A compact, rigid work platform and carrying case for a foldable keyboard is disclosed. The disclosed device has multiple flat panels, connected with hinges, that can be arranged into two configurations: a thin, rigid, planar working surface and a secure carrying case. The working surface has dimensions approximately equal to the outer dimensions of the fully expanded keyboard with a handheld computer attached to it. The interior dimensions of the carrying case are at least as large as an envelope enclosing the keyboard when it is in its folded configuration. Means are provided for securing the device in both configurations. Means are also provided to secure the keyboard to the face of the working surface when it is being operated by the user.
FIG. 9
BACKGROUND OF THE INVENTION

[0001] 1. Field of the Invention

[0002] The present invention relates to work platforms and carrying cases for small electronic devices and keyboards. More particularly, the invention relates to a collapsible work platform that provides a rigid, flat surface upon which a foldable keyboard and handheld computer can be mounted and that provides a carrying case for the foldable keyboard when the work platform is collapsed.

[0003] 2. Related Art

[0004] With the recent advances in computer technology, small handheld computers have become increasingly popular. Although many of these computers are “pen-based” computers, i.e., a stylus pen is used to enter data and select options on the computer, it is generally accepted that data entry is more easily accomplished through the use of a traditional keyboard. Therefore, most handheld computers have the capability to interface with traditional keyboards. To accommodate this new capability and still satisfy the consumer’s demand for compactness and portability, foldable keyboards are now widely available on the market. For example, Targus markets a device known as the Stowaway®. These foldable keyboards provide full-size keys in the traditional “QWERTY” layout when the keyboards are in their expanded configuration. However, when they are not in use, these keyboards fold up into a compact, rectangular configuration.

[0005] One persistent problem encountered by a person using a handheld computer with a foldable keyboard is that the keyboard has a tendency to collapse when the person tries to operate it while it is laying on an uneven surface. This problem is commonly encountered when a person tries to operate the keyboard while sitting, e.g., in an airport lobby or on a subway train. A search of the market for handheld computer accessories and of existing patents produced no device that provides a firm, compact working surface upon which a person can operate a foldable keyboard when there are no other working surfaces available. Also, there are no carrying cases designed for foldable keyboards that can be expanded to provide such a working surface.

[0006] Clipboards with storage compartments are common in the market. However, their storage compartments are not deep enough to store a folded keyboard or the clipboards are larger than necessary. U.S. Pat. No. 6,217,075 B1 discloses a collapsible clipboard. However, it only collapses to make it thinner in depth and the user is still left with a bulky device to carry around. U.S. Pat. No. 6,108,200 discloses a keyboard system for use with a handheld computer. The device has a cover that folds over to enclose and protect the keyboard. However, the keyboard does not fold into a compact configuration and the device remains bulky after it is closed.

[0007] U.S. Pat. No.’s 6,151,012, 6,168,331 B1, and 3,940,758 disclose foldable keyboard/computer systems. However, each of these systems is a complex, self-contained device that is not suitable to form a stiff working surface or carrying case for the foldable keyboards currently available on the market. Also, the keyboards of U.S. Pat. No.’s 6,151,012 and 6,168,331 B1 have only one folding point in the middle and, thus, will not fold into the small compact configuration of the device disclosed herein and the foldable keyboards for which it was designed.

[0008] U.S. Pat. No. 5,762,250 discloses a large carrying case and work platform designed particularly for use with laptop computers. Even if it was used as a work platform for handheld computers and foldable keyboards, it is large and bulky and does not collapse into a smaller carrying case when it is not in use. U.S. Pat. No. 5,445,266 discloses a carrying case for a handheld computer but the device does not support a fully expanded keyboard or provide a solid working surface for any keyboard.

[0009] One purpose of the device disclosed in this application is to provide a flat, rigid working surface upon which a foldable computer keyboard, commonly found on the market, can be operated. These computer keyboards typically have a means of mounting a handheld computer to the rear of the keyboard. The disclosed device can be placed, e.g., on the user’s lap, have a foldable keyboard and handheld computer securely mounted to it, and allow the user to easily operate the keyboard and computer. Another purpose of the disclosed device is to provide a protective carrying case for the foldable keyboard when it is not in use. Therefore, the device can be collapsed into a box shape that can accommodate the folded keyboard. Yet another goal is to design a device that is simple, easy to construct, and inexpensive.

SUMMARY OF THE INVENTION

[0010] The invention described herein addresses a need found in the market for accessories for handheld computers. The disclosed device provides a rigid working platform upon which a foldable keyboard can be mounted and operated. It doubles as a carrying case for the keyboard. The working platform has dimensions approximately equal to, or greater than, the outer dimensions of the fully expanded keyboard with a handheld computer attached to it. The carrying case has interior dimensions equal to, or slightly greater than, the dimensions of the folded keyboard. The device has a plurality of thin rigid panels that are hingedly connected. The panels can be arranged in two configurations: a closed configuration in which the panels form a box into which the folded keyboard can be inserted and a locked configuration in which the panels lock into a rigid planar surface upon which the keyboard can be mounted and operated. Means are provided for securing the panels in the closed and locked configurations.

[0011] The preferred embodiment of the invention has seven panels constructed of a thin, strong, lightweight material such as aluminum that are connected with hinges. Magnets and spring hinges are used to maintain the panels in the closed box configuration. When the user wants to operate the keyboard, the panels can easily be released and laid flat to provide a working surface for the keyboard. A means for securing the keyboard to the top face of the invention, such as a spring clip, is provided. Stiffeners are positioned on the bottom faces of one or more panels. The stiffeners can be moved into a locked position so that they cross the junction between one or more panels and, thus, hold the panels firmly in a rigid, flat configuration.
stiffeners can also be moved into a closed position so that the panels can be folded back into the folded box configuration.

**BRIEF DESCRIPTION OF THE DRAWINGS**

[0012] FIG. 1 provides a plan view of the top of the preferred device in the fully expanded configuration.

[0013] FIG. 2 provides a plan view of the bottom of the preferred device in the fully expanded configuration.

[0014] FIG. 3 shows a right side elevation of the preferred device in the fully expanded configuration.

[0015] FIG. 4 shows a front elevation of the preferred device with the stiffeners in the locked configuration.

[0016] FIG. 5 shows a front elevation of the preferred device with the stiffeners ready for folding.

[0017] FIG. 6 shows a front elevation of the preferred device when it is being folded.

[0018] FIG. 7 shows a side elevation of the preferred device in the folded configuration with the right panel removed.

[0019] FIG. 8 shows a side elevation of the preferred device in the fully folded configuration.

[0020] FIG. 9 provides a plan view of the device expanded to accept a keyboard.

[0021] FIG. 10 provides a plan view of the bottom of the alternative embodiment with the stiffeners in the locked configuration.

[0022] FIG. 11 provides a plan view of the bottom of the alternative embodiment with the stiffeners ready for folding.

**DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT**

[0023] The invention consists of a series of lightweight panels hingedly connected to each other to form a flat working surface in one configuration, the “expanded” configuration, and an enclosure for a foldable keyboard in another configuration, the “closed” configuration. When it is in the expanded configuration, the device has dimensions at least slightly larger than the dimensions of a foldable keyboard such as a Targus Stowaway®. FIG. 1 shows the preferred embodiment of the invention in the expanded configuration. FIG. 8 shows a right side view of the invention in the closed configuration. FIG. 7 shows the same view with the right panel removed. As shown in FIG. 1, the preferred embodiment has seven panels: a clip panel 1, a front panel 2, a bottom panel 3, a back panel 4, a top panel 5, a right panel 6, and a left panel 7. These panels are constructed of a thin, still, lightweight, nonmagnetic material, such as aluminum. The length and width dimensions of the clip panel 1, front panel 2, and back panel 4, are slightly larger than the length and width of the foldable keyboard when it is in its folded configuration. The width of the bottom panel 3 and the top panel 5 are slightly larger than the depth of the folded keyboard. As shown in FIG. 1, a spring clip 8 of sufficient size to hold the keyboard in place is mounted on the top face of the clip panel 1.

[0024] The panels are connected to each other by small hinges. The front panel 2, bottom panel 3, back panel 4, and top panel 5 are all connected by small piano-style hinges 9. As shown in FIG. 4, these hinges 9 have low profiles to minimize interference with the keyboard when it is placed on the face of the device. The left panel 7 is connected to the front panel with two small, stiff spring hinges 11. Similarly, the right panel 6 is connected to the top panel 5 with a spring hinge 11. The front panel 2 is connected to the clip panel 1 with a small piano-style hinge 10 constructed of a magnetic material. Magnetic hinge 10 is mounted so that it extends beyond the edges of the front panel 2 and the clip panel 1 when the two panels are folded against each other as shown in FIG. 7. Small, high-powered magnets 14 are embedded in the right edge of the top panel 5 so that when the device is in the closed configuration, the magnets 14 engage hinge 10 and hold the device firmly in the closed configuration. The magnets 14 are embedded in the top panel 5 so that they are flush with the right edge and planar surfaces of the top panel 5 as shown in FIG.’s 1, 2 and 3. Also, two magnets 12 are mounted on the bottom side of the clip panel 1 as shown in FIG. 2. Two magnet pads 13 are mounted in corresponding positions on the bottom side of the front panel 2 so that, when the device is in the closed configuration, the clip panel magnets 12 come into contact with the magnet pads 13. The magnet pads 13 are made of a magnetic material, such as carbon steel.

[0025] A means for maintaining the device in a flat, stiffened condition for laptop use is necessary. Otherwise, the device would fold in onto itself and collapse when it was placed on the lap of the user or on some other uneven surface. Stiffening of the device is accomplished by the use of stiffeners 15 installed on the bottom face of the device as shown in FIG. 2. The preferred device has four stiffeners 15 mounted on the bottom face of the front panel 2. Each stiffener 15 is constructed of a thin, strong, magnetic material. The stiffeners 15 are pivotally mounted on the front panel 2. A pivot pin 17 is attached to one end of each stiffener 15 and mounted through the front panel 2, allowing the stiffeners to swing between a locked position (when the device is locked in the expanded configuration) and a closed position (when the device is in the closed configuration). Note that FIG. 2 shows the stiffeners 15 in the locked position and their closed positions are indicated by the dashed lines in FIG. 2. Eight stiffener stops 16 are positioned on the bottom face of the device so that one stiffener stop 16 is contacting each stiffener 15 when that stiffener is in either the locked or closed position as shown in FIG. 2. The stiffener stops 16 are small high-powered magnets that will firmly hold the stiffeners 15 in place when the stiffeners are in either the locked or closed positions. FIG. 4 shows a front elevation of the device with the stiffeners 15 in the locked position. FIG. 5 shows a front elevation of the device with the stiffeners 15 in the closed position, ready for folding.

[0026] In operation, the invention is designed to be used in two configurations, as discussed above. First, when it is in the expanded configuration, the device is ready to be used as a base upon which a foldable keyboard, such as a Targus Stowaway®, can be mounted. In this configuration, the foldable keyboard can be mounted on the device and operated while it is sitting on the user’s lap or some other uneven surface. For example, the device can be useful to a person who wants to use his or her foldable keyboard on a soft bed that would yield whenever the person pressed a key if the
device wasn’t being used. The foldable keyboard is mounted to the device by placing the left edge of the keyboard under the clip 8.

[0027] The spring hinge 11 connecting the right panel 6 to the top panel 5 is positioned to hold the face of the right panel 6 flat against the face of the top panel 5 when the device is in the expanded configuration. The minimal thickness of the panels 5 and 6 will prevent them from interfering with the keyboard when it is mounted on the device. FIG. 9 shows the device ready to accept the keyboard, having the right panel 6 lying flat against the top panel 5. Similarly the spring hinges 11 connecting the left panel 7 to the front panel 2 are positioned to hold the face of the left panel 7 flat against the face of the front panel 2 when the device is in the expanded configuration. However, if a handheld computer is mounted to the keyboard, it will typically be positioned in way of the left panel 7. If so, the computer will hold the left panel 7 down in its expanded position. Alternatively, in the absence of a computer, the left panel 7 will lay flat against the front panel 2 and not interfere with the keyboard when it is mounted on the device.

[0028] To lock the device in the expanded configuration, the stiffeners 15 are swung out into their locked positions where they will come into contact with the stiffener stops 16, as shown in FIG. 2. Being magnets, the stiffener stops 16 will hold the stiffeners 15 firmly in their locked positions until they are manually swung away from the stiffener stops 16 by the user when ready to fold up the device.

[0029] When the user is finished with the keyboard (and handheld computer), the device is folded up to form a carrier for the keyboard as follows. First, the keyboard is removed from under the clip 8 and folded into its folded configuration. Next, the stiffeners 15 are rotated into their closed positions as indicated by the dashed lines in FIG. 2. Stiffener stops 16 engage the stiffeners 15 and firmly hold them in their closed positions.

[0030] The user can then fold the device into its folded configuration. FIG. 6 shows the direction in which panels 1-5 rotate. Note that, in order to fold the top panel 5, the right panel 6 will have to be pulled away from the top panel 5 and held in the open position against the force of the spring hinge 11 as shown in FIG. 1. Similarly, the left panel 7 will have to be held in the open position in order to fold the clip panel 1 and the bottom panel 3. Also note that the hinges 9 are designed to limit the rotation of the panels to a maximum 90 degree angle of rotation. Hinge 10 is not so limited and will allow the clip panel 1 to be rotated 180 degrees until it's magnets 12 contact the magnet pads 13 on the front panel 2.

[0031] When the clip panel 1 is folded against the front panel 2, the clip panel magnets 12 will engage the magnet pads 13, thereby holding the clip panel 1 firmly against the front panel 2 until it is pulled away by the user. Also, when the clip panel 1 is folded against the front panel 2, the stiffeners 15 will be covered by the clip panel 1 and, therefore, will be out of sight and protected from unintentional damage or snagging. Finally, after folding the clip panel 1 and front panel 2, the clip panel hinge 10 will extend beyond the edges of the two panels as shown in FIG.'s 7 and 8. When the device is in the folded configuration, the magnets 14 on the top panel 5 will engage the clip panel hinge 10 and hold the device firmly in the folded configuration.

[0032] After panels 1-5 are rotated into their folded positions, the right panel 6 and the left panel 7 can be released. The spring hinges 11 will cause the right panel 6 and left panel 7 to snap shut against the edges of the front panel 2, the bottom panel 3, and the back panel 4, thus completing the closed box shown in FIG. 8. The interior dimensions of the closed box will be slightly greater than the dimensions of the folded keyboard. The user can place the folded keyboard inside the box, or “carrying case”, by pulling open either the right panel 6 or the left panel 7 and inserting the keyboard.

[0033] An alternative embodiment of the invention is shown in FIG.'s 10 and 11. In this embodiment, stiffener grooves 19 are cut into the bottoms of the clip panel 1, front panel 2, bottom panel 3, and back panel 4. Stiffeners 18 are disposed in the stiffener grooves 19 and are allowed to slide horizontally within the grooves. As in the preferred embodiment described above, stiffener stops 16 consisting of small magnets, are used to hold the stiffeners 18 in the locked and closed positions. One stiffener stop 16 is installed at each end of each stiffener groove 19. FIG. 10 shows the stiffeners 18 in their locked positions. FIG. 11 shows the stiffeners 18 in their closed positions.

[0034] While the preferred embodiment and one alternative embodiment of the present invention is described above, it should be understood that it has been presented by way of example and not limitation. It will become apparent to those skilled in the art that equivalent alternative embodiments are possible. It is intended that all such alternative embodiments shall be covered by the claims set forth herein.

I claim:
1. A device for holding and carrying a foldable keyboard comprising:
   a. a plurality of panels, having top faces and bottom faces, hingedly connected to form a planar surface configuration having dimensions at least equal to the dimensions of a foldable computer keyboard in its expanded configuration; and
   b. a plurality of movable stiffeners disposed on the bottom faces of said panels;

   wherein said panels can fold into a box configuration having interior dimensions greater than the exterior dimensions of said keyboard when it is in its folded configuration; and wherein each of said stiffeners has a locked position that holds said panels in said planar surface configuration and a closed position that allows said panels to be folded into said box configuration.

2. The device of claim 1, further comprising means for holding said panels in said box configuration.

3. The device of claim 1, further comprising means for holding said keyboard on the top faces of said panels when said panels are in said planar surface configuration.

4. A device for holding and carrying a foldable keyboard comprising:
   a. a clip panel, having a top face, a bottom face, a left edge, and a right edge;
   b. a front panel, having a top face, a bottom face, a left edge, a right edge, and a top edge, said left edge of said front panel hingedly coupled to said right edge of said clip panel;
c. a bottom panel, having a top face, a bottom face, a left edge, and a right edge, said left edge of said bottom panel hingedly connected to said right edge of said front panel;

d. a back panel, having a top face, a bottom face, a left edge, and a right edge, said left edge of said back panel hingedly connected to said right edge of said bottom panel;

e. a top panel, having a top face, a bottom face, a left edge, a right edge, and a bottom edge, said left edge of said top panel hingedly connected to said right edge of said back panel;

f. a right panel, having a top face, a bottom face, and a top edge, said top edge of said right panel hingedly connected to said bottom edge of said top panel;

g. a left panel, having a top face, a bottom face, and a bottom edge, said bottom edge of said left panel hingedly connected to said top edge of said front panel;

wherein said clip panel, said front panel, said bottom panel, said back panel, said top panel, said right panel, and said left panel alternately form a box when folded into a first configuration and a flat, planar surface when unfolded into a second configuration; said box having interior dimensions greater than the dimensions of an area encompassing a foldable keyboard in its folded configuration.

5. The device of claim 4, further comprising means for holding said foldable keyboard on the top faces of said panels when said panels are in the planar surface configuration.

6. The device of claim 4, further comprising means for holding said panels in said first configuration and means for holding said panels in said second configuration.

7. The device of claim 4, further comprising:

   a. a plurality of stiffeners mounted on one or more of said panels, wherein

   i. each of said stiffeners has a locked position when said panels are in said second configuration and wherein each of said stiffeners lies across at least two of said panels and prevents said panels from folding into said first configuration,