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TOGGLE OPERATING MECHANISM AS FOR SWITCHES AND THE LIKE

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FIG. 1.

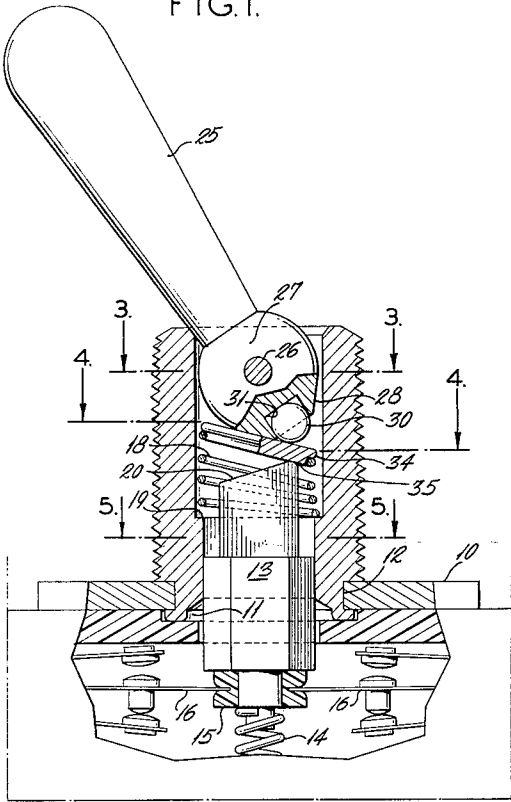


FIG. 2.

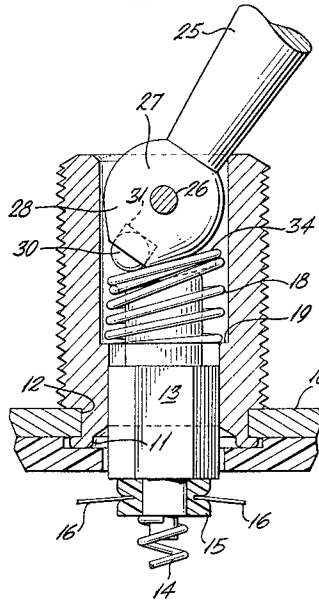


FIG. 3.

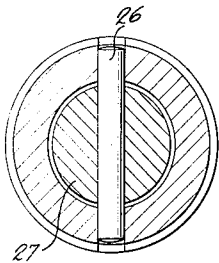


FIG. 4.

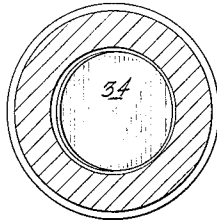
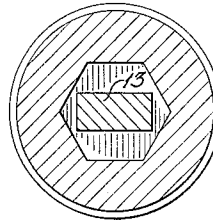


FIG. 5.



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**TOGGLE OPERATING MECHANISM AS FOR SWITCHES AND THE LIKE**

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This invention relates to toggle operating mechanism as for switches and the like, and has for an object the provision of improvements in this art. Toggle type switches of this type are often referred to as bat handle switches.

The mechanism provides stable over-center positions relative to a dead center pivot axis controlled by a spring and a lever operated element cooperating therewith which causes a plunger to move up and down or produces other controlled actions related to the tilting of an element at the end of the spring means. Specifically, one end of a pivoted lever has an over-center element which swings across the end of a helical coil spring and the angularly inclined end of a plunger which is mounted for sliding movement along the axis of the spring, the over-center element causing the plunger to move up and down and the spring holding the element in the over-center positions.

More specifically, in one form the over-center element slides across a tiltable plate which is supported on the upper end of a helical coil spring and the inclined end of a plunger, the plate tilting from one angular position to another as it shifts position on the inclined end of the plunger.

The invention will be better understood from the following description of an exemplary embodiment, reference being made to the accompanying drawings thereof wherein:

FIG. 1 is an axial section through a plunger operating mechanism embodying the invention;

FIG. 2 is a partial section like FIG. 1 but showing the parts in another position;

FIG. 3 is a transverse section taken on the line 3—3 of FIG. 1;

FIG. 4 is a transverse section taken on the line 4—4 of FIG. 1; and

FIG. 5 is a transverse section taken on the line 5—5 of FIG. 1.

As shown in the drawings, a support member 10 has secured thereon, as by a riveted end 11 in a hole in the member, a tubular barrel 12. A plunger 13 is mounted to slide in guides in the barrel and is held against turning movement by an suitable spline formation, as shown being formed to have a polygonal section, specifically a hexagonal section, fitting in a barrel guide of the same shape.

The plunger is constantly urged upward, as by a coil spring 14 at its lower end. One specific use of the plunger is to operate electrical switch mechanism, although it could operate valves or many other different mechanisms, and as here shown, a bar 15 is mounted on a reduced portion of the plunger and the spring is held in position beneath the bar by a further reduced end portion. The bar may operate spring switch blades 16.

Adjacent and surrounding the upper end of the plunger 13 a helical coil spring 18 is mounted on an annular shoulder seat 19 formed in the barrel. The upper end of the plunger 13 is bevelled, as at 20.

Means are provided for moving the plunger up and down and concurrently tilting the upper end of the spring from side to side to hold the moving means on one side or the other of a medial position to which it is shifted to operate the plunger. The means here shown comprises a bat handle lever 25 pivoted on a transverse pivot pin 26 mounted in the sides of the barrel. The axis of the pin

is parallel with a medial element of the bevelled end of the plunger.

The upper middle portion 27 of the lever is generally ball-shaped or spherical to fill the tubular space in the barrel.

The lower end or arm 28 of the lever carries the operating means for shifting the plunger and tilting the upper end of the spring. Here a unitary means in the form of an over-center shifting ball 30 is mounted in a socket 31 in the lower end of the lever.

A cam plate 34 is interposed between the ball 30 and the upper end of the spring 18, the plate having a reduced portion 35 fitting within the spring to hold it in position. The plate 34 also bears against the upper end of the plunger, either resting on the high edge as shown in FIG. 1, or lying flat on the bevelled surface, as shown in FIG. 2.

On either side of dead center position of the ball 30 the top surface of the spring tends to tilt in a direction to force the ball toward its limiting stable position where the shank of the handle engages the side of the upper end of the barrel.

The shifting element of the lever arm moving across the end surface of a helical coil spring having its axis on the dead center line of the element and the axis of the lever, provides a novel operating means in itself which would be useful for operating various types of control members other than the plunger illustrated.

The operation of the device is believed to be clear from the above description. The device is simple, inexpensive, rugged and durable, easy to manufacture and service, easy to operate, and dependable in service.

While one embodiment of the invention has been described for purposes of illustration, it is to be understood that there may be various embodiments and modifications within the general scope of the invention.

I claim:

1. Toggle operating mechanism adapted to operate electrical switches and the like, comprising in combination, a barrel having a bore, a toggle lever mounted on said barrel and having a pivoted axis extending transversely across the axis of the bore of said barrel, said lever having an operating arm extending into said barrel bore, an operating element on said arm adapted to move back and forth past the dead center position of said bore axis, a cam plate extending across the bore in a position to be crossed by movement of said arm operating element, resilient means effective on each side of said bore and shaft axis urging said plate upward against said operating element, the plate being tilted from side to side to stable stop positions when the operating element is moved from one side to the other past dead center position, stop means for limiting the movement of said lever stable positions on either side of dead center position, a plunger operated in response to the movement of said arm and element to move from one actuating position to another, said plunger being slideable along said bore axis having a bevelled upper surface engaging the lower surface of said plate, and means urging said plunger against said plate.

2. Toggle operating mechanism as set forth in claim 1, in which said operating element is a ball carried by the end of said arm.

3. Toggle operating mechanism as set forth in claim 1, in which said resilient means comprises a helical coil spring having its upper end embracing a reduced portion on the lower side of said plate.

4. Toggle operating means adapted to operate electrical switches and the like, comprising a combination, a barrel having a bore, a toggle lever mounted on said barrel and having a pivot axis extending transversely across the axis of the bore of said barrel, a helical coil spring mounted in said barrel below the axis of said lever and having its axis coincident with the axis of the bore of

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said barrel, said lever including an arm disposed below the pivot axis of the lever, an element carried by said arm which is movable transversely over the adjacent end of the spring to compress it, said element in moving from one side of the barrel bore and shaft axis to the other causing the top end of the spring to tilt from one side to the other, stop means for limiting the movement of said lever at stable positions on either side of dead center position, a plunger operated in response to the movement of said arm and element to move from one actuating position to another, said plunger being slideable along said bore axis and having a beveled upper surface, means operated by said arm engaging the beveled surface of the

plunger to operate the plunger, and resilient means urging said plunger upward against said operating means.

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