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MERCURY SWITCH

Filed June 8, 1937

Fig. 1

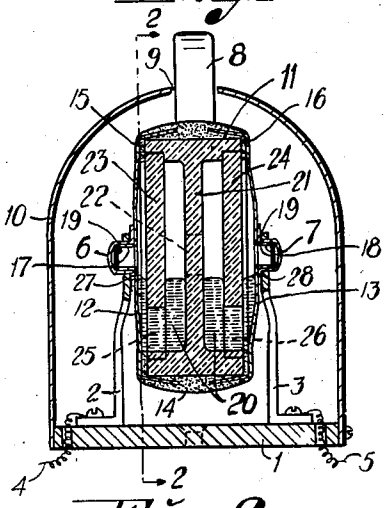
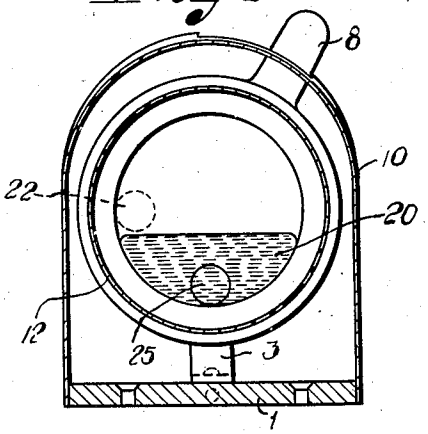


Fig. 2



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MERCURY SWITCH

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5 Claims. (Cl. 200—152)

The present invention relates to mercury switches of the type comprising a closed receptacle partly filled with mercury, and solid metallic electrodes therein, said electrodes being adapted to be connected in an outer circuit and, in the closed position of the switch, to be connected with each other within the receptacle by direct metallic contact formed by the mercury.

One object of the invention is to provide an improved mercury switch of the type described, in which impurities disengaged from the solid electrodes due to the action of the electric arc or of mercury vapor are prevented from passing to that section of the switch, in which the contact makings and breakings are performed, thus maintaining the surface of the mercury in said section clean, whereby the arc remains easy to break and excessive heating is prevented even after the switch has been used for a long period.

Another object of the invention is to prevent the arc and the mercury vapor from coming into contact with the solid electrodes so as to reduce or eliminate the disengagement of impurities from the latter and to decrease the intermediate resistance between the electrodes and the mercury.

A further object of the invention is to provide a mercury switch of the type described, in which the electrodes are screened off from the free mercury surface in the section of the receptacle, where the contact makings and breakings are performed, in such a manner that the passage of particles disengaged from the electrodes to said mercury surface is prevented or made more difficult.

Still another object of the invention is to provide a switch of the type described having two partitions protruding into the mercury between the electrodes and separating the parts of the free mercury surface located above or at the electrodes from the parts of said surface located in the space where the contact is made or broken, in order to retain the impurities on the first-mentioned parts of the mercury surface and to prevent them from moving therefrom.

A still further object is to arrange said partitions in such a manner that a so called mercury trap is formed, by which the gas-filled spaces near the electrodes are separated from the remaining gas-filled spaces.

A preferred embodiment of the switch according to the invention will be described hereinafter with reference to the accompanying drawing, in which Figures 1 and 2 are two sectional elevations at right angles to each other, the section according to Fig. 2 being taken along the line 2—2 in Fig. 1.

In the drawing, 1 designates a base plate and 2, 3 two resilient arms attached thereto. The mercury switch proper is rotatably supported by these arms which by their outer ends embrace hollow pivots 6 and 7 on the switch. The arms 2 and 3 also serve as electrical connections between the rotary switch and the wires 4 and 5 constituting part of the circuit which is to be opened and closed by the switch. The switch is operated by a lever 8 projecting through a slot 9 in a cover 10 enclosing the switch.

The switch consists of a receptacle composed of a short tubular part 11 of electrically insulating material, preferably ceramic material, for instance refractory porcelain, the ends of said tubular part being closed by caps 12 and 13 of any suitable metal, for instance iron or steel. The caps are joined to the tubular part by a molded mass 14, for instance an artificial resin, asbestos rings 15 and 16 being interposed therebetween for tightening purposes. At their centres the caps 12 and 13 are pressed out to form short open sleeves 17 and 18 respectively, serving as mercury filling openings during the assembly of the switch. The above-mentioned hollow pivots 6 and 7 embrace these sleeves and are soldered thereto. Preferably, the pivots are made of a highly conductive metal, as for instance brass, with a view to ensure a good electrical contact with the arms 2 and 3. Insulating washers 19 are interposed between the sleeves and the brass pivots to prevent the latter from being attacked by the mercury.

The receptacle thus formed is partly filled with a mercury mass 20, adapted to form metallic contact between the two electrodes of the switch, namely the caps 12 and 13. The space of the receptacle above the mercury level may be filled with a suitable gas, for instance hydrogen, or merely with mercury vapor. Provided centrally of the receptacle is a wall 21 of insulating material, preferably made integral with the tubular part 11 and having an aperture 22 located eccentrically in relation to the axis of rotation of the switch so as to be wholly above the mercury level in the one end position of the switch and immersed in the mercury, when the switch is rocked to its opposite end position. Thus, in the one end position the mercury mass is divided by the wall 21 into two separate halves and the electrical connection is broken, whereas in the other end position of the switch the aperture 22 is filled with mercury, so that the whole of the

mercury mass constitutes a coherent unit and forms a metallic connection between the electrodes 12 and 13.

Provided at each end of the tubular part 11 is an additional wall 23 and 24, respectively, of electrically insulating material, for instance porcelain, said walls fitting into recesses provided on the inner surface of the part 11 and joined thereto in a gas-tight fashion. At their bottom the walls 23 and 24 have apertures 25 and 26, respectively, which are immersed in the mercury in all positions of the switch, so that the mercury masses at both sides of the walls are electrically connected at all times. Thereby in the operation of the switch impurities originating from the electrodes 12 and 13 and collected on the outer surfaces 27 and 28 of the mercury are prevented from passing into the central space, where the contact makings and breakings take place. On account of the walls completely separating the spaces above the mercury level from each other, the electric arc is prevented from reaching the solid metal electrodes 12 and 13. Due to the restricted cross-sectional area of the apertures 25 and 26 it is difficult for the mercury vapor to find its way to the electrodes through the mercury.

The embodiment described and shown in the drawing is to be considered only as an illustration of the principle of the invention and is not restrictive of its scope, as modifications in several respects are possible without departing from the inventive idea as set forth in the appended claims.

What I claim is:

1. A mercury switch, comprising a closed receptacle mounted for rocking movement between two end positions, two electrodes in said receptacle, a mercury mass in same in contact with said electrodes, an insulating wall between said electrodes rigidly connected with the receptacle, an aperture in said wall adapted on the rocking movement of the receptacle to be located above the mercury level in one end position of the switch and under the mercury level in the other end position of the switch, an insulating wall between each of the electrodes and the first-mentioned wall, apertures in the last-mentioned walls located under the mercury level in both end positions of the switch.

2. A mercury switch comprising two metal electrodes, a mercury mass in contact with said electrodes to connect and disconnect the same, an apertured insulating wall between said electrodes to make and break the connection between same on rotation of the switch, an insulating wall between each of the electrodes and the first-mentioned wall, the last-mentioned walls being provided with apertures simultaneously immersed in the mercury mass.

3. A mercury switch, comprising a sealed receptacle mounted for rocking movements, two metal electrodes, a mercury mass to connect and disconnect the same, an insulating wall between said electrodes having an aperture located above or in the mercury mass according to the position of the receptacle, a second insulating wall between one electrode and the first mentioned wall, a third insulating wall between the other electrode and the first-mentioned wall, the two last-mentioned walls being provided with apertures located in the mercury mass in all working positions of the receptacle.

4. A rocking mercury switch comprising a mercury-filled receptacle consisting of a tubular insulating body, metal caps closing the ends of said body, an apertured insulating disk located at the centre of said tubular body and lateral insulating disks located to both sides of the first-mentioned disk and having apertures, said apertures being located on the same side of the axis of the tubular body, and means limiting the rocking movement of the receptacle.

5. A mercury switch comprising a receptacle consisting of a cylindrical insulating body mounted for rocking movement about its axis, means limiting the angle of said rocking movement, two metal electrodes one at each end of said body, a mercury mass adapted to connect and disconnect said electrodes, means adapted to separate and permit coalescence of the mercury mass during the rocking movements of the receptacle, insulating disks located between said electrodes one at each end of said cylindrical body, said disks being provided with apertures located on the same side of the axis of said cylindrical body.

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