April 18, 1939. R. F. SAMBLESON 2,155,244

ELECTRIC SWITCH

Filed Nov. 15, 1935

Fig. 1.

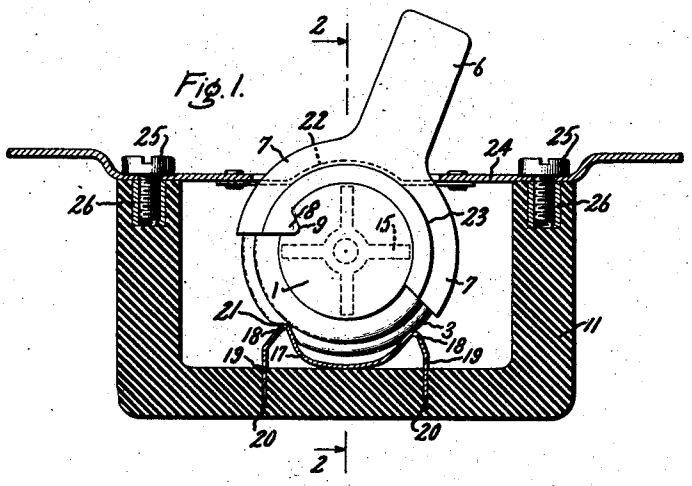


Fig. 2.

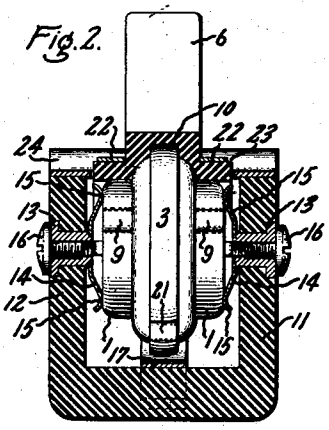
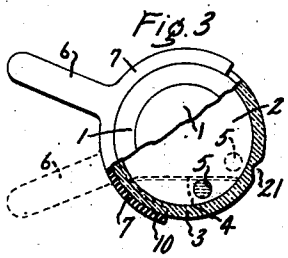


Fig. 3



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ELECTRIC SWITCH

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Application November 15, 1935, Serial No. 49,931

4 Claims. (Cl. 200—153)

The present invention relates to electric switches of the type having liquid contact circuit-closers for controlling the flow of current.

The object of my invention is to provide an improved construction and arrangement in a switch of this type, and for a consideration of what I believe to be novel and my invention attention is directed to the accompanying description and the claims appended thereto.

In the accompanying drawing, Fig. 1 is a sectional side elevation of a switch embodying my invention; Fig. 2 is a sectional view taken on line 2—2 of Fig. 1; and Fig. 3 is a diagrammatic view showing the construction and operation of the liquid contact circuit closer.

Referring to the drawing, I have illustrated my invention using a liquid contact circuit closer having a pair of cup-shaped metal terminals 1 which are separated by an insulating diaphragm 2 of refractory material, such as a ceramic material. The edges of the terminals are sealed by a bead 3 of glass which also seals the junctions between the diaphragm and the terminals. Within the space enclosed by the terminals is a suitable quantity of mercury 4 which forms the conduction medium between the terminals. In the manufacture of the circuit closer, the space enclosed by the terminals is evacuated and filled with hydrogen at a pressure of one or more atmospheres which increases the current interrupting capacity of the circuit closer. As shown by the full lines in Fig. 3, the diaphragm 2 is provided with an opening 5 which is submerged in the mercury when the circuit closer is in the current conducting position. When the circuit closer is in the current interrupting position, shown in dotted lines in Fig. 3, the opening 5 is above the mercury, and the circuit between the terminals is therefore broken or interrupted by the insulating diaphragm 2. Due to the construction of the circuit closer, the interruption of the circuit between the terminals takes place in the mercury as the circuit closer is turned so that the opening 5 in the diaphragm approaches the dotted line position. The above described construction is illustrative of a type of liquid contact circuit closer which is suitable for use in a switch embodying my invention.

For operating the liquid contact circuit closer, I have provided a handle 6 of molded thermoplastic material having forked ends 7 which envelope more than half the periphery of the circuit closer. One of the forked ends 7 is provided with projections 8 on opposite sides which fit within recesses 9 in the terminals of the circuit closer and on opposite sides thereof and prevent relative rotation between the handle and the circuit closer. The forked ends of the handle are snapped in place while hot and are held in place by the resilience of the forked ends. The gripping of the handle is increased by the shrinking of the material of the handle upon cooling so that after the handle has cooled, the circuit closer is tightly gripped by the handle. As shown in Fig. 2, the handle is shaped to conform with the outer surface of the circuit closer and is provided with a groove 10 which fits over the bead 3 and prevents sidewise displacement of the handle relative to the circuit closer.

The circuit closer is mounted within a housing 11 of molded insulating material having side walls 12 in which are molded tubular inserts 13. On the inner ends of these inserts are fixed contacts 14 having a plurality of flexible contact arms 15. In the outer end of the inserts are threaded binding screws 16 which clamp the line conductors to the inserts. The circuit closer is assembled in the housing by sliding between the contacts 14. In this position the flexible contact fingers 15 frictionally engage the outer surface of the terminals 1 and conduct electricity to the terminals. Since a plurality of spring contact fingers 15 are provided, the contact fingers align themselves with the surfaces of the terminals and provide good electrical contact. It is also apparent that this construction permits rotation of the liquid contact switch about its axis. The wiping action between the terminals and the contacts tends to prevent increased contact resistance.

At the bottom of the housing is a spring strip 17 provided with projections 18 which slidably engage the periphery of the circuit closer at angularly spaced points and also having its ends 19 slidably carried in slots 20 in the bottom wall of the housing. The projections 18 provide supports for the circuit closer and are also adapted to engage a notch 21 formed in the periphery of the glass bead 3, and thereby to hold the circuit closer resiliently in a fixed position. The circuit closer is held within the housing 11 and against the projections 18 by two curved spring strips 22 which engage the curved surfaces 23 of the handle on either side of the handle. As shown in Fig. 2, the edges of the spring strips 22 engage the sides of the handle 6 and assist in centering the handle in the housing. The spring strips 22 are riveted to a support or mounting strap 24 which is secured to the top of the housing 11 by screws 25 threaded into inserts 26. The mount-

ing strap is adapted to be secured to an outlet box to mount the switch therein.

In the assembly of the switch, the handle 6 is secured to the liquid contact circuit closer and the contacts 14 are secured to the inner end of the inserts 13 in the side walls of the housing. The ends 19 of the spring strip 17 are then placed in the slots 20 in the bottom wall of the housing, and the circuit closer is inserted in the housing so that the bottom of the glass bead 3 engages the projections 18 of the spring strip 17 and the terminals 1 engage the contacts 14. The mounting strap 24 is then secured to the top of the housing by the screws 25, thereby holding the circuit closer in place.

In the use of the switch, the switch is mounted in an outlet box by means of the mounting strap 24. Due to the location of the opening 5 in the diaphragm 2, the right-hand end of the mounting strap 24 should be at the top of the outlet box. When so mounted, vertical movement of the handle 6 causes the circuit closer to be rotated about its axis. When the handle is in the raised position, shown in full lines on Fig. 3, the opening 5 in the diaphragm 2 is submerged in the mercury, and an electric circuit is completed through the mercury between the terminals 1. When the handle is in the lowered position, as shown in dotted lines in Fig. 3, the opening 5 is raised out of the mercury, and the circuit between the terminals 1 is broken. The handle is resiliently held in either the raised or the lowered positions by the engagement of one of the projections 18 with the notch 21 in the bead 3. It is apparent that by changing the location of the opening 5 in the diaphragm 2, or by changing the positions of the notches 9 and 21, the switch can be adapted for mounting in other than vertical positions.

What I claim as new and desire to secure by Letters Patent of the United States is:

1. In an electric switch, a cylindrical liquid contact circuit closer, and a molded handle having forked ends of thermoplastic material partially enveloping the periphery of the circuit closer, said forked ends being resilient and the surfaces thereof engaging the circuit closer being normally spaced apart a less distance than the engaged surfaces on the circuit closer whereby the forked ends are forced apart by the circuit closer and the circuit closer is gripped therebetween and the handle is held thereon by the resilience of said forked ends.

2. In an electric switch, a cylindrical liquid contact circuit closer, and a molded handle having forked ends of thermoplastic material partially enveloping the periphery of the circuit closer and in gripping relation thereto, said handle being held thereon by the resilience of said forked ends, and said circuit closer and one of the forked ends of the handle having interfitting projections and depressions.

3. In an electric switch, a cylindrical liquid contact circuit closer having cup-shaped terminals joined by a bead of sealing material, and a molded handle of thermoplastic material having a groove into which said bead fits and having forked ends partially enveloping the periphery of the terminals and in gripping relation thereto, said handle being held thereon by the resilience of said forked ends, and said circuit closer and one of the forked ends of the handle having interfitting projections and depressions.

4. In an electric switch, a cylindrical liquid contact circuit closer having cup-shaped terminals joined by a bead of sealing material, and a molded handle of thermoplastic material having a groove into which said bead fits and having forked ends partially enveloping the periphery of the terminals, said forked ends being resilient and the surfaces thereof engaging the circuit closer being normally spaced apart a less distance than the engaged surfaces on the circuit closer whereby the forked ends are forced apart by the circuit closer and the circuit closer is gripped therebetween and the handle is held thereon by the resilience of said forked ends.

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