

[0118] The Pointing Device

[0119] FIGS. 3 and 4 show one embodiment of a pointing device from two different views. Starting with FIG. 3, the pointing device 200 has internal components (not shown) which convert the user's input into electrical signals which pass through the cable 204 to connect directly or indirectly with a computer 300 through a suitable connection port such as a mouse port. While cable 204 is shown at the wrist end of the pointing device 200, this is not a restriction inherent to the invention as the cable 204 could exit from another part of the housing, including, but not limited to, the opposite end of the housing. The computer 300 having computer memory 304 and a computer processor 308. The computer 300 enables the display of a computer display image 312 with position icon 316. As discussed above, the shape of the position icon can be any shape that is useful to indicate a precise point on the display screen. For a text based application, a cursor is sufficient. Other applications may use a cross hair as the position icon. The creation of the displayed image is handled by conventional hardware and software. Many computers use graphical user interfaces ("GUIs") which use windows in the displayed image. Portions of files can be viewed in the one or more windows of the displayed image.

[0120] In FIG. 3, the file providing the material being displayed contains an image of a five pointed star. With the magnification level being used, only a portion of the star fits in the window which is set to be the same size as the displayed image. The pointing device 200, like the prior pointing devices such as a mouse, can be used to provide user input to move the selected portion of the file towards the top or bottom of the file or for files that are wider than the current window on the display, the user can move the file to view material to the right or the left of the material displayed in the current window.

[0121] The computer is likely to have a keyboard 320 for the input of text. In some computer systems the pointing device 200 may be connected to the computer 300 through a connection in the keyboard 320.

[0122] FIG. 3 shows pointing device 200 without a hand. The pointing device 200 can be divided into two major portions a vertical platform 206 for mounting the x-y input device 212 and a fairly horizontal main body 214. The terms vertical and horizontal relate to the general orientation of the device when used in the manner shown in FIG. 2. Nothing within this patent constrains the user or the scope of the claims to a device that is being held at a given time in an orientation that puts the main body 214 with respect to the floor of the building or some other reference point. Further, while the terms vertical and horizontal are useful in pointing out and referencing the subcomponents of the housing body, the two sub-components need not form a 90 degree angle. One of the preferred embodiments has an angle between these two components of approximately 106 degrees which in this context is substantially perpendicular. The long axis of the main body 214 will be substantially parallel to the axis of the extended thumb (see for example FIG. 12). The vertical platform 206 will be substantially perpendicular to the long axis of the main body 214.

[0123] In this case, the vertical platform 206 includes a flat, rectangular box rimmed on the front with a rectangular bezel that frames a rectangular touchpad FIG. 3 reveals the

thumb platform 208 which provides a convertible home position for the thumb 104. As shown in FIG. 2, the thumb 104 is positioned so that with minor extensions the thumb tip 124 can contact the x-y input device 212. In the embodiment shown in FIG. 2, the x-y input device 212 is a touchpad. Alternative hardware for use in the x-y input device is discussed below.

[0124] As best seen in FIG. 4, the pointing device 200 has molded channels for index finger 216 and molded channel for middle finger 220 for the index finger 108 and middle finger 112, respectively. These channels help the user to instinctively position the device properly within the hand and to align those fingers with their intended "mouse button" switches. In the portion of the molded channel for index finger 216 where the pad for the index finger of a user would be, is a first zero force touchswitch for index finger 224. In the portion of the molded channel for middle finger 220 where the pad of the middle finger 112 of a user would be, is a second zero force touchswitch for middle finger 228. Zero force touch switch for middle finger 228 is also visible in FIG. 3. A scroll select touch switch 232 is located away from the thumb platform 208. The scroll select touch switch 232 is visible in FIG. 13.

[0125] The Use of the Thumb Tip

[0126] Like the pointing device of the present invention, typical trackballs and touch pads are superior to mice because they keep the arm stationary and reduce the muscle work in the arm when compared with x-y sliding needed for x-y input in a traditional mouse. However, trackballs and touchpads cause unneeded small-muscle strain through compound finger motions. In typical trackballs and touchpads, the placement of the trackball or touchpad adjacent to the pad of the finger or thumb requires all of the digit's joints to be flexed to produce a single vertical cursor movement. Such flexural motion requires a complex combination of muscle and tendon movements. (See FIGS. 5a and 5b) The process shown in FIGS. 5a and 5b is awkward and requires excessive small muscle effort and tendon travel within the carpal tunnel. To highlight the complexity of the movement, arrows indicate the motion of various joints of the thumb.

[0127] For example, the finger or thumb being used to provide user input must be alternately flexed and extended in a cumbersome kicking motion to achieve vertical movement of the position icon 316 relative to the display image 312.

[0128] While FIG. 5 shows a trackball, the motion for a touchpad situated in a plane below the user's hand would be similar with the exception that the thumb would need to be at a more severe angle in order to make contact with the touchpad with the thumb tip 124 or at least the front portion of the thumb pad 128.

[0129] User input for vertical (y-direction) motion is a particularly common motion as most files, such as text files require much more y-axis navigation than x-axis navigation. While display screens are made sufficiently wide so as to allow a line of text to be displayed at magnification suitable for reading, the length of the text file is often 10 or even 1000 times longer than can be displayed at a legible magnification. Typically, even a one page letter for a standard sheet of office paper is longer than the text that fits within the displayed image of the text at standard magnifications. Thus