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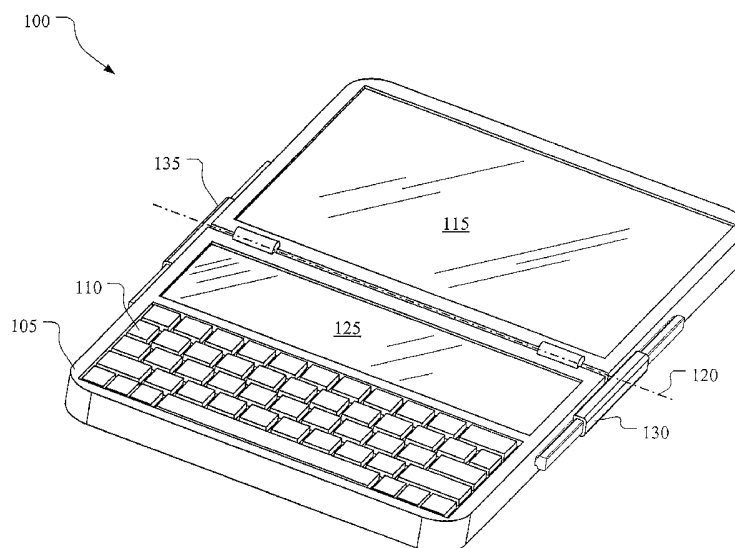
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(54) Title: FOLDING TERMINAL WITH SLIDER TO FIX TERMINAL IN A FLAT UNFOLDED CONFIGURATION



(57) Abstract: A user terminal combining touch-screen and keyboard functionality, and combining laptop and flat-pad layouts. The flat-pad layout can be locked into place using sliding pieces. The terminal comprises a base including a keyboard, a first display screen attached to the base along a primary fold line, a second display screen included in the base and located between the keyboard and the primary fold line, and at least one sliding piece for fixing the second display screen in a substantially flat configuration with the first display screen and/or with another part of the base. The first display screen, the second display screen, and the keyboard have substantially the same width, in order to fully utilize the width of the entire user terminal. this user terminal has a simple mechanical structure, having less than three fold lines, and the keyboard may be detached to reveal additional screen space.

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

configuration in which the screen lies on top of the keyboard in the pad mode — *Hawkins*' screen faces up instead of facing down as is usual with laptops in the folded position. *Hawkins*' computer in its folded position provides no protection for the screen, because the screen is facing up. Also, *Hawkins*' screen can be no bigger than the keyboard piece upon which the screen lies, and again this can make the screen difficult to read and look at, unless the keyboard piece is sufficiently large.

Some existing laptop devices have been designed in such a way that the laptop's keyboard can be detached. For example, *Kornmayer* (U.S. Patent No. 6,437,773) features a detachable keyboard. This serves two purposes in *Kornmayer*: first, removal of the keyboard from the housing allows easy access to the housing for maintenance purposes; second, operation of the keyboard at a greater distance from the display may be advantageous from an ergonomic viewpoint. Similarly, *Horiuchi* (U.S. Application No. 20020047832) discloses a detachable keyboard, so that a user having no special skills can remove or insert the keyboard. This feature may be useful, for example, when a keyboard having foreign characters is desired, or when a keyboard becomes damaged and needs to be replaced; e.g. a user may spill coffee on the keyboard and therefore order a replacement keyboard. A problem with these prior art detachable keyboards is that they do not offer the user additional functionality, tools, or resources using the area of the terminal that becomes exposed when the keyboard is removed. *Katz*, *Hawkins*, *Kornmayer*, and *Horiuchi* are incorporated herein by reference in their entireties, in order to facilitate a fuller understanding and enablement of the present claimed invention.

25 Disclosure of Invention

The present invention provides a folding computer device that has a screen bigger than the device in its folded position, and thus solves the problem of reducing size without causing visual problems. This is accomplished by having a screen split into two parts that are joined at the device's primary fold line. The keyboard and one of the screens are on the same piece of the device, and thus are not separated by the primary fold line.

The present invention provides a helpful way to combine keyboard with touch mode functionality. Because touch mode functionality renders a flat device configuration desirable, the present invention discloses a flat configuration, and sliding pieces for fixing the device in that flat configuration. Thus, the two screens
5 unite in the flat configuration. When the sliding pieces slide away to allow the device to be closed, no screen faces outward in an unprotected folded position.

The user terminal of the present invention comprises a base including a keyboard, a first display screen attached to the base along the primary fold line, a second display screen included in the base and located between the keyboard and the
10 primary fold line, and at least one sliding piece for fixing the base and the first display screen in a substantially flat configuration in which the first display screen, the second display screen, and the keyboard form a substantially flat surface. In this invention, the first display screen, the second display screen, and the keyboard have substantially the same width, in order to fully utilize the width of the entire user
15 terminal. This user terminal has a relatively simple and economical layout, having only one or two fold lines.

Each of the sliding pieces is for sliding along a side of the portable folding user terminal, and for fixing the portable folding user terminal in a flat unfolded configuration. The sliding piece comprises at least one finger contact surface, and
20 at least one terminal contact surface.

In some embodiments, the keyboard of the present invention is detachable by the user. This provides the advantages of prior art detachable keyboards, plus detachment of the present keyboard would optionally reveal an exposed area of the base that includes at least one feature available to the user when the terminal is
25 operable. For example, removal of the keyboard may expose a larger display screen. Likewise, another embodiment of the present invention has a primary fold line that is also a detachment line, so that the user is able to carry only the base which includes the keyboard and the second display screen. In this case, a secondary fold line advantageously separates the keyboard from the second display
30 screen, and the sliding piece has sufficient length to cover both fold lines at once.

Brief Description of the Drawings

Other features and advantages of the present invention will become readily apparent from the following description and drawings wherein:

Fig. 1 is a perspective view showing a laptop device according to the present invention, with two screens separated by a primary fold line, and two sliding pieces;

Fig. 2 is a perspective view showing the device of the present invention in a flat unfolded configuration that is secured by the two sliding pieces;

Fig. 3 is a top view of the present invention in the flat configuration, showing the QWERTY keyboard;

Fig 4A is a top view of a sliding piece in the flat configuration;

Fig. 4B is a perspective view of a sliding piece in the flat configuration;

Fig. 4C shows a sliding piece gripping a side of the user terminal of the present invention.

Fig. 5A shows a sliding piece anchored to the user terminal of the present invention.

Fig. 5B shows two connected sliding pieces attached to opposite sides of the user terminal.

Fig. 6 shows a laptop device according to the present invention, in a perspective view, with keyboard detached.

Fig. 7A shows a laptop device according to the present invention, having two fold lines and one slider, in a folded configuration.

Fig. 7B shows a laptop device according to the present invention, having two fold lines and one slider, in a flat configuration.

Mode(s) for Carrying out the Invention

Turning now to the drawings and considering Fig. 1 in particular, we see that the user terminal **100** has a base **105** including a keyboard **110**. The terminal also has a first display screen **115**, and a primary fold line **120**. In these respects, the user terminal of Fig. 1 is similar to typical laptop computers. The primary fold line typically operates by means of hinges, or some other flexible device or material.

Fig. 1 also shows a second display screen **125** included in the base **105**, between the keyboard **110** and the primary fold line **120**. This second screen **125** is available for tools, phone status, mini-desktop applications, et cetera. Fig. 1 furthermore shows a right sliding piece **130** for fixing the base **105** and the first display screen **115** in a substantially flat configuration, although the sliding piece **130** in Fig. 1 is not positioned for the flat configuration. Fig. 1 also shows a left sliding piece **135**.

The flat configuration is shown in Fig. 2, in which the right sliding piece **130** and the left sliding piece **135** straddle the primary fold line **120**, and in which the user terminal is fully unfolded to 180 degrees forming a pad. The two sliders **130** and **135** are shown slid into positions at opposite ends of the primary fold line **120** so as to fix the base **105** and the first display screen **115** in the substantially flat configuration. The two sliders slide along lines parallel to each other, and perpendicular to the primary fold line, and these sliders are preferably decorative in design.

The user terminal in the substantially flat configuration of Fig. 2 has at least a touch mode option in which the first display screen **115** and the second display screen **125** appear as one big screen responsive to touch, and a pointer or cursor is freely movable between the first display screen and the second display screen. The user terminal in the flat configuration of Fig. 2 also has a laptop mode option requiring use of the keyboard **110**, and a mouse, trackball, finger pad or similar device for moving the pointer or cursor.

The functionality of the additional screen **125** may advantageously be different from that of the first screen **115**. For example, the additional screen **125**

accommodates a tool zone, so as to join certain functions closer to the keyboard, while reducing clutter in the first screen **115**. The additional screen **125** preferably includes items such as a status zone indicating things like connectivity and inbox condition, and such as a news ticker, shortcuts to programs, documents, particular web sites, space for additional opened applications like a music player or calendar, screen notes that can be seen while presenting content of the main screen **115**, and yellow “stickies.” The additional screen **125** can also be used as an extension to the big screen **115**, for example to scroll web page lists.

The dual screens **115** and **125** allow the biggest possible screen area on the smallest feasible dimensions. In the flat configuration, the user terminal **100** may be as large as a piece of A4 or A5 paper, and in that case does not look like a tiny toy resembling prior art subnotebooks. In the flat configuration, when the touch mode option is active instead of (or in unison with) the keyboard option, the visibility of the screens will be virtually as good as the visibility without the touch mode, due to advances in screen technology.

As shown in Fig. 3, the keyboard is a QWERTY keyboard having only one button to the left of the Q button and having only one button to the right of the P button, and wherein the button to the left of Q and the button to the right of P have respective widths less than or equal to the width of the Q button. Fig. 3 illustrates that the first display screen **115**, the second display screen **125**, and the keyboard **110** have substantially the same width, which takes full advantage of the width of the user terminal **100**. Prior art laptops typically have a total of 14 characters on the same line with the Q button, but, according to this embodiment of the present invention, there are only 12 buttons, which allows the user device **100** to be more narrow. Of course, narrowness could also be achieved by using characters having a shrunken size, whether the number of characters per line is 14 or less.

The remaining figures show more detail of the sliding piece according to the present invention. As shown in Fig. 4A, the sliding piece **130** is for sliding along a side **400** of the portable folding user terminal, and for fixing the portable folding user terminal in a flat unfolded configuration. The sliding piece comprises at least one finger contact surface **410**, and at least one terminal contact surface **420** where

the sliding piece makes contact with the rest of the terminal. Fig. 4A shows the flat configuration in which the sliding piece straddles the primary fold line **120**; the user can exit the flat configuration by sliding the slider **130** so that it no longer straddles the primary fold line, for example into a position such as that shown by Fig. 1. The user does this by putting a finger on the contact surface **410** and exerting pressure sufficient to overcome the resistance at the terminal contact surface **420**.

Fig. 4B is a perspective view of what is already shown in Fig. 4A, further showing a ridge or slide **430** that protrudes from the side **400** of the user terminal. Such a ridge provides one way by which the slider **130** may attach to the side **400**, and this type of attachment is shown in greater detail in Fig. 4C. The ridge may extend along the entire side **400** of the user terminal, or over only part of the side **400**; the latter case would be adequate, because the slider **130** need not slide along the entirety of the side **400**.

Unlike the gripping structure shown in Fig. 4C, Fig. 5A alternatively shows the slider **130** anchored to the side **400** of the user terminal. Regardless of whether the slider **130** is attached to the side **400** by a gripping structure or an anchor structure, or by some other equivalent structure, the other slider **135** would be attached in the same way. Each slider is preferably symmetric with respect to a plane of symmetry **500**, and thus the slider **135** and the slider **130** do not require a separate manufacture, since they are substantially the same. If the user terminal is small enough, only one slider will be sufficient to provide the required stability.

Fig. 5B illustrates a connector or bridging piece **510** connecting the sliders **130** and **135** to each other. This connector **510** is an option that would provide greater stability to the flat configuration, for example by ensuring that if the right slider **130** is straddling the primary fold line **120** then the left slider **135** must also be straddling the primary fold line **120**.

Referring now to Fig. 6, that figure shows an embodiment of the present invention in a laptop configuration, with the keyboard **110** removed. In this embodiment, removal of the keyboard exposes a bigger display screen **125**, as compared to the relatively small portion of the screen **125** shown in Fig. 1. However, Fig. 6 is merely illustrative, and alternatively removal of the keyboard

110 could instead expose other features instead of a supplementary portion of the screen **125**, or could merely make the base **105** more easily accessible for maintenance or repairs, without exposing any other useful user features.

Preferably, the keyboard **110** can still be used even when detached, and therefore
5 would be connected to the rest of the user terminal by wire or by an invisible connection such as an infrared signal, as is well known in the art.

In Fig. 7A, a laptop configuration is shown, in which the apparatus has a second fold line **710** in addition to the primary fold line **120**. The slider **700** is sufficiently long so that it can cover both fold lines at once, as seen in Fig. 7B. The
10 primary fold line **120** is also a line of detachability, so that the base **105** can be separated from the first screen **115**, allowing the user to carry around the base, and to fold the base along the secondary fold line **710**. The line **120** can be implemented in a number of ways that are obvious to persons skilled in the art (e.g. using loops as in a loose-leaf notebook).

In addition to the slider **700** on the right, a slider on the left, such as slider
15 **135** in Fig. 2, becomes more advisable and necessary as the device becomes bigger or heavier. Even if the device is small and light, there are still advantages to having a short slider on the other side of the device from the long slider **700**, because the slider **700** will remain with the first screen **115** when the first screen is detached
20 along the fold line **120**. Thus, the short slider on the other side remains with the base **105**, and is available for straddling the second fold line **710**, for example if the keyboard is detached (as described above) to reveal an additional display area.

An apparatus **100** for altering a portable terminal's configuration into a more stable alternative configuration has been described above in several preferred
25 embodiments employing at least one slider to provide the stability. Two screens are separated by a primary fold line so that they unite as one big surface in the stabilized configuration. However, numerous modifications may be incorporated as is known to those skilled in the art of mobile terminals such as portable telephones, and therefore the invention has been described by way of illustration rather than
30 limitation.

WHAT IS CLAIMED IS:

1. A user terminal comprising:
a base including a keyboard;
5 a first display screen attached to the base along a primary fold line;
a second display screen included in the base and located at least between the
keyboard and the primary fold line; and
at least one sliding piece for fixing the first display screen and the second
display screen in a substantially flat configuration in which the first display screen
10 and the second display screen form a substantially flat surface.
2. The user terminal of claim 1, wherein the first display screen, the second
display screen, and the keyboard have substantially the same width, and wherein the
user terminal has less than three fold lines.
15
3. The user terminal of claim 1, further comprising a secondary fold line
located between the keyboard and the second display screen, wherein the at least
one sliding piece is sufficiently long to fix both the primary fold line and the
secondary fold line in a flat configuration.
20
4. The user terminal of claim 1, wherein the second display screen has a
functionality that depends at least upon whether the user terminal is in the
substantially flat configuration.
- 25 5. The user terminal of claim 1, wherein, at least in a configuration different
from the substantially flat configuration, the second display screen is for displaying
secondary items, and wherein the secondary items include a plurality elected from
the group consisting of: tools, phone status, desktop, and subset of desktop.
- 30 6. The user terminal of claim 1, wherein the at least one sliding piece consists

of two sliders for sliding into positions at opposite ends of the primary fold line so as to fix the base and the first display screen in the substantially flat configuration, and wherein the two sliders are for sliding along lines parallel to each other and perpendicular to the primary fold line.

5

7. The user terminal of claim 5, wherein, at least the configuration different from the substantially flat configuration, the second display screen has functionality for displaying a further plurality selected from the group consisting of: connectivity status, inbox status, new ticker, shortcuts, additional open applications, and notes.

10

8. The user terminal of claim 4, wherein the user terminal in the substantially flat configuration has at least a touch mode option in which the first display screen and the second display screen appear as one big screen responsive to touch.

15

9. The user terminal of claim 1, wherein a pointer or cursor is freely movable between the first display screen and the second display screen.

10. The user terminal of claim 8, wherein the user terminal in any configuration has laptop mode option requiring use of the keyboard.

20

11. The user terminal of claim 1, wherein the user terminal in any configuration has a laptop mode option requiring use of the keyboard.

12. The user terminal of claim 9, further comprising a trackball or finger pad for moving the pointer or cursor.

25

13. The user terminal of claim 1, wherein the keyboard is a QWERTY keyboard having only one button to the left of the Q button and having only one button to the right of the P button, and wherein the button to the left of Q and the button to the right of P have respective widths less than or equal to the width of the Q button.

30

14. The user terminal of claim 3, wherein the primary fold line is also a line of detachability.
15. A sliding piece for sliding along a side of a portable folding user terminal,
5 and for fixing at least part of the portable folding user terminal in a flat unfolded configuration, the sliding piece comprising:
at least one finger contact surface; and
at least one terminal contact surface.
- 10 16. The sliding piece of claim 15, wherein the at least one contact surface is shaped for gripping the side of the portable folding user terminal.
17. The sliding piece of claim 15, wherein the at least one contact surface is shaped for anchoring the at least one finger contact surface to the side of the
15 portable folding user terminal.
18. The sliding piece of claim 15, wherein the sliding piece is substantially symmetric with respect to its lengthwise axis.
- 20 19. The sliding piece of claim 15, wherein the sliding piece has a left terminal contact surface for contacting the left side of the terminal, and a right terminal contact surface for contacting the right side of the terminal, and a bridging piece for linking the left terminal contact surface with the right terminal contact surface.
- 25 20. A user terminal comprising:
a base including a keyboard;
a first display screen attached to the base along a primary fold line;
a second display screen included in the base and located at least between the keyboard and the primary fold line; and

at least one slide for supporting a sliding piece that is for fixing the second display screen in a substantially flat configuration in relation to the keyboard or the first display screen.

5 21. The user terminal of claim 20, wherein the keyboard is detachable, and wherein the user terminal is operable both when the keyboard is attached and when the keyboard is detached.

22. The user terminal of claim 1, wherein the keyboard is detachable, and
10 wherein the user terminal is operable both when the keyboard is attached and when the keyboard is detached.

23. The user terminal of claim 21, wherein detachment of the keyboard reveals an exposed area of the base, and wherein the exposed area of the base includes at
15 least one feature available to the user when the terminal is operable.

24. The user terminal of claim 23, wherein the at least one feature comprises a supplemental portion of the second display screen or an additional display screen.

20 25. The user terminal of claim 20, wherein the keyboard and the second display screen are separated by a secondary fold line.

26. The user terminal of claim 20, wherein the primary fold line is also a line of detachability.

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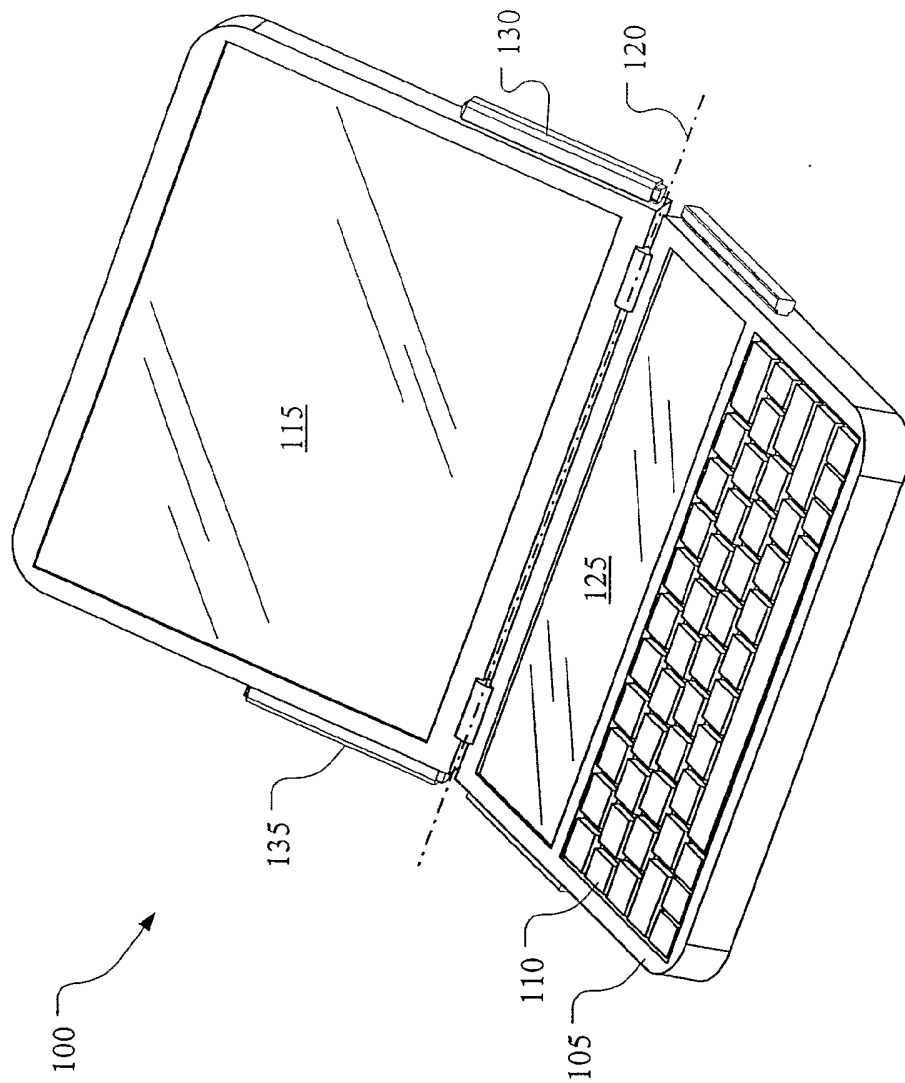


FIG. 1

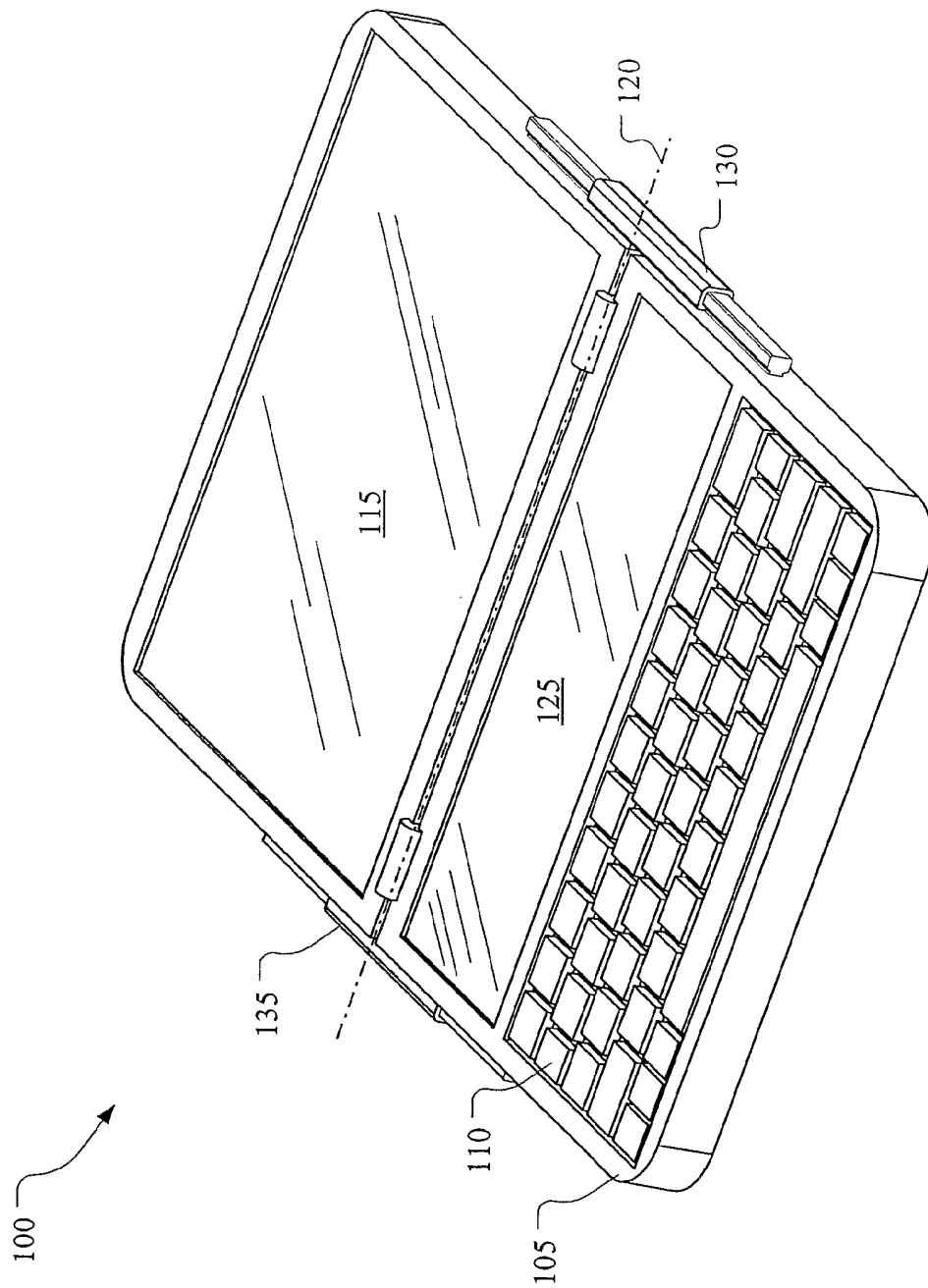


FIG. 2

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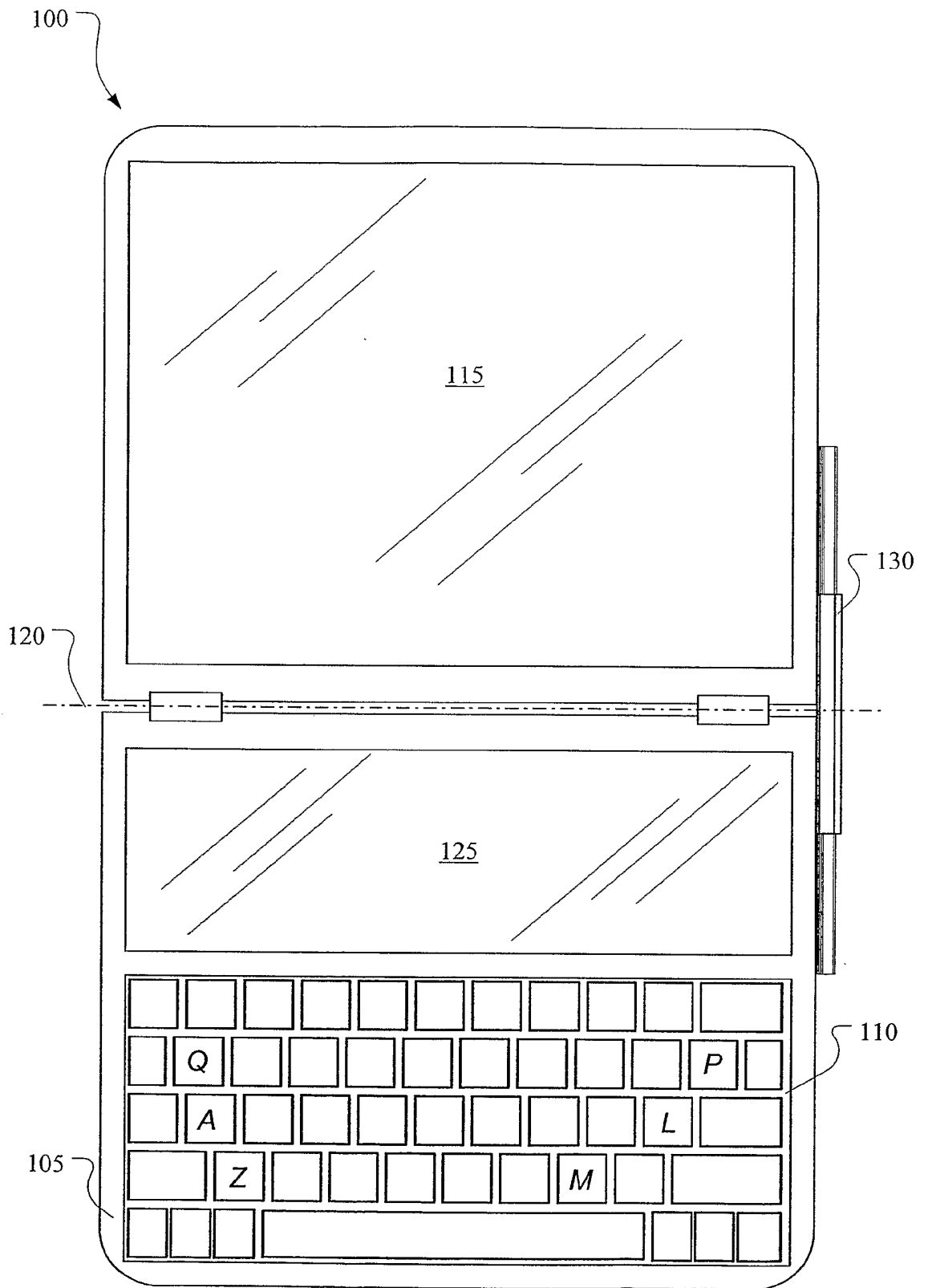


FIG. 3

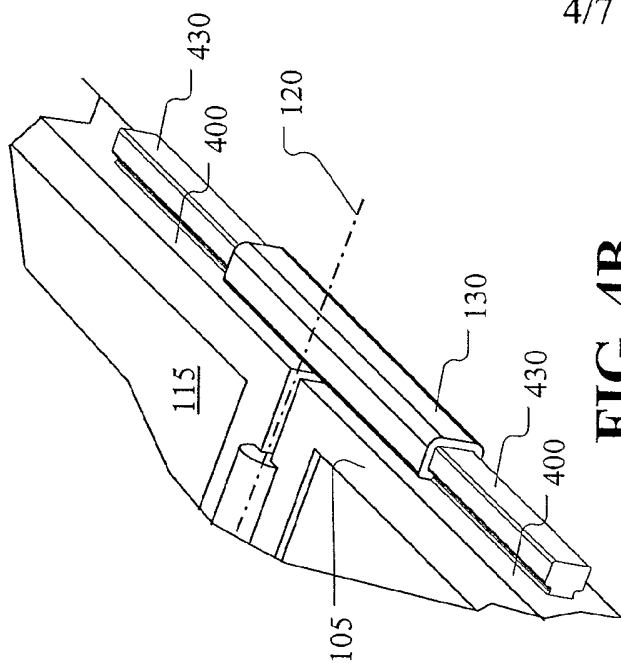


FIG. 4B

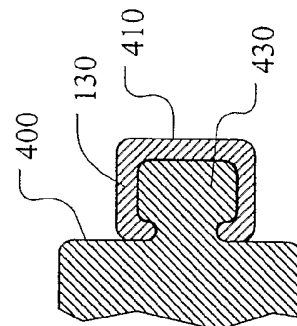


FIG. 4C

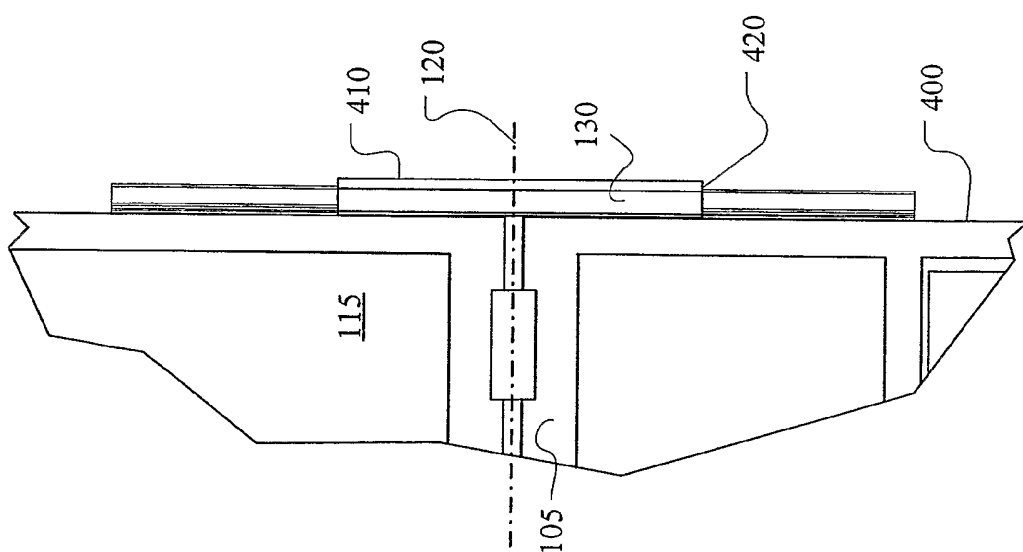


FIG. 4A

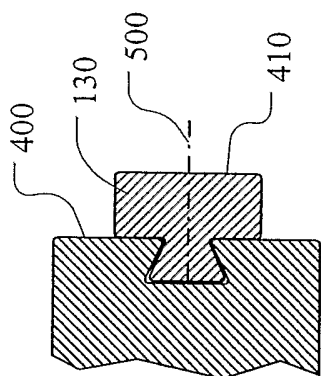


FIG. 5A

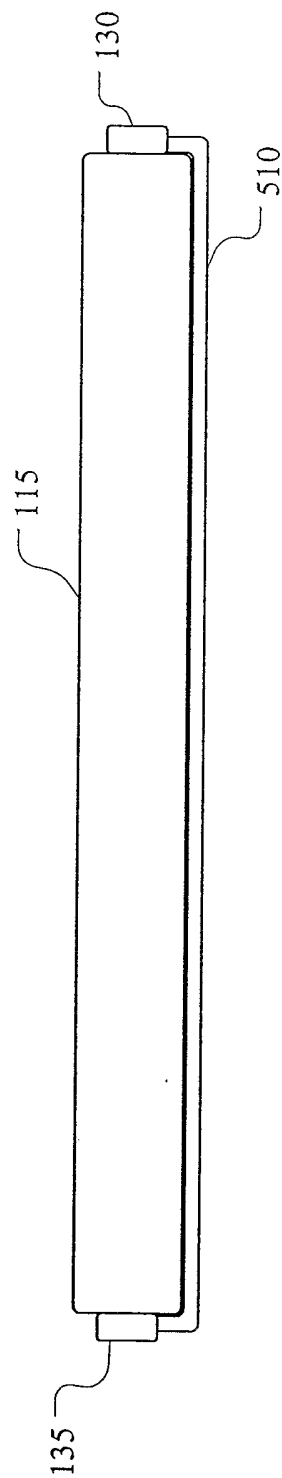


FIG. 5B

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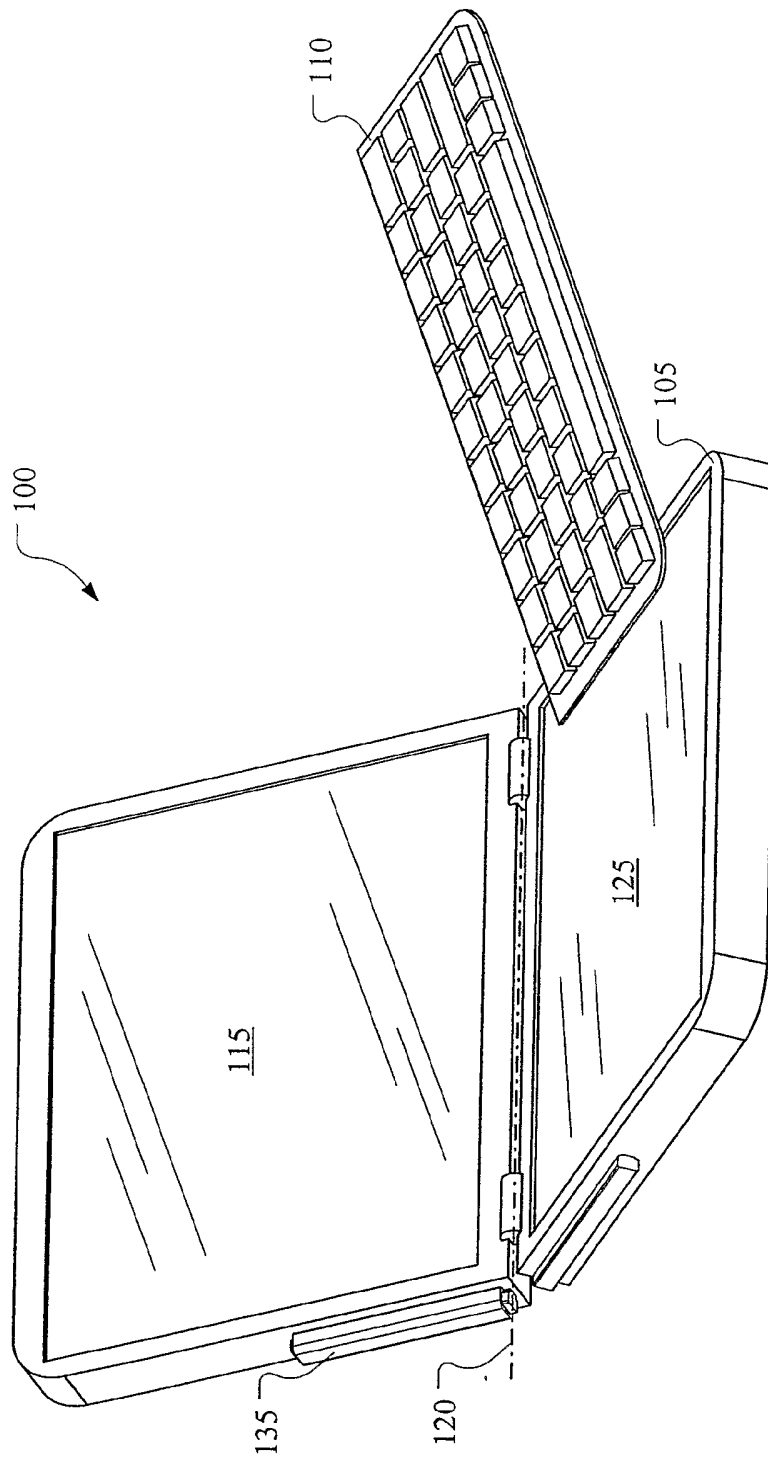


FIG. 6

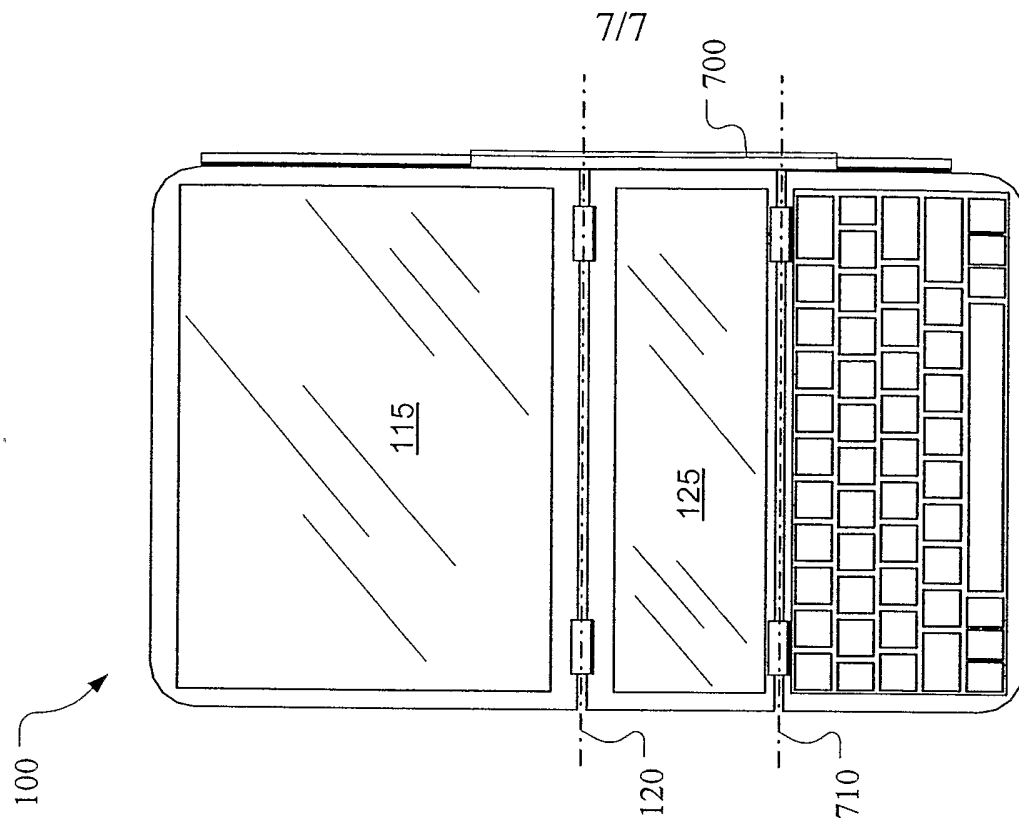


FIG. 7B

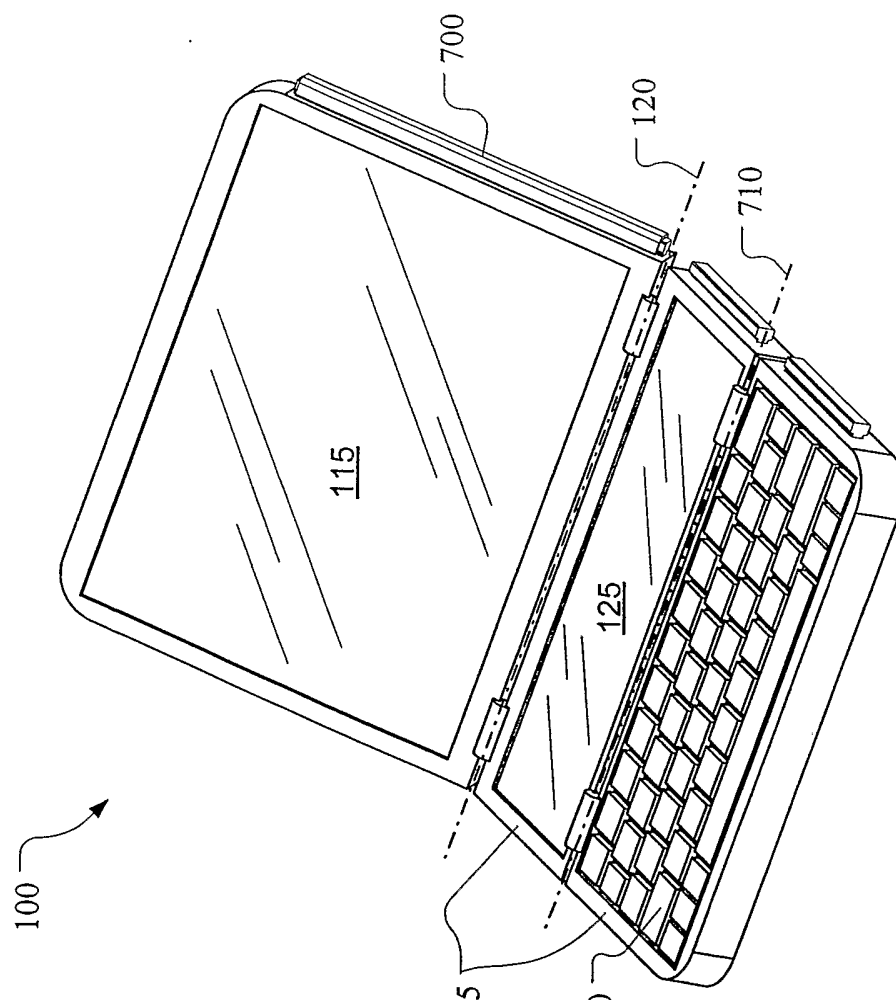


FIG. 7A