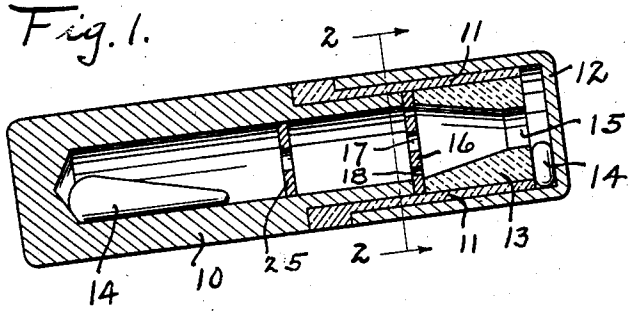
Dec. 5, 1939. J. H. STALEY 2,182,216

BAFFLED MERCURY SWITCH

Filed March 19, 1938

Fig. 1.



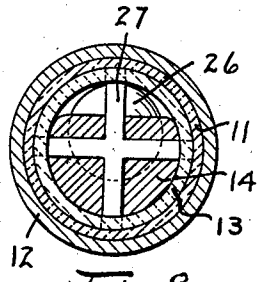
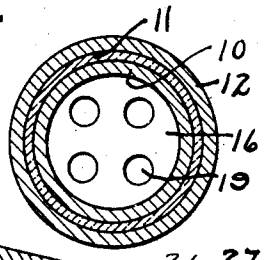


Fig. 8.

Fig. 3.



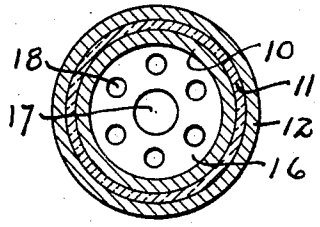
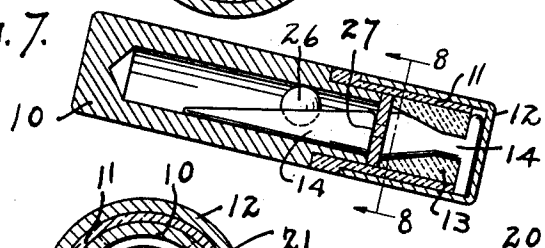


Fig. 2.

Fig. 7.



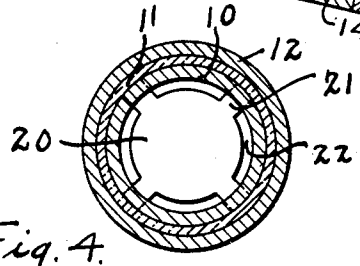


Fig. 4.

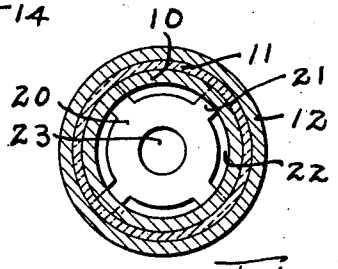


Fig. 5.

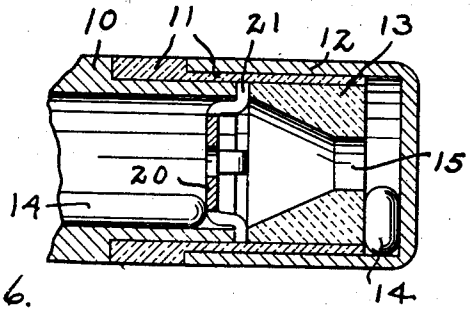


Fig. 6.

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2,182,216

BAFFLED MERCURY SWITCH

Joseph H. Staley, Columbus, Ind.

Application March 19, 1938, Serial No. 196,828

8 Claims. (Cl. 200—33)

This invention relates to a mercury switch of the tubular, metal wall type, and reference is made to my United States Letters Patent No. 1,906,118 for a Mercury switch, issued April 25, 1933.

The primary object of this invention is to provide means within the tube forming the switch to prevent splashing of the mercury as it flows from one electrode to the other or bridges therebetween, and further, to provide means for setting up a time delay in the making and breaking of a circuit by the switch through controlled flow of the mercury.

These and other objects and advantages of the invention will become apparent to those versed in the art from the following description as illustrated in the accompanying drawing, in which

Fig. 1 is a central longitudinal section through a structure embodying the invention;

Fig. 2, a transverse section on the line 2—2 in Fig. 1;

Fig. 3, a similar view in section showing a modified form;

Fig. 4, a similar view in section of a further modified form;

Fig. 5, a similar view in section of a still further modified form;

Fig. 6, a detail in longitudinal section of that form of the invention shown in Fig. 5 in further modified form;

Fig. 7, a longitudinal vertical section through a still further modified form; and

Fig. 8, a transverse section on a larger scale on the line 8—8 in Fig. 7.

The switch is primarily built up to have a tubular metallic body 10 having one end closed and the other end receiving thereover an insulating sleeve 11 over which is engaged a cap 12 in telescoping arrangement and forming a tight fit between the various members to effect a gas tight seal therebetween.

A refractory bushing 13, hereinafter termed a breaker, is compressibly held within the insulating sleeve 11 adjacent the cap end. The breaker 13 is made out of any suitable material which will resist deterioration under the action of an electric arc which may occur within the central bore through the breaker. This material may be varied but will take on the nature of soap-stone or fused silica mixtures.

The internal formation of the breaker 13 may vary somewhat in detail but it is necessary that there be a bore therethrough through which mercury 14 may flow to form a connecting medium between the body 10 and the cap 13 so as to establish an electric circuit therebetween as the body may be rocked accordingly. Also the internal shape of the breaker 13 must be made to assist in quenching the arc that may arise as the mercury connection between the two electrodes is broken by reverse tilting of the switch.

In the present form, as is also shown in my patent above referred to, this breaker 13 has an internal bore consisting first of a short cylindrical length 15 at the cap end and then an enlarging bore extending rearwardly therefrom in a conical manner as indicated in Fig. 1.

When the switch is given a rather quick motion in tilting, the mercury 14 may be thrown to the end of the chamber with the result that some of the mercury will rebound in the nature of a splash and occasionally cause a re-establishment or a re-making of the electrical circuit between the body and cap parts of the switch. In many installations, this action is extremely detrimental. In order to overcome this action, a diaphragm or baffle 16 is introduced within the chamber of the switch to extend across the chamber to be in the path of the mercury 14 as it may flow toward and away from the cap 12 through the bore 15. This baffle 16 may take a number of forms depending upon the nature of service required for individual installation.

In the form shown in Figs. 1 and 2, the baffle 16 is a disk of metal having a central bore 17 therethrough with a plurality of smaller holes 18 spaced therearound. This disk 16 is held in position by being placed across the end of the tube 10 within the sleeve 11 and there held by pushing the breaker 13 snugly thereagainst. In this form the metal baffle 16 becomes an extension of the electrode body 10. As the tube may be tilted, the mercury 14 may flow through the various holes 17 and 18 depending upon the degree of tilt of the tube and its axial rotated position. In any event, the mercury may flow initially through the smaller holes 18 and more rapidly through the larger hole 17 upon increased tilting of the tube, but in any event, the baffle presents a retarding influence upon the flow of the mercury to either side thereof.

It is obvious that by controlling the sizes of these holes, a suitable time delay may be secured in the flow of the mercury from one side of the baffle to the other in order to convey all of the volume of the mercury through the baffle.

In some instances, the flow of mercury will be better controlled by omitting the central hole 17 and merely employing a series of holes 19, Fig. 3, spaced around the baffle at regular intervals.

A still further modification of the baffle means is shown in Fig. 4 where the baffle 20 is made to have a diameter less than that of the internal diameter of the chamber in the tube 10 and legs 21, here shown as four (4) in number, are provided to extend from the baffle to be engaged between the ends of the body 10 and the breaker 13. This construction provides a baffle blocking off the central area of the chamber and leaving

arcuate openings 22, around the edge of the baffle immediately adjacent the wall of the chamber and within the tube. A further obstruction or retarding influence is offered by reason of the fact that a groove is left in the chamber between the legs 21 and the ends of the body 10 and the breaker 13.

The form of the baffle 20, as shown in Fig. 4, may be further modified to have a central hole 23 therethrough as indicated in Fig. 5 so as to permit a freer flow of the mercury past the baffle.

As indicated in Fig. 6, the baffle 20 in either or both forms may be spaced away from the end of the breaker 13 back into the chamber of the body 10 if desired, particularly to secure greater area of contact between mercury and the tube wall, by providing longer legs 21 and bending them forwardly and then around into the groove between the body and breaker ends. It is obvious that when the baffle in any of the forms indicated is made of metal, the baffle then serves, as above indicated, as a part of the electrode formed by the body 10. However, it is possible and desirous in some instances to make this baffle of a non-conducting material to have it in effect as a part of the breaker 13 rather than as a part of the body 10.

As indicated in Fig. 1, a baffle 25 (taking the form of any of the other baffles described), may be mounted directly in the chamber of the body 10 by forcing the baffle therein with a pressed fit. This structure permits the baffle to be spaced much further back of the breaker 13 and is permitted by the extended legs 21 in the form shown in Fig. 6. Under some conditions both baffles 16 and 25 would be employed in the same switch for greater time delay.

Referring to Figs. 7 and 8, a very effective anti-splash means is employed in the nature of an iron ball 26 which merely floats on the mercury and is of sufficient diameter as will prevent splash back past it of the mercury. The ball should be at least substantially equal in diameter to two-thirds of the chamber diameter in the body 10. In order to prevent stoppage of the bore through the breaker 13, some ball intercepting means is provided to stop the ball but permit the merucry to flow on past to the breaker. This intercepting means may take a number of forms such as pins or the like projecting from the wall of the body chamber, or any transversely extending member, the form herein shown, Fig. 8, comprising a pair of crossed pins or wires 27 formed integrally and held against longitudinal displacement. In any event, the ball 26 serves very effectively as a baffle.

While I have herein shown and described my invention in the particular forms, it is obvious that further structural variations may be employed without departing from the spirit of the invention, and I, therefore, do not desire to be limited to such precise forms beyond the limitations as may be imposed by the following claims.

I claim:

1. In a mercury tube switch, a metal tube serving as an electrode, a quantity of mercury flowable in the tube, an electrode carried by and insulated from said tube, a breaker between the electrode and the tube, and a mercury flow baffle maintained in abutment with the tube by said breaker.

2. In a mercury tube switch, a metal tube serving as an electrode, a quantity of mercury flowable in the tube, an electrode carried by and insulated from said tube, a breaker between the electrode and the tube, and a mercury flow baffle between the breaker and the tube, said baffle having a major central mercury flow passage therethrough, and a plurality of additional passages smaller in size from said one passage concentrically positioned therearound whereby said mercury may quickly flow through the baffle upon tilting of the tube to cause the mercury to reach the level of and pour through said major passage and comparatively slowly flow through the baffle through said smaller passages only upon less tilting of the tube.

3. In a mercury tube switch, a metal tube serving as an electrode, a quantity of mercury flowable in the tube, an electrode carried by but insulated from said tube, a breaker between the electrode and the tube, and a mercury flow baffle between the breaker and the tube, and mounting legs extending from the baffle compressively gripped between said breaker and said tube.

4. In a mercury tube switch, a metal tube serving as an electrode, a quantity of mercury flowable in the tube, an electrode carried by but insulated from said tube, a breaker between the electrode and the tube, and a mercury flow baffle between the breaker and the tube, a shoulder around the tube, said baffle being mounted against said shoulder, and said breaker compressively retaining the baffle against the shoulder.

5. In a mercury tube switch, a metal tube serving as an electrode, a quantity of mercury flowable in the tube, an electrode carried by but insulated from the tube, a breaker between the electrode and the tube, a mercury flow baffle between the electrode and the tube, and mounting legs extending from the baffle maintained in abutment with said tube by said breaker, and said baffle having mercury passageways spaced thereabout between said legs.

6. In a mercury tube switch having a chamber therein, a pair of electrodes in spaced apart relation in the chamber, a quantity of mercury flowable in the chamber upon tilting thereof to bridge the electrodes, and a baffle in said chamber between the electrodes having a major central opening surrounded by a plurality of lesser openings, whereby a quick flow of mercury is had through the baffle upon tilting the switch to have the mercury pass through the major opening and a slower flow is had upon less tilting to confine the flow through said lesser openings.

7. In a mercury tube switch, a metal tube serving as an electrode, a quantity of mercury flowable in the tube, an electrode carried by and insulated from said tube, a breaker between the electrode and the tube, and a mercury flow baffle maintained in abutment with the tube by said breaker, said electrode consisting of a tubular member telescoping with said tube, an insulating collar interposed between said tube and said electrode, and said breaker being frictionally engaged in and by said collar to maintain said baffle abutment.

8. In a mercury tube switch, a metal tube serving as an electrode, a quantity of mercury flowable in the tube, an electrode carried by and insulated from said tube, a breaker between the electrode and the tube, and a mercury flow baffle maintained in abutment with the tube by said breaker, said tube having an extension beyond said baffle abutment, and said breaker being carried in said extension in compressive engagement with said baffle.

JOSEPH H. STALEY.