the light sources **152**, and by looking at which edge occurs first (slots **140**), the system can determine the direction of the disc. More particularly, the two groups of light sources and light sensors **152** and **154** are spaced so that when one group sees light through the center of the opening **142**, the other group is looking at an edge of the slot **140** and therefore switching on or off.

[**0055**] The encoder, whether mechanical or optical, generally includes a plurality of detents that provide a tactile way for the user to know when the encoder has reached a certain position. The detent may be a mechanical detent that provides a click that gives the user the ability to feel when something is going to happen on the screen. Mechanical detents generally provide a certain amount of torque that must be overcome to rotate the scroll disc. For example, the mechanical detent may include a biased arm that engages a various portions of the scroll disc so as to produce a torque as well as a click. Mechanical detents can be built into an encoder assembly or alternatively into the mouse body. In one embodiment, the number of detents corresponds to the number of counts. In another embodiment, the scroll disc includes the same number of tactile features as detents.

[**0056**] Although not shown, the internal components **108** may include a positional movement detecting mechanism for detecting movement of said mouse **100** so as to produce positional signals that relate to a cursor on the display screen. The detecting mechanism may be a mechanical mechanism such as a trackball or an optical mechanism such as an optical sensor, both of which track the position of the mouse **100**. With regards to the track ball mechanism, a portion of the trackball generally protrudes from the underside of the base **102** while the remaining portion is housed within the mouse **100**. As should be appreciated, the protruding portion of the trackball touches a flat surface on which the mouse **100** sits, thus causing the trackball to roll when the mouse **100** is moved along the surface.

[**0057**] As the ball moves, it engages two rollers housed within the mouse. One of the rollers is oriented so that it detects motion in a first direction (e.g., X direction), and the other roller is oriented so that it detects motion in a second direction (e.g., Y direction), which is typically at a 90 degree angle relative to the first direction. By way of example, the first direction may relate to back and forth movements of the mouse, and the second direction may relate to side to side movements of the mouse. In most cases, the back and forth movements correspond to vertical movements in the GUI while side to side movements correspond to horizontal movements in the GUI. Each of the rollers is coupled to an encoder through a shaft so that when the rollers turn they spin the shaft and thus the encoders. The encoders may be mechanical encoders or optical encoders. The encoder is configured to generate signals based on the speed, distance and direction of the mouse as it is moved. In one implementation, the signals are processed by a processor chip, which is positioned on the PCB and housed within the mouse. The processor chip is typically configured to turn these signals into binary data, which can be used by a computer. Positional movement detecting mechanisms are generally well known in the art and for the sake of brevity will not be described in any greater detail.

[**0058**] In addition to the above, the mouse **100** generally includes a cable for connection to the computer. One end of the cable is permanently connected to the internal electronics such as the encoders, switches, processor, and the like, and the other end includes a connector for temporarily coupling the mouse to the computer. By way of example, the connector may be a PS/2 connector, a serial connector, a USB port and the like. In some cases, the mouse may include a radio frequency (RF link or optical infrared (IR) link to eliminate the need for a cable.

[**0059**] **FIG. 9** is a top view of a scroll disc **170**, in accordance with one embodiment of the invention. The scroll disc **170** may generally correspond to any of the discs described above. The scroll disc **170** includes a plurality of tactile bumps **172** extending from a top surface **174** of the scroll disc **170**, and a plurality of divots **176** disposed below the top surface **174** of the scroll disc **170**. The bumps and divots may be widely varied. In the illustrated embodiment, the divots **176** are positioned along the periphery of the scroll disc **170** and the bumps **172** are disposed towards the center of the scroll disc **170**.

[**0060**] The advantages of the invention are numerous. Different embodiments or implementations may have one or more of the following advantages. One advantage of the mouse is that a substantial portion of the rotary disc is accessible to the user, i.e., the rotary disc provides a large surface area for manipulation thereof. Another advantage of the mouse is that the rotary disc can be continuously rotated by a simple swirling motion of a finger, i.e., the disc can be rotated through 360 degrees of rotation without stopping. Another advantage of the mouse is that the user can rotate the disc tangentially from all sides thus giving it more range of finger positions than that of a traditional vertical wheel (**FIG. 1**). For example, a left handed user may choose to use one portion of the disc while a right handed user may choose to use another portion of the disc. In essence, the mouse is more ergonomic. Another advantage of the mouse is that the rotary disc does not protrude out of the mouse thus reducing the amount of accidental scrolling while making the mouse more aesthetically pleasing. Another advantage is that the mouse allows an intuitive way to scroll on a display screen. For example, as shown in **FIG. 10**, the user can manipulate the disc **182** side to side as shown by arrows **183** for horizontal scrolling **184** and the user can manipulate the disc **182** backwards and forwards as shown by arrows **185** for vertical scrolling **186**. Another advantage of the invention is that pressing down on the disc for clicking does not cause the disc to rotate, i.e., since the motion of the disc is orthogonal to the direction of clicking (button press) the user can press on the disc itself to activate the button.

[**0061**] While this invention has been described in terms of several preferred embodiments, there are alterations, permutations, and equivalents, which fall within the scope of this invention. Although a scrolling feature is described throughout this document, it should be noted that a scrolling feature is not a limitation and that the rotary dial may be used to manipulate other features. For example, the rotary dial may be used to adjust a volume control in an audio application. In addition, the rotary dial may be used to advance through frames in a movie in video editing applications. The rotary dial may also be used in video game applications. Furthermore, although a conventional button as shown in **FIG. 1** is not described in combination with a scroll disc, it should be noted that the scroll disc and conventional buttons may be used together on a single mouse. It should also be