

Oct. 22, 1929.

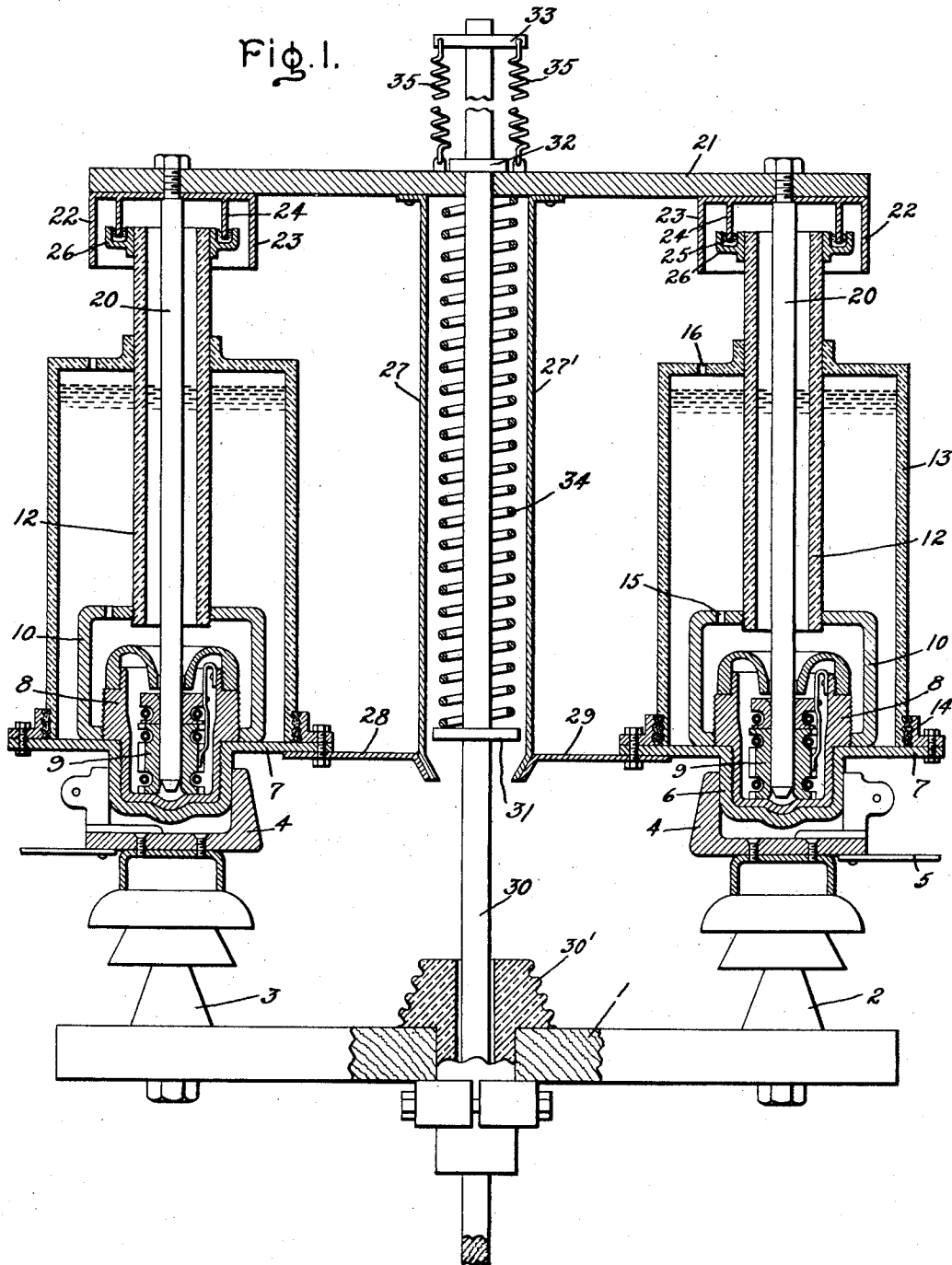
J. D. HILLIARD

1,733,017

ELECTRIC SWITCH

Filed Jan. 2, 1924

2 Sheets-Sheet 1



Inventor:
John D. Hilliard,
by *Alexander S. Lunt*
His Attorney.

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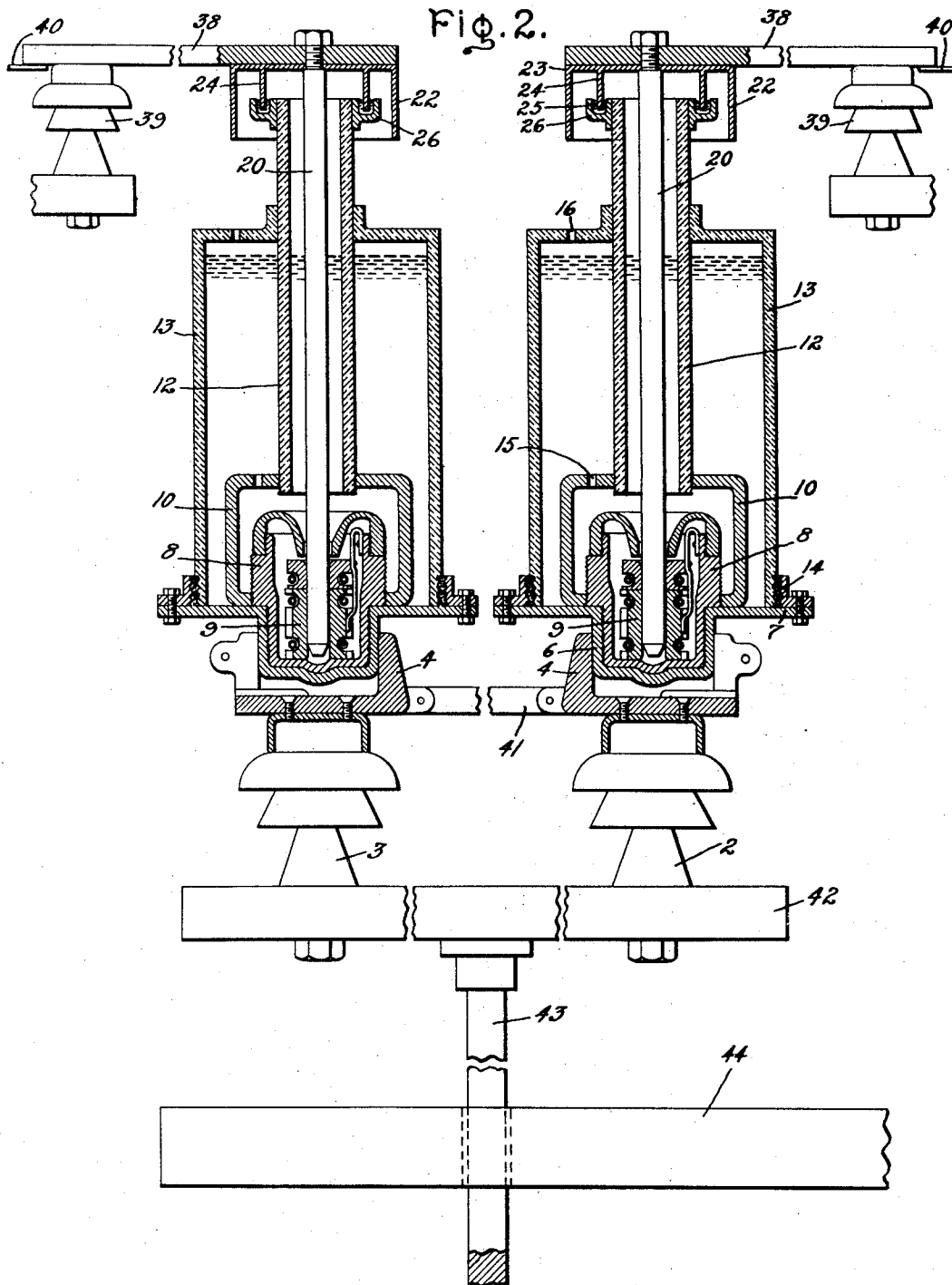
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ELECTRIC SWITCH

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2 Sheets-Sheet 2



Inventor:
John D. Hilliard,
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UNITED STATES PATENT OFFICE

JOHN D. HILLIARD, OF SCHENECTADY, NEW YORK, ASSIGNOR TO GENERAL ELECTRIC COMPANY, A CORPORATION OF NEW YORK

ELECTRIC SWITCH

Application filed January 2, 1924. Serial No. 684,004.

My invention relates to electric switches of the fluid break type and an object of my invention is to provide an improved construction of switch of this type, the construction being such that the switch is adapted to be mounted on a pole for use as a line disconnecting switch.

Heretofore the connection between branch transmission lines and the main line has customarily been effected by means of a simple air break switch. Where the operating voltage is high and the branch line to be isolated is of considerable length, the charging current of the branch is of such a magnitude that it is not adapted to be broken by the disconnecting switches now in common use. In accordance with my invention, I have provided for this purpose a fluid break switch of the explosion chamber type, each chamber having an upwardly extending tube of insulating material secured to it, through which extends a rod contact member when the circuit is closed and from which the rod is relatively withdrawn when the circuit is open. To maintain the liquid in the chamber and tube at the desired level I have provided a reservoir enclosing those parts and in communication with the chamber through a small opening therein.

My invention will be better understood by reference to the accompanying specification and drawing and its scope will be pointed out in the appended claims.

Figure 1 is a vertical sectional view of one form of switch embodying my invention, and Fig 2 is a similar view of another form of my invention.

Referring first to Fig. 1, a cross arm or other suitable support 1 carries two spaced insulators 2 and 3 upon which are mounted the stationary elements of two fluid break switch structures. As these two structures are identical in every respect, the one supported by insulator 2, only, will be described in detail. A cup-shaped terminal 4 to which

a lead 5 may be attached for connection to an electric circuit clamps around the depending portion 6 of a base plate 7. A contact holder 8 is shown threaded into the portion 6 and surrounded by this holder and connected thereto is the stationary socket contact 9 which as illustrated may be of the segmental type. An explosion or pressure chamber enclosing the contact 9 is formed in part by the strong metal casing 10 and the holder 8. The casing 10 may be secured as shown by screw threading it to the holder 8 whereby it may be readily removed to permit inspection or removal of the contacts 9. In the top wall of the casing 10 a tube 12 of insulating material, for example a phenolic condensation product such as bakelite, is secured and surrounding the casing 10 and the greater portion of the tube 12 is a vessel 13 which with the base plate 7 forms a reservoir for the arc extinguishing fluid. This vessel 13, which may for example be constructed of stone ware, fits snugly around the tube 12 and is shown secured to the base plate 7 by cementing it to the ring 14 bolted to the base plate. The casing 10 is provided, preferably at its upper wall, with a small opening or bleed hole 15 for allowing the arc extinguishing liquid to refill the chamber after each opening of the switch. The top of the reservoir or vessel 13 is also provided with a small opening 16 to connect the interior of the vessel with the outside atmosphere.

The movable contact member of the switch shown in Fig. 1 comprises a rod 20 which is secured at its upper end to a bridge 21. The tube 12 through which the rod 20 extends is preferably though not necessarily materially larger than the rod. At each end, the bridge 21 carries a shield 22 having an outer flange 23 and an inner flange 24. The inner flange dips into a trough 25 in the annular member 26, filled for example with oil to provide a liquid seal to prevent evaporation of the liquid in the tube 12 when a volatile liquid

is used. The arrangement also prevents the entrance of rain. Secured to the underside of the bridge 21 are two contact members 27 and 27' which when the switch is in closed position engage respectively contact members 28 and 29 carried by the base plates 7 as shown, thus providing the main current carrying means of the switch. For raising and lowering the bridge 21 as in opening and closing the switch, a rod 30 which may be in part or wholly of wood is provided which has sliding engagement with the bridge 21 and with an insulator 30' mounted in the support 1. This rod is preferably square in cross section to prevent turning of the bridge 21 and has secured to it two flanges 31 and 32 and a cross arm 33. A compression spring 34 is shown between the flange 31 and the bridge 21 and a pair of tension springs 35 connect the bridge 21 to the cross arm 33. To open the switch the operator who may be standing on the ground beneath the switch pushes upwardly on the rod 30 stressing the springs 34 and 35 which causes a sudden separation of the switch contacts. The contact rods 20 are preferably completely withdrawn from the tubes 12, leaving an air gap between the ends of the rods 20 and the insulating liquid. In the form of my invention illustrated by Fig. 2 the contact rods 20 are held in fixed position and the socket contacts 9 and associated parts are adapted to be moved up and down respectively to close and open the switch. In this case, each contact rod 20 is secured to a support 38 carried by an insulator 39 on a cross arm and adapted to be connected by a conductor 40 to the line. The construction of the socket contact and the parts connected and related thereto are similar to those described above in connection with Fig. 1 with the exception that in this case the switch comprising contacts 27, 27', 28 and 29 are omitted and the terminals 4 are permanently connected together by a bar 41. The insulators 2 and 3 are shown bolted to a cross bar 42 which may be of wood and attached to this bar is shown an operating rod 43 which preferably is square and passes through a square opening in the bar or arm 44. To open the switch according to this form of the invention the rod 43 is lowered until the rod and the socket contacts are separated and the tubes 12 are entirely withdrawn from the contact rods. In this position the socket contacts may be inspected or renewed, the reservoirs may be filled and any other needed attention given to the parts connected therewith without danger from the line and without the use of additional disconnecting switches.

The arc extinguishing liquid is shown in both forms of the invention as nearly filling the reservoirs and may consist of oil, water, a mixture of water and glycerine or any other liquid having a fairly high dielectric

strength. Inasmuch as complete separation is provided for between the contact rod and the liquid, an extremely high insulating property of the liquid used is not such an important consideration as it is in switches where the contact rod remains in the liquid. When a hydrous liquid is used evaporation of the liquid may obviously be further reduced by applying a film of oil thereto.

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 of the fluid break type comprising a pressure chamber, a fixed contact therein, a vessel adapted to contain a supply of insulating liquid, said chamber having a small passage through which the insulating liquid may enter the chamber from the vessel, a discharge tube connected with the top of the pressure chamber and extending upwardly therefrom and a movable contact cooperating with said fixed contact and arranged to be initially separated therefrom in the pressure chamber and to be withdrawn from the discharge tube.

2. An electric switch of the fluid break type comprising a pressure chamber, a fixed contact therein, a vessel adapted to contain a supply of insulating liquid for the chamber, said chamber having a small passage through which the insulating liquid may enter from the vessel, an insulating discharge tube connected with the pressure chamber and extending therefrom up through the vessel, a contact rod extending through the discharge tube and spaced from the walls thereof and means for withdrawing the rod from the fixed contact and from the tube.

3. An electric switch of the fluid break type comprising a pressure chamber closed at its lower end and containing a fixed contact, a discharge tube extending up from the chamber, a movable contact arranged to be withdrawn from the fixed contact through the discharge tube and a reservoir for insulating liquid surrounding the tube and in communication with pressure chamber, said tube passing out through the top of the vessel.

4. An electric switch of the fluid break type comprising a pressure chamber closed at its lower end and containing a fixed contact, a vessel surrounding and communicating with said chamber and adapted to contain a supply of insulating liquid, a discharge tube extending up from the chamber and through the top of the vessel, and a contact rod arranged to extend through the tube to engage the fixed contact.

5. A fluid break switch comprising coop-

erating rod and socket contact members, an explosion chamber enclosing the socket contact member, a discharge tube extending upwardly from said explosion chamber, an insulating fluid in said tube and chamber, and a
5 cap adapted to cover the top of said tube when the switch is closed, said cap having a liquid seal with the tube to prevent evaporation of the insulating fluid therein.

10 In witness whereof, I have hereunto set my hand this 31st day of December, 1923.

JOHN D. HILLIARD.