer, capable of extremely enhancing the portability of the input device and the personal computer for carrying and achieving good operationality during use equivalent to a desktop type input device and personal computer, and enabling a stable folding operation of the display over a long period of time.

Additional objects and advantages of the invention will be set forth in part in the description which follows and in part will be obvious from the description, or may be learned by practice of the invention. The objects and advantages of the invention may be realized and attained by means of the instrumentalities and combinations particularly pointed out in the appended claims.

To achieve the purpose of the invention, there is provided an input device including: a foldable keyboard including a first keyboard unit, a second keyboard unit, and a rotatable connecting part provided between the first and second keyboard units, so that the first and second keyboard units are rotated to come apart from each other into an unfolded, horizontally arranged state through the connecting part for use of the keyboard, while the first and second keyboard units are rotated to come close to each other into a closed, folded state through the connecting part for nonuse of the keyboard, and a foldable flexible display rotatably attached to one edge of the first or second keyboard unit, the display being openable in correspondence with the horizontally arranged state of the first and second keyboard units and foldable in correspondence with the folded state of the first and second keyboard units.

In the above input device, the flexible display is opened in correspondence with a horizontally arranged state of the first and second keyboard units. For use of the keyboard, a display part of the flexible display is widened in displaying area, making the letters or other information displayed thereon easily viewable and being not subject to any restriction in displaying the letters or others. Furthermore, the first and second keyboard units are unfolded from the folded state into