Aug. 15, 1950 A. I. APPLETON ET AL 2,519,215

ROTARY SNAP SWITCH

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FIG. 1

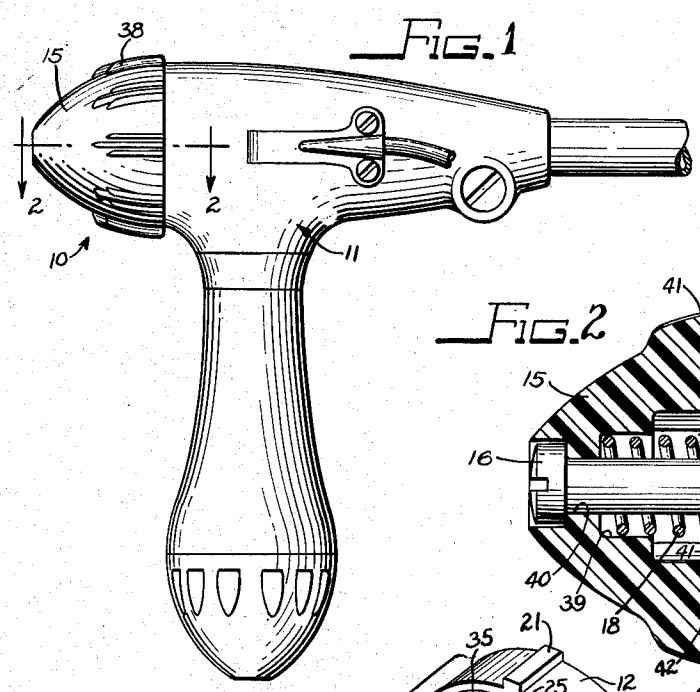


FIG. 2

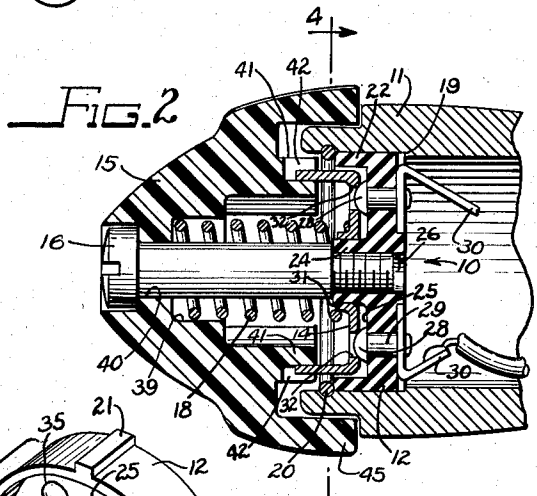


FIG. 3

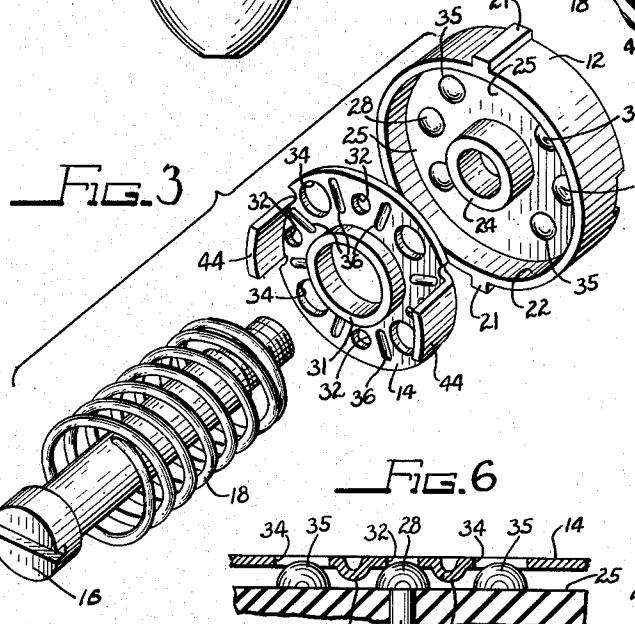


FIG. 4

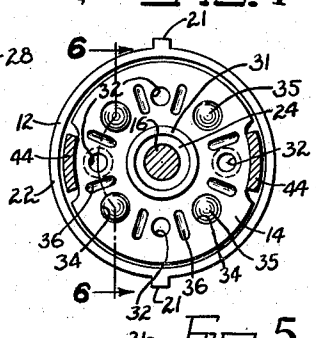


FIG. 5

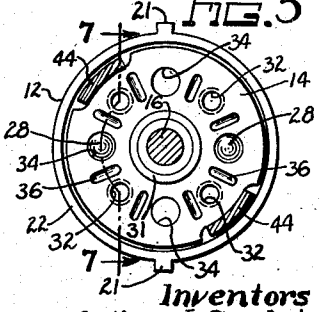
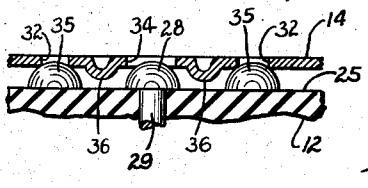


FIG. 6

FIG. 7



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ROTARY SNAP SWITCH

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5 Claims. (Cl. 200—63)

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The present invention relates generally to electrical switches and more specifically to a novel rotary snap switch finding particular but by no means exclusive utility in connection with automobile accessories such as spotlights.

One object of the invention is to provide a novel rotary snap switch having a simple, positive action and which will perform reliably over a relatively long life.

Another object is to provide a rotary snap switch of rugged and simple construction which will lend itself to economical manufacture on a mass production basis largely from molded plastic and stamped sheet metal parts.

Other objects and advantages will become apparent as the following detailed description proceeds, taken in connection with the accompanying drawings, wherein:

Figure 1 is an elevation of an automobile spotlight handle which has been adapted to house an illustrative switch embodying the present invention.

Fig. 2 is an enlarged fragmentary sectional view taken longitudinally through the switch shown in Fig. 1 and in the plane of the line 2—2.

Fig. 3 is an exploded perspective view detailing various component parts of the switch.

Figs. 4 and 5 are fragmentary transverse sectional views of the switch taken in the plane of the line 4—4 in Fig. 2 and showing the rotary contact member in the closed circuit and open circuit positions, respectively.

Figs. 6 and 7 are enlarged fragmentary sectional views detailing under closed circuit and open circuit conditions the relationship between the rotary contact member and certain parts fixed to the terminal block, such views being taken respectively in the plane of the line 6—6 in Fig. 4 and in the plane of the line 7—7 in Fig. 5.

While the invention is susceptible of various modifications and alternative constructions, a preferred embodiment has been shown in the drawings and will be described below in considerable detail. It should be understood, however, that there is no intention to limit the invention to the specific form disclosed, but on the contrary, the intention is to cover all modifications and alternative constructions falling within the spirit and scope of the invention as expressed in the appended claims.

Upon more specific reference to the drawing, it will be noted that there is shown an exemplary rotary snap switch 10 embodying the invention and housed, for purposes of illustration,

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within the handle 11 of an automobile spotlight. The switch 10 comprises a terminal block 12 of molded phenolic plastic or the like, together with a rotary contact disc 14 and an actuating cap 15. These members are secured together by means of an assembly screw 16 with an approximate compression spring 18 interposed between the cap 15 and the rotary contact disc 14.

In the present instance, the terminal block 12 is substantially cylindrical in shape, being of appropriate size to nest against a shoulder 19 within the handle 11 (Fig. 2). The block 12 is retained in place by means of snap ring 20 and is constrained against rotation by one or more peripheral lugs 21 (Fig. 3). The outer face of the block 12 has an annular recess defining therein a skirt 22 and a central bearing boss 24. The latter has a centrally located, tapped hole 26 for receiving the threaded end of the assembly screw 16. Mounted in diametrically opposed relation on the floor 25 of the recess are stationary contacts 28 which, in the present instance, constitute rounded heads of a pair of rivets 29. These serve as conductors and also as mechanical fasteners for terminal lugs 30 on the underside of the block 12.

Provision is made in the switch 10 for closing and opening the circuit between the stationary contacts 28 as an incident to rotation of the contact disc 14 through a relatively small angle in either direction. Accordingly, the disc 14 is journaled on bearing boss 24, being formed with a central aperture surrounded by a bearing flange 31. In order to define a plurality of closed circuit positions. the face of the disc 14 has a set of circumferentially spaced holes 32, all of which are located at the same radial distance from the center. As indicated in the drawing, the holes 32 are arranged in diametrically opposed pairs which are adapted to register with the stationary contacts 28. To insure good electrical contact between the disc 14 and the contacts 28 when the holes 32 are in registration with the latter, the holes 32 are made of somewhat smaller diameter than the contacts 28. In certain instances it might be found desirable to taper the holes 32 slightly on the underside of the disc so as to create a circular band of contacting area between the peripheral portions of the holes 32 and the contacts 28 with which they are associated.

For the purpose of defining a plurality of open circuit positions in the switch 10, the rotary contact disc 14 is formed with a second set of circumferentially spaced holes 34, the latter being disposed in alternate series relation with the holes

32. The holes 34 are somewhat larger in diameter than the holes 32 so as to permit registration in diametrically opposed pairs with the contacts 28 but without having their peripheral portions touch the contacts 28.

In order to insure maintenance of the open circuit condition during registration of the holes 34 and the contacts 28, the floor 25 of the terminal block recess has a plurality of nonconductive buttons 35 integral therewith. The buttons 35 are spaced so as to register with the smaller holes 32 when the holes 34 are in registration with the contacts 28. Moreover, the buttons 35 are of comparable size to the stationary contacts 28 and when they engage the smaller holes 32, they tend to maintain the disc 14 in such a position that there will be adequate space between the peripheral edges of the openings 34 and the stationary contacts 28. Thus it will be appreciated that the buttons 35 serve to maintain the disc 14 in proper axial as well as circumferential relation with the stationary contacts 28.

For the purpose of minimizing wear upon the contacting members during interruption of the circuit and also to give the switch 10 a positive snap action which would enable a driver to operate it readily by sense of touch, the rotary contact member has a set or radial cam embossments 36 interposed in alternate series relation between the holes 32, 34. With this construction, it will be perceived that when the switch is moved from one position to another, the embossments 36 will cam over the stationary contacts 28 and the nonconductive buttons 35. Moreover, when the switch is shifted from the closed circuit to the open circuit position, the electrical break occurs between the embossments 36 and the contacts 28 rather than between the edges of the openings 32 and the contacts 28. This minimizes wear and tear on the current conducting areas and assures longevity of the switch.

Actuation of the switch 10 is effected by rotation of the cap 15 which may be made of plastic or some other appropriate nonconductive material. Exteriorly, the cap 15 may be provided with a plurality of peripheral teeth 38 of appropriate size and shape to enable the cap to be turned merely by thumb pressure. The interior of the cap is hollow and accommodates the assembly screw 16 together with the compression spring 18, the latter being suitably centered in a counterbore 39 concentric with screw opening 40. To connect the cap 15 with the disc 14 positively, the former is fashioned in the present instance with a pair of diametrically opposed driving lugs 41 having segmental recesses 42 which drivingly receive axial ears 44 projecting outwardly from the plane of the rotary contact disc 14. The cap also has a skirted portion 45 underlying the teeth 38 and extending axially over the end of the handle 11 to complete the protective housing of the switch.

In operation, the open circuit condition of the switch exists when the larger holes 34 register with the stationary contacts 28 (Figs. 5 and 7). At the same time, the smaller holes 32 register with the nonconductive buttons 35 which maintain the disc 14 in spaced relation from the contacts 28. If the cap 15 is subsequently turned in either direction, the radial embossments 36 will cam over the stationary contacts 28 and the nonconductive buttons 35, first compressing the spring 20 and then allowing the rotary contact member 14 to snap into its new position as the spring expands (Figs. 4 and 6). When this occurs, a pair of the smaller holes 32 will be brought into registration with the stationary contacts 28 and the larger holes 34 will then register with the nonconductive buttons 35. At this point, the peripheral edges of the holes 32 will make electrical contact with the buttons 28 and define the closed circuit position of the switch. By the use of several sets of openings arranged in alternate series relation, it will be noted that the switch may be actuated by rotation of the cap 15 through only a relatively slight angle.

In view of the foregoing, it will be apreciated at this point that the switch 10 possesses a number of important commercial advantages. First of all, the ruggedness and simplicity of the construction used, and in particular the combination of the low inertia rotary contact member 14 with the heavy loading spring 18, are adequate to insure that the switch will be free from the adverse effects of shock and vibration. In addition to the ruggedness of the parts themselves, the switch structure lends itself readily to adequate protective housing which also contributes to its reliability and performance. The construction utilized also lends itself readily to manufacture of the switch in a wide range of sizes.

We claim as our invention:

1. A rotary snap switch comprising the combination of a terminal block having a plurality of stationary contacts and a plurality of nonconductive projections, said contacts and said projections being arranged in circumferentially spaced relation on one face of said terminal block, a nonconductive bearing boss projecting outwardly from said one face of said terminal block, a rotary contact member journaled on said boss and having circumferentially spaced sets of openings therein, one set of openings being substantially smaller than said other set, said rotary contact member also having a set of embossments projecting toward said one face of said terminal block and spaced alternately with said openings of said contact member, means for actuating said rotary contact member manually, and a resilient member interposed between said means and said rotary contact member for urging the latter toward said one face of said terminal block.

2. A rotary snap switch comprising, in combination, a terminal block having an annular recess in one face thereof, a plurality of stationary contacts and a plurality of nonconductive buttons arranged in circumferentially spaced relation on the floor of said terminal block recess, an integral bearing boss projecting outwardly from the floor of said terminal block recess, a rotary contact disc journaled on said boss and having alternate sets of holes spaced circumferentially therein, the holes of one of said sets being substantially smaller than those of said other set, said rotary contact disc also having a set of cam embossments projecting toward the floor of said terminal block recess, said cam embossments alternating with said holes of said rotary contact disc, an actuating cap, means defining a positive driving connection between said cap and said rotary contact disc, and a compression loading spring interposed between said cap and said rotary contact disc for maintaining the latter securely against said stationary contacts and said nonconductive buttons.

3. A rotary snap switch comprising, in com-

bination, a terminal block having an annular recess in one face thereof defining an annular skirt and a central bearing boss, a pair of stationary contacts and a plurality of nonconductive buttons arranged in circumferentially spaced relation on the floor of said terminal block recess, a rotary contact disc of stamped sheet metal journaled on said boss and having alternate sets of circular holes spaced circumferentially therein, the holes of one of said sets being substantially smaller in diameter than those of said other set and said stationary contacts, a pair of ears extending axially from said rotary contact disc, a hollow actuating cap having means adapted to engage said ears to define a positive driving connection between said cap and said rotary contact disc, and a compression spring interposed between said cap and said rotary contact disc for maintaining the latter securely against said stationary contacts and said nonconductive buttons.

4. In a rotary snap switch, an integral rotary contact member of stamped sheet metal and comprising, in combination, a disc having a central bearing aperture, said disc also having first and second sets of openings therein, the openings of

said first set being disposed in alternate and circumferentially spaced relation with those of said second set and also being of substantially larger size, a plurality of cam embossments in said disc, said embossments being interposed between adjacent openings of each of said sets, and means for coupling said disc to a manual actuating member.

5. In a rotary snap switch, an integral rotary contact member comprising the combination of a disc having a central aperture surrounded by a bearing flange, said disc also having therein a first and a second set of holes disposed in alternate and circumferentially spaced relation, the holes of one of said sets being of substantially larger size than the holes of said other set, a plurality of radial cam embossments interposed in alternate series relation with the holes of each of said sets, and a pair of axially extending ears for transmitting an actuating torque to said disc.

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No references cited.