[0026] An example of an increasing force profile with a two-cantilever button assembly is given below in Table 2. The external surface if the button is 3.1 cm wide and 3.5 cm long (palm to finger direction). The button assembly contacts an electro-mechanical switch that has an actuation force of 0.60 N located at 2.0 cm. The transverse variation in force is about ±0.15 N or less. An increasing force profile may be desirable for persons with larger hands because the higher force provides greater tactile feedback and thus better control over button actuation.

TABLE 2

Distance (cm)	Force (N)
0.0	0.60
1.0	0.65
1.5	0.70
2.0	0.75
2.5	0.85
3.0	1.00
3.5	1.20

[0027] **FIG. 3** is a simplified partial cross section of a computer pointing device **50** with a reverse cantilever button assembly **52** according to an embodiment of the present invention. The mouse includes a palm portion **54** configured to fit into the hand of a user. In use, the user's fingers extend from the palm portion **54** to the distal end **56** of the finger portion **38** of the button. The button includes a first fulcrum **58** near the palm section typically under the metacarpalphalangeal joint and a second fulcrum **60** near the distal end of the button which typically resides under or beyond the end of the user's fingertip. In this embodiment the button plunger **62** and associated electronic switch **12** with movable switch element **22** is not centered in the finger portion of the button. A cable **64** is provided to connect the device to a computer, but a wireless connection could be provided.

[0028] 3. An Exemplary Trackball

[0029] **FIG. 4** is a simplified section of a button assembly **70** inside a conventional trackball pointing device. An electronic switch **12** is placed behind a thumb pad (switch button) **72** on a thumb button **74** movable in a small arc about a fulcrum **76** relative to the trackball housing **78**. The fulcrum is proximate to a palm portion **80** of the trackball housing, thus the force required to be applied to the thumb pad **72** in order to actuate the switch decreases as one moves further from the palm portion of the device.

[0030] **FIG. 5** is a simplified top view section of a button assembly **90** inside a trackball pointing device according to another embodiment of the present invention. In this instance the fulcrum **92** is distal from the palm portion **80'** of the trackball housing **78'** i.e. nearer the thumb tip. Thus the force required to be applied to the thumb pad **72'** increases as one moves from the palm end of the thumb pad to the distal end of the thumb pad. This increasing profile is more consistent with ergonomic considerations, for example, allowing a person with smaller and presumably weaker hands to more easily actuate the button, and providing more tactile feedback for persons with larger hands.

[0031] **FIG. 6** is a simplified section of a trackball pointing device **100** according to another embodiment of the present invention. A trackball **102** is in a housing **104** having a palm portion **106** configured to accept a hand. The fingers manipulate the trackball, and a thumb switch button **108** is configured to be actuated by the user's thumb. Like the button assembly shown in **FIG. 5**, above, the button has a fulcrum (not shown as it lies within the housing) between the thumb switch button and a distal end **110** of the trackball housing. Thus, the actuating force necessary to apply to the thumb switch button decreases with increasing distance from the distal end. In other words, when a user's hand is resting on the palm portion **106** of the trackball housing, a user with a shorter thumb can advantageously actuate the thumb switch with less applied force than would be required if the fulcrum was on the opposite side (from the distal end) of the thumb switch button.

[0032] While the invention has been described above with reference to specific embodiments, modifications and equivalents may be apparent or become apparent to those skilled in the art. For example, while an electronic switch with a simple plunger is illustrated, other types of electronic switches, such as a levered microswitch where switch, lever, and small roller (all contained on the switch unit), could be used. Similarly, the fulcrums have been shown as being live spring hinges, but could be pivots or be movable fulcrums to change the stiffness of the beam assemblies. While specific embodiments are molded from plastic, other materials, such as metals, could be used for some or several of the components, such as the fulcrum and beam. These and other variations are intended to fall within the scope of the invention; therefore, the invention is to be limited only as recited in the following claims.

I claim:

1. A button assembly comprising:

a housing having a palm portion configured to fit a hand of a user;

a spring beam having a first spring beam end and a second spring beam end;

a first fulcrum having a first spring constant supportively attaching the first spring beam end to the palm portion of the housing so that the spring beam forms a first cantilever beam extending away from the palm portion of the housing;

a switch button having a first switch button end and a second switch button end; and

a second fulcrum having a second spring constant supportively attaching the first switch button end to the second spring beam end so that the switch button forms a second cantilever beam extending from the second fulcrum towards the palm portion of the housing.

2. The button assembly of claim 1 wherein the housing, the spring beam, the first fulcrum, the switch button, and the second fulcrum are molded as a single piece of plastic.

3. The button assembly of claim 1 wherein the first spring constant cooperates with the second spring constant so as to provide an increasing force profile from the second switch button end toward the first switch button end.