Aug. 10, 1954 T. J. OBSZARNY 2,686,234

MULTIPLE POSITION SWITCH

Filed Aug. 9, 1952

Fig. 1

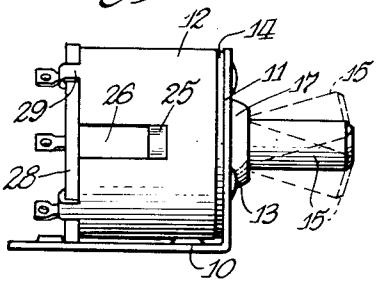


Fig. 2

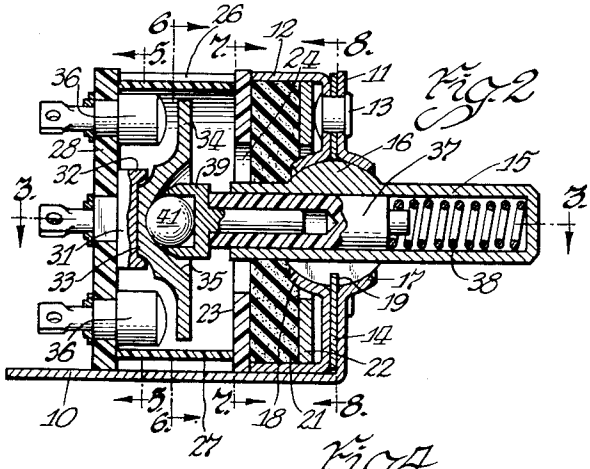


Fig. 3

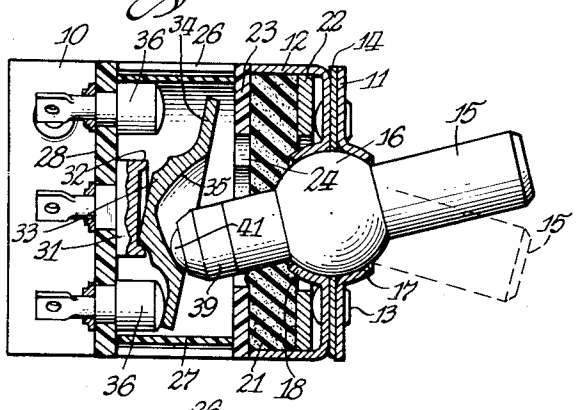


Fig. 4

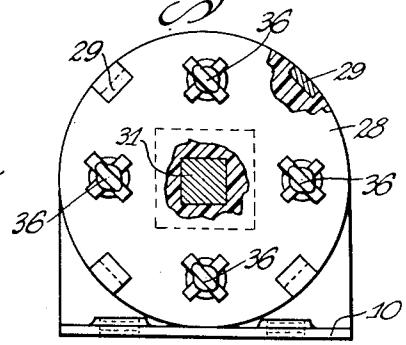


Fig. 5

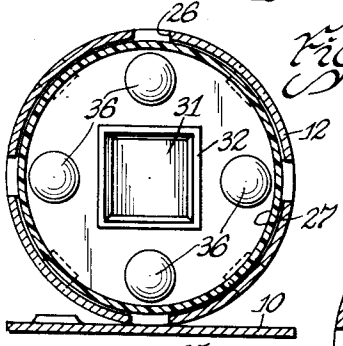
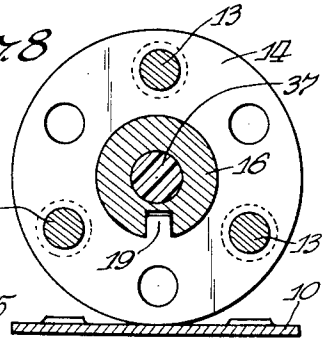


Fig. 8



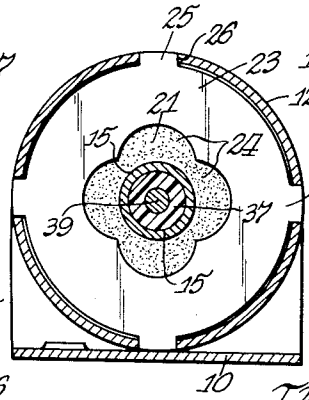


Fig. 7

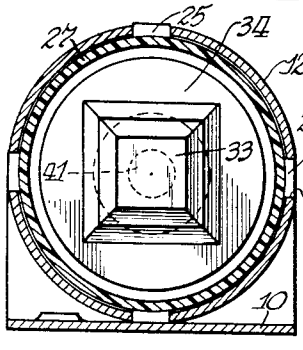


Fig. 6

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MULTIPLE POSITION SWITCH

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Application August 9, 1952, Serial No. 303,568

5 Claims. (Cl. 200—6)

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This invention relates to multiple position switches, and more particularly to a switch of the tilting disc type.

Multiple position switches have heretofore been proposed employing a disc tiltable to any one of a plurality of positions selectively to engage different fixed contacts and establish different circuits. As heretofore constructed, such switches usually include a tiltable contact disc having a circular flat base to fit against a circular flat contact seat and within a circular peripheral flange on the seat. The opposite face of the disc is engaged by a spring pressed operating plunger in a tiltable handle to tilt the disc as the handle is tilted.

In such constructions the contact between the disc and seat when the disc is tilted is substantially a point contact. The disc is therefore tiltable to any angular position and is relatively unstable so that it can engage two of the fixed contacts simultaneously unless the tilting movements of the handle are carefully restricted. This is very undesirable and may create serious problems in certain types of controls such as aircraft controls. Furthermore, due to the small contact area between the disc and seat the disc tends to heat excessively under high load current conditions.

It is one of the objects of the present invention to provide a multiple position switch in which the contact disc is guided to tilt only in selected directions and to be stable when tilted in any such direction.

Another object is to provide a switch in which a relatively large contact area is provided between the seat and the disc so that relatively large current can be carried with a minimum of heating.

A further object is to provide a switch in which the seat and disc are defined by a series of connected straight lines registering with the fixed contacts to limit tilting of the disc to directions toward the fixed contacts, and to provide a large contact area between the disc and seat.

The above and further objects and advantages of the invention will be more readily apparent from the following description when read in connection with the accompanying drawing, in which

Figure 1 is a side elevation of a switch embodying the invention.

Figure 2 is a central section on an enlarged scale.

Figure 3 is a horizontal section on the line 3—3 of Figure 2.

Figure 4 is an end view looking from the left of Figure 2, and

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Figures 5, 6, 7 and 8 are sections on the lines 5—5, 6—6, 7—7, and 8—8, respectively, of Figure 2.

The switch as shown comprises a mounting bracket 10 having a base portion and a flat end portion 11 to receive and support the switch construction. The switch mechanism is enclosed in a cup-shaped housing 12 whose closed end fits against the end 11 of the mounting bracket and is secured thereto by rivets 13. Preferably a separate plate 14 is mounted between the end of the housing and the end plate 11 of the bracket.

A tubular handle 15 projects through the end of the bracket and of the housing and is supported for universal angular movement therein. For this purpose, the handle is formed with a spherical enlargement 16 supported in spherical flanges 17 and 18 on the bracket end 11 and the end of the housing, respectively. Preferably the enlargement 16 is formed with an axial slot at one side thereof into which a tongue 19 on the separator plate 14 projects to prevent the handle from turning while permitting free angular movement thereof.

The handle is sealed in the housing 11 and is urged to a centered position coaxial with the housing by a disc 21 of resilient material such as rubber. The disc 21 is supported between a ring 22 fitting in the housing and a ring 23 overlying the outer face of the disc. Preferably the ring 23 has a center opening therein formed with projecting lobes 24 in which the handle may swing so that tilting movement of the handle is limited to preselected directions. The disc 23 is angularly located in the housing by means of tabs 25 thereon to fit in the slots 26 in the housing outer wall. Therefore the angular positions of the lobes 24 are accurately located properly to control tilting of the handle.

The disc 23 is held in place by an insulating sleeve 27 fitting in the housing and seated at one end against the disc 23 and having its opposite end against an insulating cover disc 28 which closes the open end of the housing. The cover disc 28 is formed in its periphery with notches to receive axially extending tabs 29 on the housing wall. To secure the cover disc in place the tabs 29 are bent over as shown in the drawings.

The cover disc 28 carries a central contact seat 31 having a flat seating surface and an upstanding peripheral flange 32. The contact seat receives the base 33 of a tiltable contact disc which has a flange 34 extending outward from the base and a concave surface 35 opposite the base and radially inward of the flange. The flange is

adapted to engage fixed contacts 36 carried by the cover disc 28 around the contact seat 31. As shown, four fixed contacts 36 are provided spaced 90° around the contact seat although more or less fixed contacts could be used to control a greater number of different circuits if desired.

The contact disc is adapted to be tilted to engage fixed contacts by means of spring pressed plunger 37 fitting slidably into the tubular handle 15 and urged outwardly thereof by the spring 38. At its outer end the plunger carries a cup member 39 receiving a ball 41 for universal rotation, as more particularly described and claimed in my copending application, Serial No. 303,567 filed August 9, 1952.

The ball 41 engages the concave surface 35 of the contact disc and when the handle is in its centered position, as shown in Figure 2, holds the base of the contact disc against the contact seat. When the handle is swung as shown in Figure 3 the disc will be tilted so that its flange 34 will engage one or the other of the fixed contacts to complete a circuit therewith.

According to the present invention to insure that the disc will tilt only toward one of the fixed contacts, the contact seat is defined by a series of connected straight lines and the flange 32 is formed by a series of connected straight sections. Where four fixed contacts are employed, as shown, the contact seat is square and the contact flange 32 is also square. The base 33 of the contact disc, as best seen in Figure 6, is square to fit relatively closely within the flange 32 and the flange and the edge of the base may be curved as illustrated so that the base can rock easily over the flange and will contact the flange over a substantial area when the disc is tilted.

With this construction the disc will tilt easily across the straight portions of the flange so that it will be guided accurately into engagement with a selected one of the fixed contacts. However, even if the handle is not swung accurately toward the contact which is to be engaged, the innerengaging straight edge portions of the contact seat and the base will still insure that the disc swings in the desired angular direction to engage the selected fixed contact. Furthermore, it is substantially impossible with this construction for the disc to be tilted to a position in which it will engage two contacts simultaneously.

In addition to guiding the tilting of the disc accurately, the straight line engagement between the contact seat and the disc provides an elongated contact area therebetween when the disc is tilted. Therefore, the current density in the contact area will be relatively low so that heating of the contact seat and disc is minimized even under relatively heavy load conditions.

While one embodiment of the invention has been shown and described in detail it will be understood that that is illustrative only and is not to be taken as a definition of the scope of the invention, reference being had for this purpose to the appended claims.

What is claimed is:

1. A multiple position switch comprising a housing, a central contact seat carried by one end of the housing, a plurality of fixed contacts carried by said one end of the housing and spaced around the contact seat, the contact seat having a substantially flat seating surface and an upstanding peripheral flange formed by a plurality of straight sections registering with the fixed contacts respectively, a contact disc having a base to seat on the contact seat and whose periphery is defined by a plurality of connected straight lines corresponding to the straight flange sections, a flange on the contact disc overlying and normally spaced from the fixed contacts, and a handle extending through the other end of the housing and mounted therein for universal angular movement and engaging the contact disc to tilt it along one of said straight lines as a fulcrum on the contact seat in a direction substantially normal to said one straight line.

2. A multiple position switch comprising a housing, a central contact seat carried by one end of the housing, a plurality of fixed contacts carried by said one end of the housing and spaced around the contact seat, the contact seat having a substantially flat seating surface and an upstanding peripheral flange formed by a plurality of straight sections registering with the fixed contacts respectively, a contact disc having a base to seat on the contact seat and whose periphery is defined by a plurality of connected straight lines corresponding to the straight flange sections, a flange on the contact disc overlying and normally spaced from the fixed contacts, the disc having a concave dished surface opposite to the base, a handle extending through the other end of the housing and mounted therein for universal angular movement, a plunger slidably carried by the handle and engaging the concave surface of the disc, and a spring urging the plunger outwardly of the handle toward the disc for normally maintaining said disc, handle and plunger in axial position.

3. A multiple position switch comprising a housing, a central contact seat carried by one end of the housing having a flat seating surface and a square upstanding peripheral flange, four fixed contacts carried by said end of the housing spaced respectively from the sides of the square flange, a contact disc having a square base seated on the contact seat within and substantially filling the flange, a flange on the contact disc overlying and normally spaced from the fixed contacts, and a handle projecting through the other end of the housing and mounted therein for universal angular movement and engaging the contact disc to tilt it along one edge of its square base, which edge serves as a fulcrum on the contact seat, in a direction substantially normal to said one edge of the contact disc.

4. A multiple position switch comprising a housing, a central contact seat carried by one end of the housing having a flat seating surface and a square upstanding peripheral flange, four fixed contacts carried by said end of the housing spaced respectively from the sides of the square flange, a contact disc having a square base seated on the contact seat within and substantially filling the flange, a flange on the contact disc overlying and normally spaced from the fixed contacts, the disc having a concave dished surface opposite to the base, a handle projecting through the other end of the housing and mounted therein for universal angular movement, a plunger slidably carried by the handle and engaging the concave surface of the disc, and a spring urging the plunger outwardly of the handle toward the disc for normally maintaining said disc, handle and plunger in axial position.

5. A multiple position switch comprising a housing, a central contact seat carried by one end of the housing, a plurality of fixed contacts carried by said one end of the housing and spaced around the contact seat, the contact seat having a substantially flat seating surface, a contact

disc having a base to seat on the contact seat and whose periphery is defined by a plurality of connected straight lines registering with the fixed contacts respectively, said contact seat having means for maintaining said disc in such registering relation, a flange on the contact disc overlying and normally spaced from the fixed contacts, a handle extending through the other end of the housing and mounted therein for universal angular movement, and a spring press member carried by the handle and engaging the concave dished surface of the disc for normally

and resiliently maintaining said flat base of the disc seated flat upon said flat base of the contact seat, with the handle in axial position and the switch in an off position.

References Cited in the file of this patent

UNITED STATES PATENTS

Number	Name	Date
1,912,624	Douglas	June 6, 1933
2,469,336	Kohl	May 3, 1949