Sept. 17, 1929. J. D. HILLIARD 1,728,829

ELECTRIC SWITCH

Filed April 30, 1925

Fig. 1.

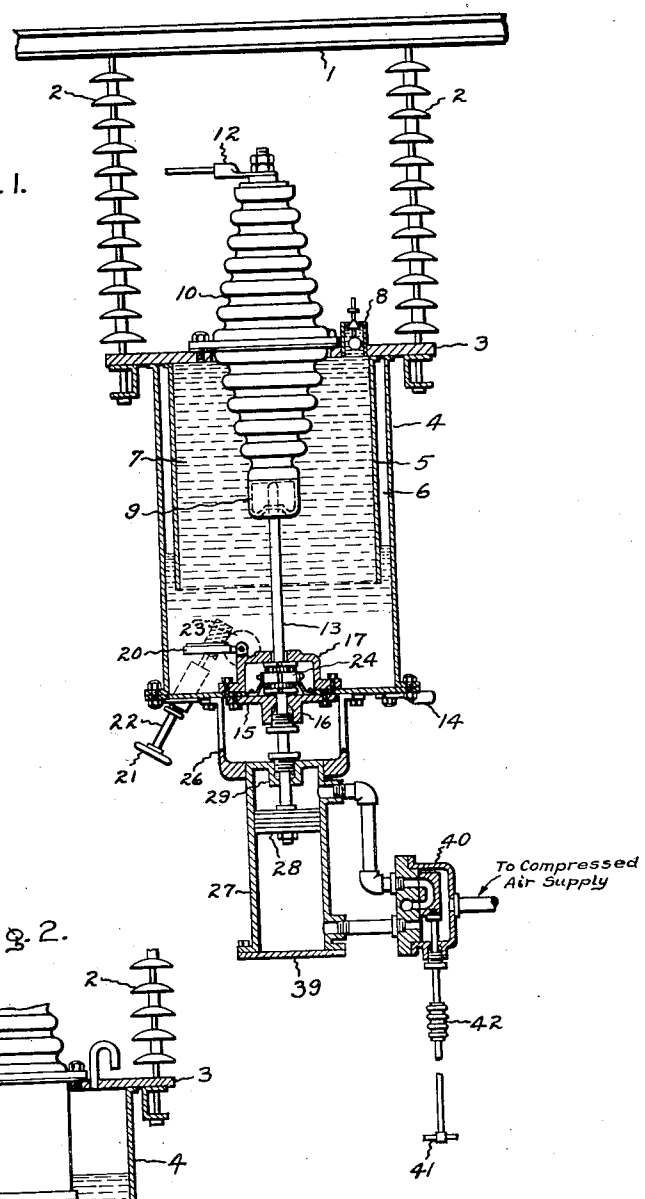
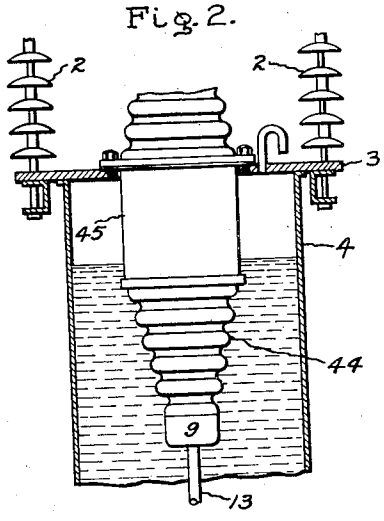


Fig. 2.



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UNITED STATES PATENT OFFICE

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ELECTRIC SWITCH

Application filed April 30, 1925. Serial No. 27,007.

My invention relates to electric switches of the fluid break type and particularly to switches of this type in which the circuit is broken by the downward movement of a movable contact. One object of my invention is to provide an improved construction of switch of this nature which is adapted for use in high tension service, has a large interrupting capacity and which requires the use of but a single insulating bushing. Another object is the provision of means whereby the movable contact can be completely withdrawn from the bottom of the fluid tank and replaced if desired without disturbing the tank or withdrawing the fluid therefrom.

My invention will be better understood from the following description taken in connection with the accompanying drawing, and its scope will be pointed out in the appended claims.

Referring to the drawing, Fig. 1 is a vertical sectional view of a fluid break switch illustrating my invention, and Fig. 2 is a fragmentary view illustrating a modification.

From a suitable supporting structure 1 which, for example, may comprise structural steel members, are shown depending a plurality of suspension insulators 2 of a type employed for supporting transmission lines, etc. The cover 3 of the switch tank 4 is supported by the insulators 2 whence the tank is effectively insulated from the supporting structure 1. The tank 4 has a detachable bottom as shown and is secured to the cover in any desired manner but preferably by welding. The inner shell 5 is secured at the top to the cover 3 also preferably by welding and being open at the bottom forms with the tank 4 a cushioning air space 6. The tank is otherwise filled with insulating fluid 7, as for example oil, and is provided in the cover with a float actuated valve 8 which operates automatically to release gases produced by the arc drawn in the insulating fluid upon the separation of the contacts.

The switch according to the embodiment of my invention illustrated is adapted to break the circuit at a single point and accordingly has but one stationary contact and one movable contact. The single stationary contact 9 is carried by the inner end of the insulator bushing 10 which is mounted in the cover 3, a circuit terminal 12 being secured to the outer end of the bushing. The movable contact rod 13 is reciprocally mounted in the bottom of the tank 4 and is electrically connected therewith hence the other circuit terminal of the switch may if desired be attached directly to the tank as shown for example at 14. A plate 15 having a suitable stuffing box 16 for the rod 13 is secured to the bottom of the tank so as to cover the enlarged opening therein. Tightly secured to the inner face of the bottom of the tank is a cap 17 through the crown of which is an opening for the free passage of the contact rod 13. This rod 13, by means hereinafter described, is adapted to be completely withdrawn from the tank for purposes of inspection, repair or replacement and in order to prevent the escape of insulating fluid at such times a flap door 20 is provided. This door has a suitable gasket on its face so as to seal the opening in the cap to prevent the escape of oil and is mounted on a short shaft journalled in the cap 17. The door is opened and closed by the hand wheel 21 on the second shaft 22 which extends through the tank and which is connected by gearing 23 with the shaft carrying the door. For the purpose of insuring good contact between the tank 4 and the rod 13 I have shown a spring-pressed contact member 24 which preferably is segmental in form, the segments being pressed against the rod by helical or by garter springs to insure good contact at all times with the rod.

For supporting the contact rod operating mechanism a stool 26 is provided having its legs bolted to the under side of the tank bottom. The openings between the legs facilitate access to the stuffing box 16 as well as access to the bolts securing the plate 15 to the tank bottom. The cylinder 27 depends from the stool 26 and has the piston 28 mounted on the lower end of the rod 13, the latter passing through the stuffing box 29. The bottom of the cylinder is closed by end head 39 which is readily detachable to permit the withdrawal of the piston and contact rod. Air pressure is preferably employed for operat-

ing the movable contact rod and according to the illustration, opposite ends of the cylinder are connected to a source of compressed air supply through the slide valve 40. The operating handle 41 of this valve may be operated manually or otherwise as desired and may have an insulation section 42 interposed at some point therein.

The operation of the contact operating means whereby the circuit is opened and closed will be obvious from the drawing, and the description given above. Should the contact rod 13 become burned or should one desire to inspect this rod or the contact member 24, the rod is first moved to open position in which position the upper end of the rod still projects above the end of the cap 17. By removing the bottom cap 39 of the cylinder the piston 28 can be lowered until the end of the rod 13 is below the top of the cap 17. Handle 21 is then rotated to close the door 20 tightly after which the piston and rod may be completely removed. If desired, the stuffing box 16 and contact 24 may also then be removed. Furthermore, with the door 20 in its closed position the entire operating mechanism in addition to the contact rod may be removed and subsequently replaced without the removal or the loss of the insulating fluid.

In the modified form shown in Fig. 2 the inner shell 5 and the float actuated valve 8 are omitted and an expansion space is maintained between the cover 3 and the level of the insulating fluid. The insulating bushing 44 is somewhat longer in this case and surrounding that portion of the bushing which extends through the space is a metal ground shield 45. The mechanism for operating the movable contact and for closing the opening in the bottom of the tank is the same as in Fig. 1.

While I have described only one embodiment of my invention, I do not wish to be limited to the particular form shown and described as it will be apparent that many modifications therein may be made without departing from the scope of my invention as set forth in the appended claims.

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

1. An electric switch comprising a tank containing insulating liquid and having an opening in the bottom thereof, a fixed contact mounted in the tank, a cooperating movable contact rod mounted to slide in said opening, said rod being adapted to be completely removed through said opening from the tank, and a valve supported by the tank and arranged to be moved to a position completely closing the opening therein when the rod is removed therefrom.

2. An electric switch comprising a tank containing insulating liquid and having an opening in the bottom thereof, insulators supporting said tank from the top thereof, a fixed contact mounted in the tank, a cooperating contact rod mounted to slide in said opening, means external to the tank for moving the rod into and out of engagement with the fixed contact, said rod being adapted to be completely removed through said opening from the tank, a valve mounted within the tank, and means operable from the exterior of the tank for moving the valve to a position completely closing said opening to prevent the escape of liquid when the rod is removed.

In witness whereof, I have hereunto set my hand this 29th day of April, 1925.

JOHN D. HILLIARD.