An apparatus comprising a shaft, a member and a lever coupled with the member, wherein a sloped portion of the lever is in contact with a first end of the shaft. A second end of the shaft receives applied pressure and, as a result of the applied pressure, moves along the sloped portion of the lever to apply a force to the lever. The sloped portion of the lever receives the force and, as a result of the force, the lever deflects to pull the member a distance along the axis of the member.
FIG. 3
TABLET COMPUTER SYSTEM WITH A DETACHABLE BASE

TECHNICAL FIELD OF THE INVENTION

[0001] Embodiments of the invention are generally related to the field of computer systems and, in particular, to a tablet computer system with a detachable base.

BACKGROUND OF THE INVENTION

[0002] In general, a laptop computer, sometimes referred to as a notebook computer, is a lightweight, battery-powered or AC-powered computer system. A laptop computer can be transported and used by a user who has the opportunity to operate the laptop and/or work environments, e.g., on an airplane, in a library or lecture hall or at a meeting, change.

[0003] A laptop computer generally includes a display screen enclosed in a casing, the bottom edge of which is coupled in a hinged manner with a top edge of another casing that includes a keyboard. The keyboard casing typically houses the laptop’s internal components, e.g., one or more processors, static and dynamic memory, buses, and disc drives, as well as connections for peripheral devices such as a printer, and a battery.

[0004] Because of the hinged coupling, the laptop computer’s display screen casing can be folded down over the keyboard casing, and latched to keep the laptop closed. This makes the laptop relatively thin and compact, and thus transportable. The latching mechanism typically includes one or more latches on the display screen casing, and one or more corresponding slots in the keyboard casing. Inside of a slot in the keyboard casing is a cavity compatible in size with the edge of a hook on the display screen casing. When the display screen casing is folded down over the keyboard casing, a hook slips vertically into a corresponding slot. The edge of the hook then slides horizontally into the cavity on the inside of the slot, thereby latching the laptop shut.

[0005] Typically, when the user wants to open a closed laptop, the user slides horizontally one or more latches on an edge of the display screen casing. The button is connected with a hook, so that when the user slides a button horizontally, the edge of the hook slides horizontally out of the cavity on the inside of the slot. The user then flips open the keyboard casing, thereby removing a hook from a slot and opening the laptop.

[0006] A hook used in the latching mechanism for closing laptop computers are typically thin, sharp and hard. When the laptop computer is open, a hook typically protrudes perpendicular to the surface of the display screen. Consequently, a person’s sleeve or other clothing can get caught in a hook, or worse, the hook can cut a person whose exposed skin comes into contact with the hook. In addition, if a hook is bent, it may not properly align with a slot, making it difficult to close and latch the laptop.

[0007] An alternative latching mechanism utilizes one or more magnets, wherein magnets in the upper corners of the display panel casing align with a corresponding metallic material in the keyboard casing. When the laptop is closed, a metallic surface magnetically couples with a magnet, thereby latching the laptop closed. However, when a person wants to open a magnetically latched laptop, the person must manually apply a force to pull the display panel casing away from the keyboard casing. The amount of force necessary to separate the casings may prevent a person who is not strong enough from opening the laptop, or may prevent a person who lacks the manual dexterity, for example, because of an injured hand(s), arthritis or other condition, from opening the laptop.

[0008] In general, a tablet computer is a computer system that allows a user to input data and commands by moving a digital pen over a display screen, rather than by using a keyboard, thus eliminating the need for a keyboard. The tablet computer uses digital ink and handwriting recognition software to allow a user to write on the display screen as if writing on a piece of paper. Handwritten material can be edited and revised using the digital pen, or can be converted into a text document.

[0009] A tablet computer is generally even more compact and easier to transport than a laptop, because the internal components reside in the display screen casing, since there is no keyboard. In addition, a tablet computer typically provides most of the same functionality as a laptop. Thus, a tablet computer is capable of being a user’s primary personal computer system, as well as a note-taking device. Furthermore, because a tablet computer includes a display screen, no keyboard, the tablet computer does not close like a laptop, and therefore does not include a magnetic or hook-based latching mechanism. However, a user may be reluctant to rely on a digital pen and handwriting recognition software as the sole option for entering data on a personal computer, especially if the digital pen is ever lost or damaged.

[0010] In addition, the digital pen for a tablet computer typically is stored in a vertical space located in a corner on the top edge of the tablet computer. In order to remove the digital pen from the vertical space, a user typically must slide the user’s finger along the side of the tablet computer, in a small space providing access to the surface of the digital pen. This method of accessing the digital pen can be cumbersome and inconvenient.

BRIEF DESCRIPTION OF THE DRAWINGS

[0011] Embodiments of the invention are illustrated by way of example, and not by way of limitation, in the figures of the accompanying drawings in which like reference numerals refer to similar elements.

[0012] FIGS. 1A, 1B, 1C and 1D are illustrations of configurations of one embodiment of a tablet computer system.

[0013] FIG. 2 is an illustration of another configuration of one embodiment of a tablet computer system.

[0014] FIG. 3 is an illustration of yet another configuration of one embodiment of a tablet computer system.

[0015] FIG. 4 is a block diagram illustrating one embodiment of internal components of a tablet computer system.

[0016] FIGS. 5A and 5B are illustrations of one embodiment of portions of a tablet computer system.

[0017] FIGS. 6A and 6B are illustrations of one embodiment of an opening mechanism of a tablet computer system.

[0018] FIGS. 7A and 7B are illustrations of one embodiment of a pen ejector mechanism of a tablet computer system.
DETAILED DESCRIPTION OF THE INVENTION

[0019] A tablet computer system with a detachable base is described. In the following description, for purposes of explanation, numerous specific details are set forth. It will be apparent, however, to one skilled in the art that embodiments of the invention can be practiced without these specific details. In other instances, structures and devices are shown in block diagram form in order to avoid obscuring the understanding of this description.

[0020] FIGS. 1A, 1B, 1C and 1D are illustrations of configurations of one embodiment of a tablet computer system. Tablet computer system 10 includes tablet component 100 detachably coupled, via attachment mechanism 105, with base 200. In one embodiment, attachment mechanism 105 comprises a connector (not shown) on base 200 inserted into a receptacle (not shown) on tablet component 100. In another embodiment, the connector is on tablet component 100, while to receptacle is on base 200. Attachment mechanism 105 may be any coupling system that allows tablet component 100 to detachably couple with base 200, and transmit signals, for example, from a keyboard, mouse or other input device, from base 200 to tablet component 100. Alternatively, base 200 is not detachable from tablet component 100.

[0021] Tablet component 100 includes display screen 110, which receives input from a user via digital pen 300, commonly referred to as a stylus. Display screen 110 is digital-pen sensitive computer display panel. Display screen 110 allows a user to input data and communicate commands to tablet computer system 10 by writing, as if writing on a piece of paper, or touching pictures or words on display screen 110. Digital pen 300 is an input device used to write text, draw, and touch pictures or words on display screen 110. Display screen 110 and digital pen 300 are intended to represent any number of display screens and digital pens, respectively, known in the art, and thus are not described in greater detail herein.

[0022] Tablet component 100 further includes cavities 120. In one embodiment, tablet component 100 includes two cavities 120. However, tablet component 100 may include any number of cavities 120. Cavities 120 include members. An example of a member 140 is shown in FIG. 5A. As explained in more detail below, when tablet component 100 is closed to cover base 200, as illustrated in FIG. 1D, cavities 120 cover protruding elements, which include magnets. An example of a protruding element is shown in FIG. 5B.

[0023] As a result of tablet component 100 covering base 200, members 140 magnetically couple with the magnets within protruding elements 220 to hold tablet computer system 10 closed. Members 140 can be any size or shape, for example, a short rod, a thin cube, a small disk. In one embodiment, members 140 are metal rods. In another embodiment, members 140 are magnets with polarities opposite of the polarities of the magnets in protruding element 220. In one embodiment, cavities 120 and members 140 are located in tablet component 100, while protruding elements 220 and their magnets are located in base 200. In an alternative embodiment, protruding elements 220 and their magnets are located in tablet component 100, while cavities 120 and members 140 are located in base 200.

[0024] Tablet component 100 further includes button 130. As explained in more detail below, when tablet component 100 is closed to cover base 200, a user can press button 130, to decouple members 140 from magnets in protruding elements 220, so that the user can open tablet computer system 10.

[0025] FIG. 2 is an illustration of another configuration of one embodiment of a tablet computer system. Base 200 includes alphanumeric keyboard 210, to input data and communicate commands to tablet computer system 10, for display on display screen 110. Base 200 may include additional input devices, e.g., a mouse or a trackball.

[0026] Base 200 further includes protruding elements 220. In one embodiment, base 200 includes two protruding elements 220. However, base 200 may include any number of protruding elements 220, each corresponding with a cavity 120 in tablet component 100, as illustrated in FIG. 2. As stated previously, protruding elements 220 include magnets (not shown).

[0027] Tablet computer system 10 is capable of being used in multiple configurations. As illustrated in FIG. 1A and FIG. 2, tablet component 100 may be coupled with base 200, to allow a user to input data and communicate commands via alphanumeric keyboard 210. In addition, as illustrated in FIG. 1B, base 200 may be folded behind tablet component 100, to allow a user to input data and communicate commands using digital pen 300, while still having the option to unfold base 200 to utilize keyboard 210. Finally, as illustrated in FIG. 3, tablet component 100 may be decoupled from base 200, to allow a user to input data and communication commands solely via digital pen 300. The ability to use tablet computer system 10 in these various configurations allows it to be a user's primary personal computer system, as well as a note-taking device, even for users who want the features of a tablet computer, without losing the ability to input data and communicate commands via an alphanumeric keyboard.

[0028] FIG. 4 is a block diagram of one embodiment of various internal components of tablet computer system 10. For purposes of illustration and ease of explanation, tablet computer system 10 includes the components described below. However, other embodiments of tablet computer system 10 can include more, fewer and/or different components.

[0029] Tablet computer system 10 includes a bus 410 or other communication device to communicate information, and processor 420 coupled to bus 410 to process information. While tablet computer system 10 is illustrated with a single processor, tablet computer system 10 can include multiple processors and/or co-processors.

[0030] Tablet computer system 10 further includes random access memory (RAM) or other dynamic storage device 430 (referred to as memory), coupled to bus 410 to store information and instructions to be executed by processor 420. Memory 430 also can be used to store temporary variables or other intermediate information while processor 420 is executing instructions. Tablet computer system 10 also includes read-only memory (ROM) and/or other static storage device 440 coupled to bus 410 to store static information and instructions for processor 420, such as handwriting recognition software.
In addition, data storage device 450 is coupled to bus 410 to store information and instructions. Data storage device 450 may comprise a magnetic disk (e.g., a hard disk), optical disc (e.g., a CD-ROM) and/or digital versatile disc (DVD), and corresponding drive. Tablet computer system 10 further includes one or more antennae 460 and/or network interface 470, to provide via wireless and/or wired connections, respectively, access to a network, such as a personal area network, local area network and/or wide area network.

Instructions are provided to memory from a machine-accessible medium, or an external storage device accessible via a remote connection (e.g., over a network via antenna 460 and/or network interface 470) providing access to one or more electronically-accessible media, etc. A machine-accessible medium includes any mechanism that provides (i.e., stores and/or transmits) information in a form readable by a machine (e.g., a computer). For example, a machine-accessible medium includes RAM; ROM; magnetic or optical storage medium; flash memory devices; electrical, optical, acoustical or other form of propagated signals (e.g., carrier waves, infrared signals, digital signals); etc.

In alternative embodiments, hard-wired circuitry can be used in place of or in combination with software instructions in embodiments of the present invention. Thus, the embodiments of the present invention are not limited to any specific combination of hardware circuitry and software instructions.

FIGS. 6A and 6B are illustrations of one embodiment of an opening mechanism of a tablet computer system. Opening mechanism 20 includes button 130, located on the outer end of a shaft (not shown). Inner end 132 of the shaft is in contact with upward slope 135 of lever 134. For purposes of illustration and ease of explanation, inner end 132 of the shaft is described as being in contact with lever 134. However, inner end 132 of the shaft may be initially not in contact with lever 134, and come into contact with lever 134 as the shaft moves. Another portion (not shown) of lever 134 is coupled with member 140.

As explained previously, when tablet computer system 10 is closed, as shown in FIG. 1D, cavities 120 cover protruding elements 220. Consequently, magnetic forces couples members 140 with magnets in protruding elements 220. When a user wants to open tablet computer system 10, the user presses button 130. As a result, the shaft moves a certain distance linearly inward along its axis, the distance being at least a portion of the distance, referred to herein as slope length 136, from where upward slope 135 begins to where upward slope 135 ends. As the shaft moves inward, inner end 132 slides along upward slope 135. As a result of inner end 132 sliding along upward slope 135, the shaft causes lever 134 to deflect a certain distance downward, the distance downward being at a portion of the height, referred to herein as slope height 138, from the bottom of lever 134 to the top edge of upward slope 135. This is the reason for sloping the surface of lever 134 upward, i.e., to allow the shaft to, in effect, press lever 134 downward.

As lever 134 deflects downward, the portion of lever 134 coupled with member 140 pulls member 140 linearly along the axis of member 140, with sufficient force to overcome the magnetic force coupling member 140 with the magnet within protruding element 220, and for a sufficient distance, corresponding to at least a portion of slope height 138, to decouple members 140 from the magnets. As a result, a user is able to open tablet computer system 10.

Opening mechanism 20 further may include a shaft spring (not shown), a lever spring (not shown) and a member spring (not shown). The shaft spring, coupled with the shaft, compresses as a result of a user pressing button 130, and decompresses, when the user releases button 130, to cause the shaft to move a distance corresponding to at least a portion of slope length 136 linearly outward along the axis of the shaft. The lever spring, coupled with lever 134, compresses as a result of lever 134 deflecting downward, and decompresses, when the shaft moves linearly outward, to cause lever 134 to move a distance corresponding to at least a portion of the slope height 138 upward. Finally, the member spring, coupled with a member 140, compresses as a result of lever 134 pulling member 140, and decompresses, when lever 134 moves upward, to cause member 140 to move back a distance corresponding to at least a portion of the slope height 138, along the axis of members 140 in the opposite direction lever 134 pulled members 140 to decouple members 140 from the magnets.

Opening mechanism 20 does not utilize a hook-based latching mechanism to keep tablet computer system 10 closed, and thus avoids the potential of damage or injury caused by a hook, or damage to the hook itself. Furthermore, although opening mechanism 20 utilizes a magnet latch to keep tablet computer system 10 closed, a person who wants to open tablet computer system 10 can use button 130 to decouple members 140 from the magnets in protruding elements 220, rather than manually applying a force to decouple members 140 from the magnets.

FIGS. 7A and 7B are illustrations of one embodiment of a pen ejector mechanism of a tablet computer system. Tablet component 100 includes cavity 150, to receive digital pen 300, and a pen eject mechanism, to release digital pen 300 from cavity 150. In particular the pen eject mechanism includes spring 160 at the inner end of cavity 150. Spring 160 compresses when digital pen 300 is inserted into cavity 150.

The pen eject mechanism further includes latch 170, which rests against latch-stop 180. Latch end 175 of latch 170 holds digital pen 300 in cavity 150, once digital pen 300 is inserted into cavity 150. When a user wants to eject digital pen 300 from cavity 150, the user applies a force to latch 170, away from cavity 150. As a result of the applied force, latch end 175 slides away from cavity 150, which allows spring 160 to decompress, thereby ejecting digital pen 300 from cavity 150.

In one embodiment, the pen eject mechanism further may include a latch spring (not shown), which compresses when the user applies the force, and decompresses, when application of the forces, to cause latch 170 to slide back towards cavity 150 until latch 170 hits latch-stop 180. Therefore, the pen ejector mechanism allows a user to remove digital pen 300 from cavity 150 without the user having to slide the user’s finger upward along the side of tablet component 100, in a small space providing access to the surface of digital pen 300.

In an alternative embodiment, cavity 150 includes one or more magnets at its inner end, or some other location,
and digital pen 300 also includes one or more magnets with the same polarity as the magnet at the end of cavity 150. Latch 170 holds digital pen 300 in cavity 150 as described previously. When a user slides latch 170 away from cavity 150, digital pen 300 repels the magnetic force of the magnet at the end of cavity 150, thereby causing digital pen 300 to move out of cavity 150. Alternatively, latch 170 may be used to eject a digital pen 300 by reversing the polarity of a magnet in cavity 150, wherein the magnet in cavity 150 couples with a magnet included in digital pen 300 to hold digital pen 300 in cavity 150.

[0043] Reference in the foregoing specification to “one embodiment” or “an embodiment” means that a particular feature, structure, or characteristic described in connection with the embodiment is included in at least one embodiment of the invention. The appearances of the phrase “in one embodiment” in various places in the specification are not necessarily all referring to the same embodiment.

[0044] In the foregoing specification, the invention has been described with reference to specific embodiments thereof. It will, however, be evident that various modifications and changes can be made thereto without departing from the broader spirit and scope of the invention. The specification and drawings are, accordingly, to be regarded in an illustrative rather than a restrictive sense.

What is claimed is:

1. An apparatus comprising:
   a shaft;
   a member;
   a lever, coupled with the member, and a sloped portion of the lever to contact a first end of the shaft, the sloped portion to receive a force from the shaft, and as a result of the force, the lever to deflect, and pull the member along the axis of the member a distance; and
   a second end of the shaft, to receive applied pressure, and as a result of the applied pressure, the shaft to move along the sloped portion of the lever, to apply the force to the lever.

2. The apparatus of claim 1, further comprising:
   a spring, coupled with the shaft, to compress, as a result of the applied pressure, and to decompress, when the applied pressure is relieved, to cause the shaft to move along the axis of the shaft.

3. The apparatus of claim 2, further comprising:
   another spring, coupled with the lever, to compress, as a result of the lever deflecting, and to decompress, when the shaft moves along the axis of the shaft, to cause the lever to move upward.

4. The apparatus of claim 3, further comprising:
   a different spring, coupled with the member, to compress, as a result of the lever pulling the member, and to decompress, when the lever moves upward, to cause the member to move the distance along the axis of the member in an opposite direction of a direction the member was pulled.

5. A system, comprising:
   a tablet computer system, to have a tablet component detachably coupled with a base component, the tablet component to cover the base component when the tablet computer system is closed;
   the base component, to include a keyboard to transmit signals to be received by the tablet computer system, the base component further to include at least one protruding element, the at least one protruding element to include a magnet;
   the tablet component, to include at least one cavity aligned with the at least one protruding element, the at least one cavity to include a member, the at least one cavity to cover the at least one protruding element, and the member to couple with the magnet, when the tablet component covers the base component, the tablet component to further include a button on the outer end of a shaft, the button to receive applied pressure, an inner end of the shaft to slide along an upwardly sloped surface of a lever, to cause the lever to deflect downward, to pull the member, to cause the member to decouple from the magnet, wherein the lever is coupled with the member.

6. The system of claim 5, wherein the member comprises a metal rod.

7. The system of claim 5, wherein the member comprises another magnet.

8. A computer system, comprising:
   a tablet component covering a base component, the tablet component including a member, to couple with a magnet, and a button, coupled with the member, to receive applied pressure, to decouple the member from the magnet; and
   the base component, detachably coupled with the tablet component, the base component including the magnet.

9. The computer system of claim 8, wherein the member comprises a metal rod.

10. The computer system of claim 8, wherein the tablet component further includes a pen cavity, to receive a digital pen.

11. The computer system of claim 10, wherein the tablet component further includes a pen eject mechanism, to release a pen from the pen cavity.

12. The computer system of claim 11, wherein the pen eject mechanism comprises:
   a spring at an inner end of the pen cavity, to compress when the pen is pushed into an outer end of the cavity, the spring to decompress when the pen is released from the outer end of the cavity;
   a latch, to hold the pen in the pen cavity when the pen is inserted into the pen cavity, the latch to receive a force applied in a direction away from the pen cavity, the latch to slide the distance away from the pen cavity as a result of the pressure, and release pen from the cavity.

13. The apparatus of claim 12, further comprising another spring, coupled with the latch, to compress when the latch receives the force, and to decompress, when the force ceases, to cause the latch to slide the distance back towards the pen cavity.

14. A method comprising:
   coupling, by a metal rod, with a magnet;
   moving, by a shaft, a distance inward, as a result of receiving the pressure;
sliding, by an inner end of the shaft, along a sloped surface of a lever;
deflecting, by a portion of the lever, another distance, as a result of the inner end of the shaft sliding along the sloped surface;
pulling, by another portion of the lever, the metal rod, as a result of the lever deflecting; and
moving, by the metal rod, a different distance away from the magnet, as a result of the pulling; and
decoupling, by the metal rod, from the magnet, as a result of moving the different distance.

15. The method of claim 14, further comprising receiving, by an outer end of the shaft, a pressure.
16. The method of claim 14, wherein sliding, by the inner end of the shaft, along the sloped surface of the lever comprises sliding, by the inner end of the shaft, along an upwardly sloped surface of the lever.
17. The method of claim 14, further comprising:
compressing, by a spring coupled with the shaft, when the shaft moves the distance in a direction;
decompressing, by the spring, when the pressure is removed from the shaft; and
causing, as a result of decompressing, the shaft to move the distance in an opposite direction.

18. A method, comprising:
receiving, by a cavity, a pen inserted into the cavity;
compressing, by a spring at the end of the cavity, as a result of receiving the pen;
holding, by a latch, the pen in the cavity;
receiving, by the latch, a force;
sliding, by the latch, a distance in a direction, as a result of the force;
releasing, by the latch, the pen, as a result of sliding the distance;
decompressing, by the spring, as a result of the pen being released;
pushing, by the spring, a tip of the pen, as a result of decompressing; and
 ejecting, by the spring, the pen from a cavity, as a result of pushing the tip of the pen.

19. The method of claim 18, further comprising:
compressing, by another spring coupled with the latch, as a result of the latch sliding the distance in the direction;
decompressing, by the another spring, when the force is removed; and
causing, as a result of decompressing, the latch to slide the distance in the opposite direction.

20. The method of claim 18, wherein receiving, by the latch, the force comprises receiving, by the latch, a force in a direction away from the pen cavity.