Oct. 17, 1950 H. W. BATCHELLER 2,526,061

SPRING PLUNGER SWITCH

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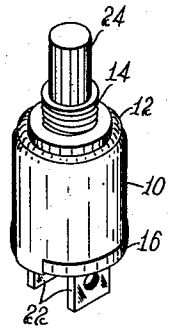


Fig. 1

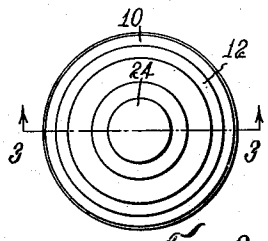


Fig. 2

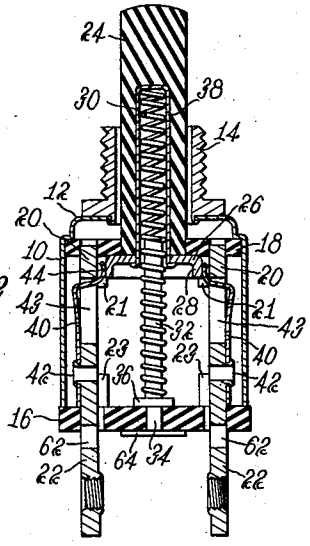


Fig. 3

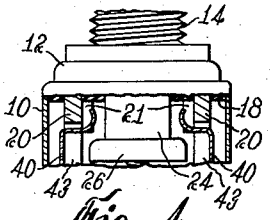


Fig. 4

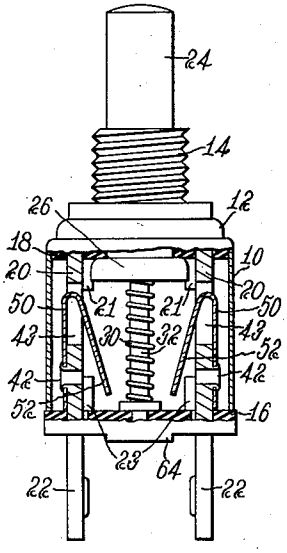


Fig. 5

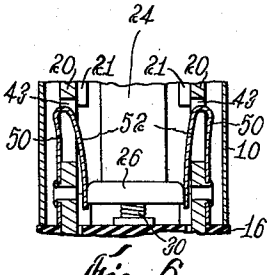


Fig. 6

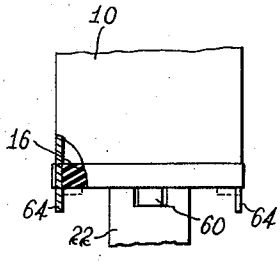


Fig. 7

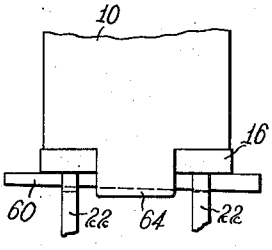


Fig. 8

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SPRING PLUNGER SWITCH

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Application February 17, 1948, Serial No. 8,829

1 Claim. (Cl. 200—159)

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This invention relates to an electric switch of the spring plunger type including a housing from which projects a plunger. The plunger can be pushed inward against the pressure of a spring to operate the switch, the spring acting to restore the plunger to its projected position when the pressure on the plunger is removed. The plunger carries a bridging conductor which electrically connects two fixed contact elements when the plunger is in one position, and is out of contact with the contact elements when the plunger is in its other position. The contact elements can be arranged acording to the service desired of the switch. That is, they can be located so that the switch is "on" when the plunger is out and is "off" when the plunger is pressed in, or vice versa.

The present invention has to do with the structure and arrangement of parts designed to facilitate the assembling operation. In the manufacture of electric switches, particularly those of relatively small size, the cost of labor is a large item which must be reckoned in the price of the switch. Any improvement in the construction and/or arrangement of parts which will make for more rapid assembling reduces by so much the price which the manufacturer must ask to make a profit. According to the present invention, the parts which go into the shell or casing are quickly and easily assembled and are held together as a unit by a temporary pin. The assembly is thrust into the open end of a shell, two ears at the open end of the shell are bent over to lock the assembly therein, and the pin is then removed, leaving the assembled switch complete.

For a more complete understanding of the invention, reference may be had to the following description thereof, and to the drawing, of which:

Figure 1 is an isometric view of a switch embodying the invention;

Figure 2 is a plan view of the same on a larger scale;

Figure 3 is a section on the line 3—3 of Figure 2;

Figure 4 is a fragmentary, elevational view of the switch shown in Figure 3, partly broken away to show in section;

Figure 5 is an elevational view of a switch with modified contact elements, a part being broken away to show in section;

Figure 6 is a portion of the structure shown in Figure 5, the movable parts being in a different position;

Figure 7 is a partial elevational view of the assembly switch before the shell is secured; and

Figure 8 is a fragmentary elevation of the

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switch shown in Figure 7, as seen from another angle.

The switch illustrated in the drawing is mounted in a cylindrical casing or shell 10, which is open at one end and has an end wall 12 at the other end. The end wall 12 is provided with a central aperture in which is secured a stem 14. This stem is hollow and is externally screw-threaded to facilitate the mounting of the switch on a supporting wall or panel (not shown). The open end of the shell 10 is closed by a disk 16 of insulation. A second disk 18 of insulation, having a central aperture aligned with that in the end wall 12, is seated against the end wall 12. Two parallel frame members 20 are secured at one end to the disk 18, each said member having a pair of laterally projecting ears 21 against which the disk 18 bears. The members 20 project through suitable apertures in the disk 16, the projecting portions 22 beyond the disk 16 serving as terminals for the switch. Each member 20 also has a pair of laterally projecting ears 23 against which the disk 16 bears.

Slidably mounted in the stem 14 is a plunger 24 of insulation, this plunger carrying at its inner end a bridging conductor 26 which, as shown, is in the form of a metal disk of greater diameter than the aperture in the disk 18, said conductor 26 having a peripheral flange 28. The conductor 26 is secured to the inner end of the plunger 24 and is adapted to move longitudinally within the shell when the plunger 24 is pressed. Opposing the inward motion of the plunger is a helical spring 30, a portion of which is located within a bore which extends axially into the plunger from the inner end thereof. One end of the spring presses against the plunger, the other presses against the end disk 16. To prevent the spring from buckling, a plug 32 is inserted in the end of the spring remote from the plunger, the plug having an end portion 34 fitting in a small hole in the center of the disk 16 and a collar 36 which bears against the disk. The plug is preferably long enough to extend as far as the disk 18, as illustrated in Figure 3. If desired, the bore may have a thin, metal liner 38 on which the coils of the spring 30 slide easily when the plunger is pushed in.

Each of the frame members 20 is provided with a contact element 40 which consists of a strip of resilient metal, such as copper or brass. Each strip 40 is secured to its frame member 20 by any suitable fastening means. As shown, an extruded lip 42 from the member 20 is inserted through a hole near an end of the strip 40 and

is then swaged over to engage against the outer face of the strip so as to hold it in position against the outer face of the frame member. The strip **40** is bent so that it extends through an aperture **43** in the member **20** and its free end portion **44** is disposed radially inward with respect to the member **20** which supports it. The end portions **44** are contact elements which are adapted to be simultaneously engaged by the flange of the bridging conductor **26** when the plunger is in its normal or outer position, as shown in Figure 3. When the plunger is pressed inward, the bridging conductor **26** moves out of contact with the elements **44** and thus opens the switch until the plunger is released so that the spring **30** can restore it to its normal position.

Figures 5 and 6 show a switch having a structure similar to that hereinbefore described excepting that the contact elements are differently formed so as to provide a switch which is normally open but which is closed when the plunger is pressed inward. In this switch, each contact element **50** is secured to the outer face of its frame member **20**, as previously described. The strip is bent back sharply so that the strip extends through the aperture **43** and its end portion **52**, which is engageable by the bridging conductor **26**, is located near the end of the shell remote from the plunger. The bridging conductor is thus normally separated from the contact elements **52** until the plunger is pushed inward to bring the bridging conductor into simultaneous contact with the contact elements **52** so as to close the switch.

In assembling the parts of the switch, the contact elements **40** or **50** are secured to their respective frame members **20**, as hereinbefore described, and two such frame members are secured to a disk **18**. The bridging conductor **26** is secured to the plunger **24**, this being done conveniently by swinging the end edge of the liner **38** over the adjacent surface of the conductor **26**, as indicated in Figure 3. The operator then inserts a spring **30** in the bore of the plunger and a plug **32** in the end of the spring. This plunger assembly is thrust through the central hole in the disk **18** until the conductor **26** bears against the disk. An end disk **16** is then pushed over the end portions **22** of the frame members **20** against the pressure of the spring **30** until it bears against the ears **23**. This disk is temporarily held in place by thrusting a pin **60** through holes **62** in the members **20**, as indicated in Figures 7 and 8.

The pressure of the spring **30** against the disk **16** prevents the pin **60** from prematurely falling out. The parts thus far assembled constitute a unit which can be readily handled without coming apart. This unit is inserted into a shell **10** so that the plunger projects through the hollow stem **14**. A suitable machine is employed to bend a pair of ears **64** at the open end of the shell so that these ears overlap the marginal portions of the disk **16** and, thus, hold the disk against the open end of the shell **10**. The assembly pin **60** can be removed then, completing the operation of assembling the switch.

I claim:

An electric switch comprising two elongated, rigid, metal frame members, each said member being formed with an aperture and having a pair of laterally projecting ears at an end thereof and a second pair of laterally projecting ears spaced from the other end thereof, an insulation disk secured to said frame members against the ears at the end thereof, a second insulation disk secured to said frame members against the other ears thereof, whereby said other end of each member projects beyond the second disk to serve as a terminal, a contact element mounted on each said frame member, each said element consisting of a strip of resilient metal secured near one end to the outer face of the corresponding frame member and extending through the aperture of said member to present a contact portion inward of the other side of said member, a plunger slidably extending through the first said disk, a bridging conductor carried by said plunger between said frame members and movable into simultaneous contact with the contact portions of said contact elements, and a compressed spring pressing against the second said disk and against said plunger.

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