to move between a deactivate position (e.g., upright) and an activate position (e.g., depressed). When activated, a command signal such as a data selection or execution command signal is sent to a computer. By way of example, the signal may be sent through a cable (not shown) that is connected to the internal electronics **108** housed within the mouse **100**.

[**0047**] In one embodiment, a spring mechanism is used to bias the inner shell **112** in a direction away from the base **102**, i.e., in the un-clicked position (as shown). By way of example, the spring mechanism may be part of the switch **124**, i.e., the actuator **128** may be biased in the upright position, or it may be a separate spring pad connected to the base **102**.

[**0048**] Referring now to the disc **106**, the disc **106** is rotatably coupled to and oriented relative to the body **104**. In the illustrated embodiment, the disc **106** is positioned within an opening **130** in the outer shell **114** and is rotatably coupled to the inner shell **112**. In particular, the disc **106** is attached to a shaft **134** that rotates within a housing **135** attached to the inner shell **112**. The shaft allows the disc **106** to freely rotate about an axis **136**. The housing may include bearings so as to provide smoother disc rotation. As shown, the imaginary axis **136** intersects the bottom surface of the mouse (e.g., base **102**). In the illustrated embodiment, the housing is structurally coupled the top surface of the inner shell **112**. This coupling may be made using suitable methods and techniques. By way of example, the housing may be coupled to the inner shell **112** using fasteners such as glue, screws and the like.

[**0049**] Although the housing is shown attached to the top surface of the inner shell **112**, it should be appreciated that this is not a limitation and that other configurations may be used. For example, the housing may be recessed within the inner shell, or it may be positioned on an inner surface of the inner shell. In addition, the houisng may also be connected to the outer shell, which is structurally coupled to the inner shell as described above. Furthermore, a lip or seal may be provided by the outer shell **114** to help support the disc **106** in the outer shell **114** and to eliminate gaps that may allow dirt or dust to penetrate into the mouse **100**.

[**0050**] In accordance with one embodiment, the rotation of the disc **106** is measured via an encoder. In most cases, the encoder is activated by rotating the scroll disc **106**, and thus the shaft **134**, with a finger (index or otherwise). The encoder may be an integral portion of the scroll disc, i.e., the shaft may be included in the encoder or the encoder may be a separate component that is connected to the scroll disc. The encoder may be an optical encoder or a mechanical encoder. Optical encoders generally operate by interrupting a signal between two sensors. They may also be reflective where the signals are generated by reflecting light (visible or IR) off of a patterned surface. Mechanical encoders generally operate by turning a switch on and off. In either case, the encoder determines what direction the scroll disc **106** is turning and reports the number of counts, i.e., the number of points that are measured in a given rotation (360 degrees). In most cases, the encoder is operatively coupled to a portion of the internal circuitry **108** of the mouse **50**. Thus, the scrolling information may be sampled and sent to a host computer by the internal circuitry. The host computer then does what it wants with the scrolling information. For example, signals are sent to the host computer over a cable, and software, converts the number, combination and frequency of the signals into distance, direction and speed necessary to scroll in the GUI.

[**0051**] Any suitable number of counts may be used. In most cases, it would be desirable to increase the number of counts per report so as to provide higher resolution, i.e., more information can be used for things such as acceleration. Unfortunately, however, as the number of counts increases per report, it becomes harder for a human to determine. That is, there is generally a minimum angle that corresponds to human motor function (360/counts=degrees of rotation per count). Therefore, it would be desirable to balance the resolution and the human motor function, i.e., a high resolution that has some benefit to the user. It is generally believed that optical encoders give the user more control over the resolution, i.e., how many counts per rotation.

[**0052**] The mechanical encoder typically includes a disc having a plurality of contact points. The disc may be the bottom of the scroll disc, or another disc positioned on the shaft, as for example, within the housing. The mechanical encoder also includes two pairs of contact bars that are configured to touch the contact points as they pass by during rotation of the scroll disc. An electrical signal is thus produced each time a contact bar passes a contact point. The number of signals indicates how many points the contact bars have touched—the more signals, the more the user rotated the disc. The direction in which the disc is turning, combined with the ratio between the number of signals from the disc indicate the direction and magnitude that the disc is rotating. In most cases, the mechanical contacts are arranged to produce quadrature signals in order to determine both speed and direction of the scroll disc.

[**0053**] The optical encoder typically includes an optical encoding disc having a plurality of slots separated by openings therebetween. The optical encoding disc may be a portion of the scroll disc, or another disc positioned on the shaft. By way of example, referring to **FIG. 8**A, the disc **106** may include a plurality of slots **140** extending from the bottom of the disc **106** and openings **142** disposed between the slots **140**. The optical encoder also includes a light source such as an infrared LED and a light sensor such as an infrared sensor (light sensitive transistor) or photo detector positioned on opposites sides of the optical encoding disc. The slots and openings in the optical encoding disc break the beam of light coming from the light source so as to produce pulses of light that are picked up by the light sensor (as the disc spins around, it chops up or interrupts the light). The rate of pulsing is directly related to the speed of the disc and the distance it travels. In most cases, an on board processor chip reads the pulses from the light sensor and turns the pulses into binary data that the host computer can understand.

[**0054**] The optical encoder generally includes a pair of optical switches that provide quadrature pulses (90 degrees out of phase) as the scroll disc is turned. By providing pulses in quadrature, the optical encoder lets you determine the direction the scroll disc is being turned, as well as its speed. Referring to **FIG. 8**B, each optical encoder **150** typically has two light sources **152** and two light sensors **154** so as to determine the disks **106** direction and speed of rotation. Broadly, as the disk **106** turns, two signals are generated by