

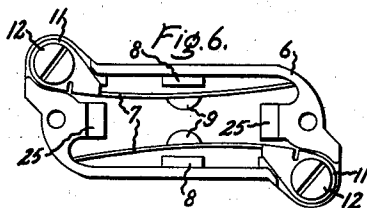
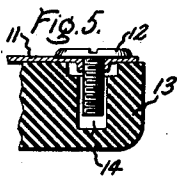
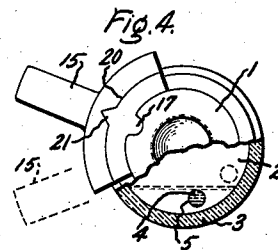
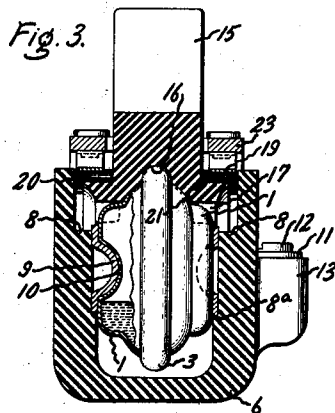
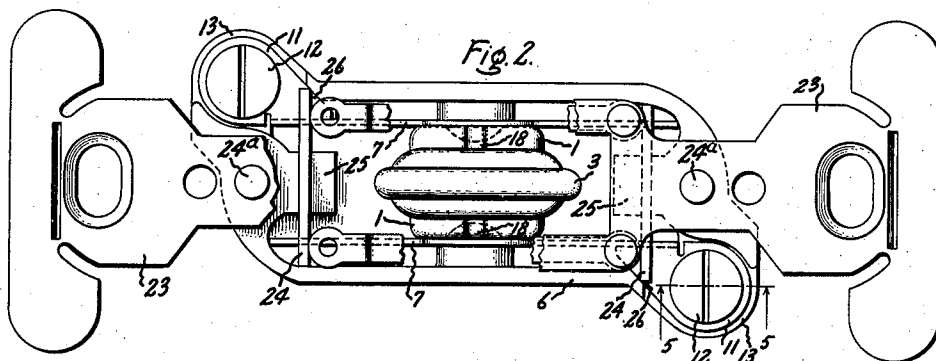
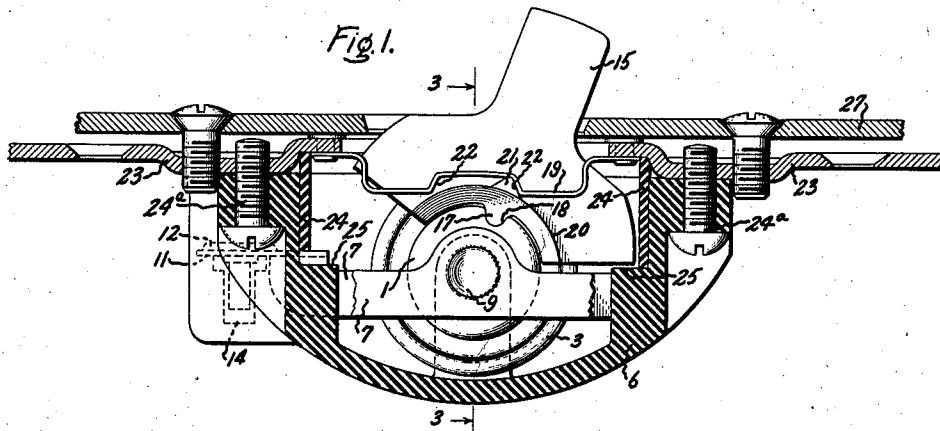
Jan. 3, 1939.

R. F. SAMBLESON

2,142,154

ELECTRIC SWITCH

Original Filed March 21, 1936.



Inventor:
Robert F. Sambleson,
by *Harry C. Dunham*
His Attorney.

UNITED STATES PATENT OFFICE

2,142,154

ELECTRIC SWITCH

Robert F. Sambleson, Bridgeport, Conn., assignor
to General Electric Company, a corporation of
New York

Application March 21, 1936, Serial No. 70,063
Renewed September 23, 1937

7 Claims. (Cl. 200—152)

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.

In the accompanying drawing, Fig. 1 is a sectional side elevation of a switch embodying my invention; Fig. 2 is a plan view of the switch partially broken away; Fig. 3 is a sectional view taken on line 3—3 of Fig. 1; Fig. 4 is a diagrammatic view showing the construction and operation of the liquid contact circuit closer; Fig. 5 is a fragmentary sectional elevation taken on line 5—5 of Fig. 2, and Fig. 6 is a top plan view of the switch with the liquid contact circuit closer removed.

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 junction between the diaphragm and the terminals. Within the space enclosed by the terminals is a suitable quantity of mercury 4 which forms the conducting 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. 4, 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. 4, the opening 5 is above the mercury, and the circuit between the terminals is therefore 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 in the diaphragm approaches the dotted line position. The above-described construction is typical of a liquid contact circuit closer which is suitable for use in a switch embodying my invention. This liquid contact circuit closer is being claimed in Patent 2,101,092 issued Dec. 7, 1937, to John H. Payne.

The liquid contact circuit closer is carried within a housing 6 of a suitable molded insulating material. On either side of the circuit closer

are resilient contact strips 7 which rest on shoulders 8a on bosses 8 on the side walls of the housing. As shown in Fig. 6, the contacts are arranged to bear against the side walls of the housing at each end. The portions of the contacts intermediate the ends are bowed inwardly and are normally spaced from the side walls of the housing. The bowed portions of the contacts are provided with spherical projections 9 which fit into a complementary depression 10 in each of the terminals. The portions 9 and 10 provide a ball and socket connection between the contacts 7 and the terminals and therefore provide a construction which supports the liquid contact circuit closer for rotation about the axis of its terminals. Since the portions 9 and 10 are spherical, the contact obtained between these parts is substantially independent of the alignment of the circuit closer and the contacts. During the rotation of the circuit closer, the wiping action between the terminals and the contacts tends to prevent increase of contact resistance. The same support for the circuit closer would be provided if the projections 9 were formed on the terminals 1 and the depressions 10 were formed in the contacts 7. At one end of each of the contacts is a flange 11 into which is threaded a terminal screw 12 for clamping a line conductor to the contact. The flanges 11 extend through openings in the side walls of the housing over bosses 13 which are provided with clearance holes 14 (see Fig. 5) for the terminal screws 12.

When the circuit closer is between the contacts the bowed portions of the contacts are forced outward so that the contacts rest on the shoulders 8a. Since each end of the contacts bears against the side walls of the housing, the resilience of the contacts is utilized to effect the contact pressure between the terminals and the contacts.

For operating the switch, I have provided a handle 15 of molded insulating material which fits over the top of the liquid contact circuit closer. The handle is provided on its under side with a groove 16 which fits over the glass bead 3 and prevents lateral displacement of the handle relative to the circuit closer. On the under side of the handle are projections 17 which fit in depressions 18 in the terminals 1 and prevent relative rotation between the handle and the circuit closer. The handle is held in place by a pair of spring strips 19 which extend over the curved flanges 20 on either side of the handle. On the flanges 20 are projections 21 which cooperate with the spring strips and resiliently hold the

handle in either of its extreme positions. The spring strips are provided with stops 22 which cushion the movement of the handle so that the movement of the handle to either extreme position is not accompanied by a sharp noise due to the impact of the handle with a stationary part. The spring strips 19 are riveted to a support or mounting strap 23 which is secured to the housing 6 by means of screws 24a threaded from the under side of the housing. The mounting strap provides a means for mounting the switch in an outlet box. When so mounted, the right-hand end of the mounting strap 23 should be at the top of the outlet box.

Besides holding the handle 15 in place on the liquid contact circuit closer, the spring strips 19 also force the circuit closer toward the bottom of the housing 6. Due to the socket connection provided between the contacts 7 and the terminals 1, this downward force increases the contact pressure between the contacts 1 and the terminals.

Since the contacts 7 are adjacent the side walls of the housing, spreading of the contacts is prevented, and this force does not displace the contacts 7 relative to the terminals. The contacts 7 are clamped against the bosses 13 and the shoulders 8a by strips 24 of insulating material arranged between the mounting strap 23 and the upper surface of the contacts. As shown in Figs. 1 and 2, each of the strips 24 rests against a boss 25 on the end wall of the housing and one end of the strip rests against the end 26 of one of the side walls of the housing. The strips 24 are therefore prevented from twisting when the mounting strap is secured to the housing. With this arrangement the contacts are securely held in place in the housing without the use of inserts molded into the housing.

In the assembly of the switch, the terminal screws 12 are attached to the contacts 7. The projecting portions 9 of the contacts are then placed within the depressions 10 in the terminals 1. The handle 15 is then placed on the liquid contact circuit closer so that the projections 17 of the handle fits within the depressions 8 in the terminals. The assembled parts are then inserted through the open end of the housing. The strips 24 are then inserted in the housing and the mounting strap 23 is attached to the housing holding the parts in assembled relation. A cover plate 27 may be attached to the mounting strap.

In the use of the switch, the switch is mounted in an outlet box by means of the mounting strap 23, the right-hand end of the mounting strap being located at the top of the outlet box. When so mounted, vertical movement of the handle 15 causes the liquid contact circuit closer to be rotated about its axis. When the handle 15 is in the raised position, as shown in full lines in Fig. 4, the opening 5 in the diaphragm 2 is submerged in the mercury, and an electric circuit is completed between the terminals 1 through the mercury. When the handle is in the lowered position, as shown in dotted lines in Fig. 4, 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 the projections 21 with the spring strips 19. It is apparent that by changing the location of the opening 5 in the diaphragm 2, or by changing the position of the depressions 18, the switch can be adapted for mounting in other than vertical positions.

The switch construction shown in this application is being claimed broadly in my application Serial No. 49,927, filed Nov. 15, 1935.

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

1. In an electric switch, spaced resilient contact strips supported at each end and having inwardly bowed portions intermediate the ends providing opposed contact surfaces, a liquid contact circuit closer between said contacts and having terminals frictionally engaging said opposed surfaces, the intermediate portions of said contacts being forced outward by the circuit closer whereby the resilience of the contact strips is utilized to effect the contact pressure, and interfitting portions in said terminals and said contact surfaces having frictionally engaging surfaces inclined to the axis of said terminals whereby said circuit closer is supported for rotation about the axis of its terminals.

2. In an electric switch, a housing, spaced resilient contact strips bearing at each end on the walls of the housing and having inwardly bowed portions intermediate the ends, providing opposed contact surfaces, said contact surfaces being normally spaced from the walls of the housing, a liquid contact circuit closer between said contacts and having terminals frictionally engaging said opposed surfaces, the intermediate portion of said contacts being forced outward by the circuit closer whereby the resilience of the contacts is utilized to effect the contact pressure, and interfitting portions in said terminals and said contact surfaces having frictionally engaging surfaces inclined to the axis of said terminals whereby the circuit closer is supported for rotation about the axis of its terminals.

3. In an electric switch, a housing, spaced resilient contact strips bearing at each end on the walls of the housing and having inwardly bowed portions intermediate the ends providing opposed contact surfaces, said contact surfaces being normally spaced from the walls of the housing, a liquid contact circuit closer between said contacts and having terminals frictionally engaging said opposed surfaces, the intermediate portions of said contacts being forced outward by the circuit closer whereby the resilience of the contacts is utilized to effect the contact pressure, interfitting portions in said terminals and said contact surfaces having frictionally engaging surfaces inclined to the axis of said terminals whereby the circuit closer is supported for rotation about the axis of its terminals, a mounting strap secured to said housing for mounting the switch in an outlet box or the like, and means carried by said mounting strap and exerting a force on the circuit closer transversely to its axis for maintaining the contact pressure between the terminals and the contacts.

4. In an electric switch, a housing having side walls provided with openings and having bosses outside said openings, spaced resilient contact strips bearing at each end on the walls of the housing and having inwardly bowed portions intermediate the ends providing opposed contact surfaces, said contact surfaces being normally spaced from the walls of the housing, flanges on said contact strips extending over said bosses and being provided with means for attaching conductors thereto, a liquid contact circuit closer between said contacts and having terminals frictionally engaging said opposed surfaces, the intermediate portions of said contacts being forced outward by the circuit closer whereby the re-

silience of the contacts is utilized to effect the contact pressure, interfitting portions in said terminals and said contact surfaces having frictionally engaging surfaces whereby said circuit closer is supported for rotation about the axis of its terminals, a mounting strap secured to said housing for mounting the switch in an outlet box or the like, and means between said mounting strap and said contacts for holding said contacts against said bosses.

5. In an electric switch, spaced resilient contact strips supported at each end and having inwardly bowed portions intermediate the ends providing opposed contact surfaces, a liquid contact circuit closer between said contact strips and having terminals frictionally engaging said opposed surfaces, the intermediate portions of said contacts being forced outward by the circuit closer whereby the resilience of the contact strips is utilized to effect the contact pressure between the engaging surfaces of the contact strips and terminals, and interfitting portions in said terminals and said opposed surfaces whereby the circuit closer is supported for rotation about the axis of its terminals.

6. In an electric switch, a housing, spaced resilient contact strips bearing at each end on the walls of the housing and having inwardly bowed portions intermediate the ends providing opposed contact surfaces, said contact surfaces being normally spaced from the walls of the housing, a liquid contact circuit closer between said contacts

and having terminals frictionally engaging said opposed surfaces, the intermediate portion of said contacts being forced outward by the circuit closer whereby the resilience of the contacts is utilized to effect the contact pressure between the engaging surfaces of said contact strips and said terminals, and interfitting portions in said terminals and said opposed surfaces whereby the circuit closer is supported for rotation about the axis of its terminals.

7. In an electric switch, a housing, spaced resilient contact strips bearing at each end on the walls of the housing and having inwardly bowed portions intermediate the ends providing opposed contact surfaces, said contact surfaces being normally spaced from the walls of the housing, a liquid contact circuit closer between said contacts and having terminals frictionally engaging said opposed surfaces, the intermediate portions of said contacts being forced outward by the circuit closer whereby the resilience of the contacts is utilized to effect the contact pressure between the engaging surfaces of the contact strips and terminals, interfitting portions in said terminals and said opposed surfaces whereby the circuit closer is supported for rotation about the axis of its terminals, a member secured to the housing, and means including a handle between said member and the circuit closer for exerting a force on the circuit closer transversely to the axis of its terminals.

ROBERT F. SAMBLESON.