

## CURSOR CONTROL DEVICE

### FIELD OF THE INVENTION

[0001] The present invention relates to a cursor control device for controlling the movement of a cursor on a computer display. More specifically, the invention is concerned with such a device that comprises a tracking element.

### BACKGROUND OF THE INVENTION

[0002] The immense rise in popularity of personal computers is in large part attributable to improvements in user-machine interfaces. More particularly, improvements in data input devices, such as the mouse and the trackball, have made communication with computers easy and convenient, thus increasing the usefulness of computers.

[0003] As is well known, a mouse and a trackball are useful devices for positioning a cursor on a computer display. To quickly and efficiently input certain types of data or commands to a computer, the cursor is positioned on an appropriate spot on the display and then manipulated ("clicked"). It will readily be appreciated that the convenience and, thus, usefulness of the computer is promoted by facilitating rapid, yet precise, cursor placement.

[0004] It happens, unfortunately, that rapid cursor positioning is more or less competitive with precise cursor positioning. This is because the faster the cursor moves across the screen, the less time the user has to react to stop the cursor when it arrives at the desired screen location. Stated differently, the user is provided with only one kind of feedback, namely, visual feedback, to aid the user in stopping a rapidly moving cursor, and visual feedback alone often is insufficient to promote both rapid and precise cursor placement.

[0005] It has therefore been suggested to enhance both rapid and precise cursor placement by providing more than one kind of feedback to the user. More specifically, tactile feedback is used in conjunction with visual feedback to promote both rapid and precise cursor placement.

[0006] Thus, U.S. Pat. No. 5,889,670 discloses a method and apparatus implementing a user interface device, such as a mouse or trackball, having electronically controllable tactile responsiveness which is flexibly programmable. Programmable force-position characteristics relate the tactile responsiveness of the interface device to the position of the cursor within a limited area or on the display screen. A force generated by a servo motor after converting a digital signal from a controller into an analog current signal is perceived as a resistance, tactile pressure or the lack thereof, or as a positive, assisted motion which is indicative of position on a screen display.

[0007] In U.S. Pat. No. 5,973,670 there is disclosed a cursor on a graphics display controlled by a cursor control device including a tactile generator. The tactile generator is activated when the cursor is located at a graphics object that has been determined to be intersecting, and that has a size which bears a predetermined relationship to the speed of the cursor, provided an update time has elapsed since the time of the last tactile activation of the cursor control device.

[0008] Though precise placement of the cursor has been enhanced by providing additional tactile feedback, there is

still a need to improve cursor control devices comprising a tracking element. These devices are mainly operated with the user's fingertips, his thumb or the palm of his hand. When retracting the user's hand from the cursor control device, e.g., to input data via a keyboard, the device may easily slip due to the fact that the user's hand has no support or that the palm exhibits a certain suction effect.

### SUMMARY OF THE INVENTION

[0009] It is therefore an object of the present invention to provide a cursor control device for controlling the movement of a cursor on a computer display that avoids the above mentioned disadvantages.

[0010] The present invention provides a cursor control device for controlling the movement of a cursor on a computer display, said cursor control device comprising: a tracking element; and a braking device operable to apply a braking force on said tracking element, said braking force being dependent on the speed of said cursor.

[0011] The present invention also provides a method for controlling a cursor, said method comprising the steps of: displaying a cursor; moving the cursor in response to manipulation of a cursor control device comprising a tracking element; and generating a user-discernible braking force on said tracking element depending on the speed of said cursor.

[0012] Advantageous embodiments of the invention are defined in the dependent claims.

### BRIEF DESCRIPTION OF THE DRAWINGS

[0013] The invention will hereinafter be described in more detail in connection with the accompanying drawings, in which **FIG. 1** schematically depicts an embodiment of an apparatus according to the invention;

[0014] **FIGS. 2A and 2B** show the apparatus according to **FIG. 1** in a non-activated and in an activated state;

[0015] **FIG. 3** schematically depicts a second embodiment of an apparatus according to the invention;

[0016] **FIGS. 4A and 4B** show the apparatus according to **FIG. 3** in a non-activated and in an activated state;

[0017] **FIG. 5** schematically depicts another embodiment of the present invention;

[0018] **FIG. 6** schematically shows still another embodiment of the invention; and

[0019] **FIGS. 7 to 9** are graphs showing the braking effect relative to the speed of the tracking element for several embodiments of the invention.

### DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0020] **FIG. 1** schematically shows an embodiment of an apparatus according to the invention. The apparatus shown therein consists of two parts and functions like a loud-speaker.

[0021] The upper part consists of a cylinder **10**, a first iron core **12**, a pin **14** and a coil **16**. The cylinder **10** is preferably made of aluminum or synthetic material. The coil **16** is wound around the cylinder **10**, the first iron core **12** func-