Feb. 14, 1933. O. J. LEINS 1,897,132

SWITCH

Filed Feb. 13, 1932

Fig. 1.

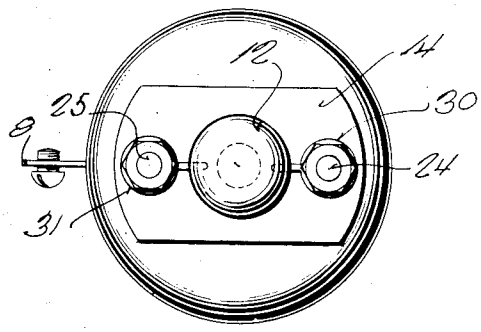


Fig. 2.

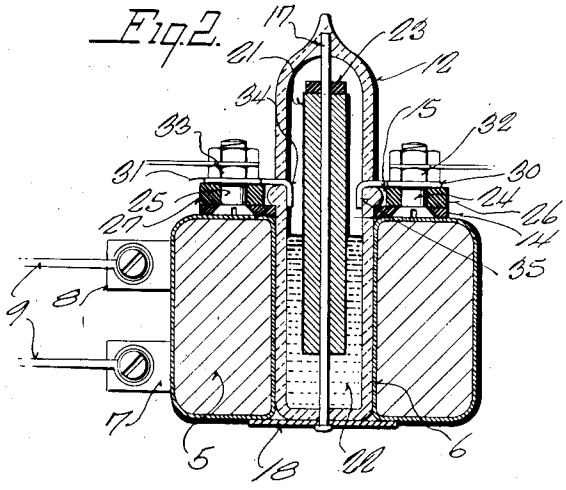
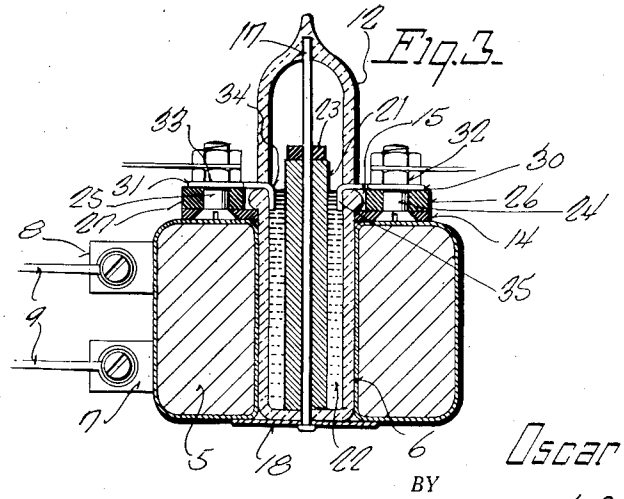


Fig. 3.



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UNITED STATES PATENT OFFICE

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SWITCH

Application filed February 13, 1932. Serial No. 592,752.

This invention relates to switches and more particularly to a mercury solenoid switch adapted to operate on light currents.

It is an object of the present invention to produce a switch adapted for use with explosive substances such as gas or oil, and with this object in view, the invention contemplates a switch which may be placed in close proximity to the explosive substance without danger usually incurred in switches due to arcing during making or breaking of the circuit.

Another object of the present invention is to produce a switch in which the contacts are hermetically sealed within a tube.

It is a further object of the invention to produce a switch which is operable to complete a primary circuit upon the completion of a secondary circuit, the operation of the primary circuit being dependent entirely upon the maintenance of current in the secondary circuit.

These and other objects, the nature of which will become apparent as the description proceeds, are accomplished by means of the following preferred form hereinafter described, and shown in the drawing wherein:

Figure 1 is a plan view looking at the top of the switch;

Figure 2 is a cross section on the line 2—2 of Fig. 1, and showing the switch with the contact between the terminals broken; and

Figure 3 is a view similar to Fig. 2 showing the switch with the circuit completed between the terminals.

Referring more particularly to the drawing in which like numerals indicate like parts throughout the several views, the actuating member of the switch comprises the solenoid 5 wound about a core 6 and having terminals 7 and 8 to which the ends of the solenoid wire are attached.

The terminals 7 and 8 comprise any sort of a binding post which is adapted to receive current from a line 9. A hermetically sealed tube 12 of glass or other suitable insulating material is received in the core 6 of the solenoid and is held therein by means of an insulating plate 14 mounted just below a bead 15 on the tube. The tube 12 may be hermetically sealed with either a vacuum within it or a gas such as nitrogen, which is chemically inert.

A guide rod 17 passes through the lower end of the tube 13 and has attached thereto a second strip 18 which may be of any desired material. The strip 18 contacts the bottom of the solenoid and prevents the tube 12 from being withdrawn therefrom.

Reciprocably mounted on the rod 17 is a plunger 21 of iron, steel or other magnetically influenced material. A recoil cushion 23 is loosely mounted on the rod on top of the plunger to reciprocate with and on top of said plunger, in the tube 12.

A pair of binding posts 24 and 25 are mounted in the plate 14 and carry washers 26 and 27 between the plate 14 and the clamping member of the binding post. A pair of switch terminals 30 and 31 are clamped on the washer 26 and 27 by means of nuts 32 and 33. The terminals 30 and 31 project inwardly through the tube 12 and are hermetically sealed therein. The terminals 30 and 31 terminate in downturned portions 34 and 35, the lower ends of which lie normally above the level of the mercury 22 when the current to the solenoid is shut off.

The binding posts 24 and 25 may be connected in any circuit which it is desired to make in the usual manner.

In operation, the mercury 22 in the tube 12 normally stands at a level beneath the terminals 34 and 35. Upon completion of the circuit through the wires 9, the solenoid 5 becomes energized and draws the iron core or plunger 21 down into the core 6 of the solenoid displacing the mercury 22 and raising the level of that mercury above that of the contacts 34 and 35.

The raising of the mercury in the tube brings it into contact with the terminals 34 and 35 completing the circuit therebetween to operate any desired mechanism. It will be noted that as soon as the current in the line 9 fails that the solenoid is immediately de-energized, breaking the circuit through the terminals 34, 35. It will also be noted that the tube 12 is hermetically sealed, which pre-

vents the contact of an explosive substance such as illuminating gas with the spark or arc which usually occurs upon breaking a circuit.

Upon consideration of the foregoing description, it will be seen that the applicant has provided a relatively simple switch which provides positive making and breaking of the circuit and which will operate on relatively light currents and it will be realized that the invention is of broader application than the preferred form herein shown and described. Applicant does not, therefore, wish to be limited to the precise form of the invention shown herein, but only by the scope of the appended claims.

What is claimed as new and desired to secure by Letters Patent is:

1. In a switch of the character described, a hollow core, a solenoid wound about said core, mounting means at one end of said solenoid, a receptacle supported from said mounting means within said core, a rod passing through the bottom of said receptacle, means carried by said rod to prevent the withdrawal of said receptacle from said core, terminal members mounted on said mounting means projecting into said receptacle, mercury in the bottom of said receptacle normally at a level below said contact members and a plunger within said receptacle floatingly mounted on said mercury and adapted to be drawn into said solenoid to raise the level of said mercury into engagement with said contact members upon application of current to said solenoid.

2. In a switch of the character described, a hollow core, a solenoid wound about said core, mounting means at one end of said solenoid, a hermetically sealed tube supported from said mounting means within said core, a rod passing through the bottom of said tube, means carried by said rod to prevent the withdrawal of said tube from said solenoid, terminal members mounted on said mounting means projecting into said tube, mercury in the bottom of said tube normally at a level below said contact members and a plunger within said tube floatingly mounted upon said mercury and adapted to sink into said mercury to raise the mercury into engagement with said contact members upon the application of current to said solenoid.

3. In a switch of the character described, a hollow core, a solenoid wound about said core, a hermetically sealed tube within said core, a peripheral bead on said tube, a mounting member contacting said bead to support said tube within said solenoid, a guide-rod axially located in said tube and projecting through the lower end of said rod to hold said tube against withdrawal from said solenoid, a quantity of mercury in the bottom of said tube, a pair of contact members having downturned end portions mounted on said support and projecting into said tube and a plunger mounted for movement on said rod and adapted to sink within said mercury upon application of current in said solenoid to raise the level of the mercury above said contacts.

In testimony whereof, I hereunto affix my signature.

OSCAR J. LEINS.