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3,458,840

MULTI-POSITION ELECTRIC SWITCH

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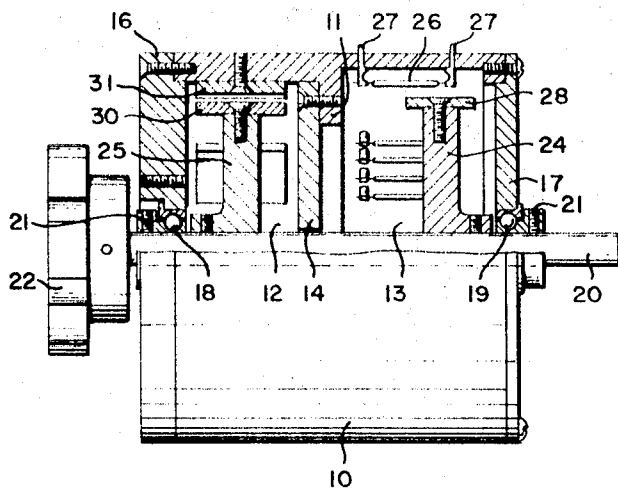


FIG. 1

FIG. 2

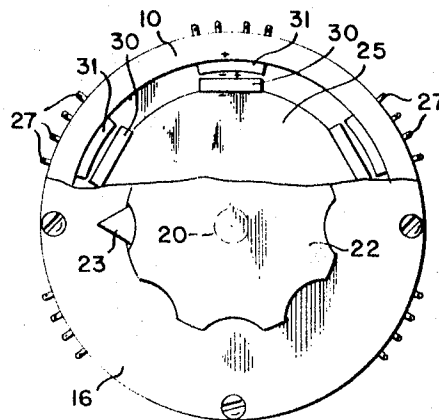
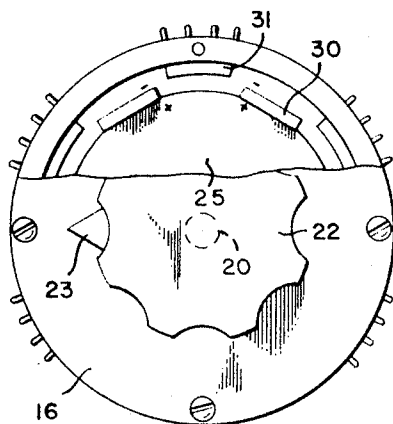


FIG. 3



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ATTORNEYS

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MULTI-POSITION ELECTRIC SWITCH

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3 Claims

ABSTRACT OF THE DISCLOSURE

A multi-position rotary switch having stop mechanism functioning by the attraction and repulsion of sets of magnets to insure that the switch will exactly center itself when moved to any one of several circumferentially spaced switch positions.

BACKGROUND OF INVENTION

Selector switches heretofore available have relied for their stop actions upon mechanisms which have physical contact. A bullet element spring-pressed into detents is one example of this type of mechanism. It has been the wear factor on the stop mechanisms, rather than on the selector mechanism of the switch, which determines the useful life of many selector switches. This has been especially true with selector switches in which arcing is avoided across their circuit closing terminals, say by the instrumentality of using dry reed switches comprised of a pair of low reluctance, magnetically actuated flat metal rods hermetically sealed within a glass tube in an atmosphere of dry inert gas.

SUMMARY OF INVENTION

The present invention is applied to a switch of the character having a selector member movable into a selected one of a plurality of evenly spaced switching positions, and provides two like-numbered sets of permanent magnets one of which sets is stationary and the other of which moves in concert with the selector member and so related, one set to the other set of magnets, that the fields of the two sets exert one upon the other either an optimum attraction or an optimum repulsion when the selector member of the switch is centered in any one of its several switching positions.

THE DRAWINGS

FIG. 1 is a view partly in elevation and partly in longitudinal vertical section illustrating a rotary switch constructed in accordance with preferred teachings of the invention;

FIG. 2 is a front elevational view with a portion of a cover plate for the switch case broken away to expose positioner mechanism housed in a front compartment of the case; and

FIG. 3 is a view similar to FIG. 2 portraying a modification.

DESCRIPTION OF PREFERRED EMBODIMENT

A case for the switch is denoted by the numeral 10, being cylindrical in shape with an internal flange 11 dividing the case into front and back compartments 12 and 13. The compartments are shielded from one another by a centrally apertured plate 14 which is secured to the flange, and have the outer ends closed by a respective centrally apertured cover plates, as 16 and 17.

Ball-bearing assemblies 18 and 19 are received in the central apertures of the cover plates to provide a rotary journal for a through-spindle 20. Set screws 21 fix the spindle to the inner races of the bearings to hold the spin-

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dle against endwise displacement. A selector knob 22, with a pointer 23, is secured to an exposed end of the spindle.

The spindle has a radial selector arm 24 and a positioner disc 25 fixed thereto, the former for rotation with the spindle within the compartment 13 and the latter for rotation with the spindle within the compartment 12. These two compartments function, respectively, as a switch compartment and a positioner compartment and will be hereinafter so termed.

The switching mechanisms 26 are housed in the switch compartment and in the particular embodiment which I have here elected to illustrate are shown as being the dry reed type, with a plurality, say four, of such reed switches being supported by conductive clips 27 to lie in a side-by-side series at each of several switching stations. The stations, five are here shown, are located at five of six equally spaced positions about the circumference of a circle having the axis of the spindle as its center. A permanent magnet 28 which is or may be of the rubber type is screwed or otherwise secured upon the end of the switch arm, acting by magnetic attraction as the arm moves to a centered position at a selected one of said stations to close the reed switches. The reed switches are contained in normally incomplete electric circuits each functional to an electric device. In the drawing I have illustrated four reed switches at each of the switch stations, an arrangement which would permit up to four separate circuits to be simultaneously closed. Such an arrangement would be suitable for use in a profile mill like or similar to that which I illustrate and describe in my pending application Ser. No. 545,957, filed Apr. 28, 1966, wherein devices conveying logs along a guided travel path and chipping the same in course of such travel are each caused to selectively occupy one of several predetermined positions which are correlated to different log diameters.

Within the positioner compartment 12 there are provided two sets of permanent rubber magnets 30 and 31. The magnets in each set correspond as to number with the number of switching stations. The set of magnets 30 is secured to the perimeter of the positioner disc so as to rotate therewith, being placed at equidistant intervals of the circumference of a circle having the axis of the spindle 20 as its center. The magnets 31 of the other set are held stationary, being secured to the surrounding wall of the compartment in closely spaced relation to the movable magnets at equidistant intervals of a circle concentric to the circle occupied by the movable magnets. Assuming a placement of the poles of the magnets as they are here shown, and namely with opposite poles in facing relation, it will be apparent that as the movable magnets cut across the magnetic fields of the stationary magnets in response to a turning movement of the disc 25, an optimum attraction force is exerted when the magnets of the one set are radially aligned with the magnets of the other set. I place the stationary magnets so that the occurrence of this optimum force coincides with the exact moment when the selector arm becomes centered relative to a switching station. Thus, in the selection of a switching station, the magnetic force assures a centering of the selector arm at any selected switching station regardless of whether the operator, in making his selection, has properly turned the selector knob to have the same point exactly at the station. It is here noted that the magnets can be placed so that an optimum force of repulsion, rather than attraction, is relied upon to center the selector arm at selected switching stations. This is illustrated in FIG. 3.

It is believed the invention will have been clearly understood from the foregoing detailed description of my now-preferred illustrated embodiment. Changes in the details of construction may be resorted to without departing from the spirit of the invention and it is accordingly my

intention that no limitations be implied and that the hereto annexed claims be given the broadest interpretation to which the employed language fairly admits.

The embodiments of the invention in which an exclusive property or privilege is claimed are defined as follows:

1. A switch comprising

a case having a spindle journaled for rotation therein, a selector member coupled to said spindle for rotation therewith having a magnet for actuating reed switches mounted on said case at switching stations,

a positioner member coupled to said spindle for rotation therewith having a plurality of first permanent magnets equidistantly mounted about the periphery of said positioner member, said first magnets orientated to expose a single pole to said case with the polarity of said first magnet exposed poles being the same, and

a plurality of second permanent magnets equidistantly mounted on said case about the periphery of said positioner member adjacent said first magnets, said second magnets orientated to expose a single pole to said first magnets with the polarity of said second magnet exposed poles being the same.

2. The switch of claim 1 wherein said exposed poles of said first and second magnets have opposite polarity whereby said first and second magnets attract one another.

3. A switch comprising

a case having a spindle journaled for rotation therein, a selector member coupled to said spindle for rotation

therewith having a magnet for actuating reed switches mounted on said case at switching stations,

a positioner member coupled to said spindle for rotation therewith having a plurality of first permanent magnets equidistantly mounted about the periphery of said positioner member, said first magnets orientated to expose a single pole to said case with the polarity of said first magnet exposed poles being the same, and

a plurality of second permanent magnets equidistantly mounted on said case about the periphery of said positioner member adjacent said first magnets, said second magnets orientated to expose a single pole to said first magnets with the polarity of said second magnet exposed poles being the same, said exposed poles of said first and second magnets have the same polarity whereby said first and second magnets repulse one another.

References Cited

UNITED STATES PATENTS

2,555,571	6/1951	Chisholm.	
2,980,777	4/1961	Howell et al.	335-207
3,251,960	5/1966	Petterson	335-207 X

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