

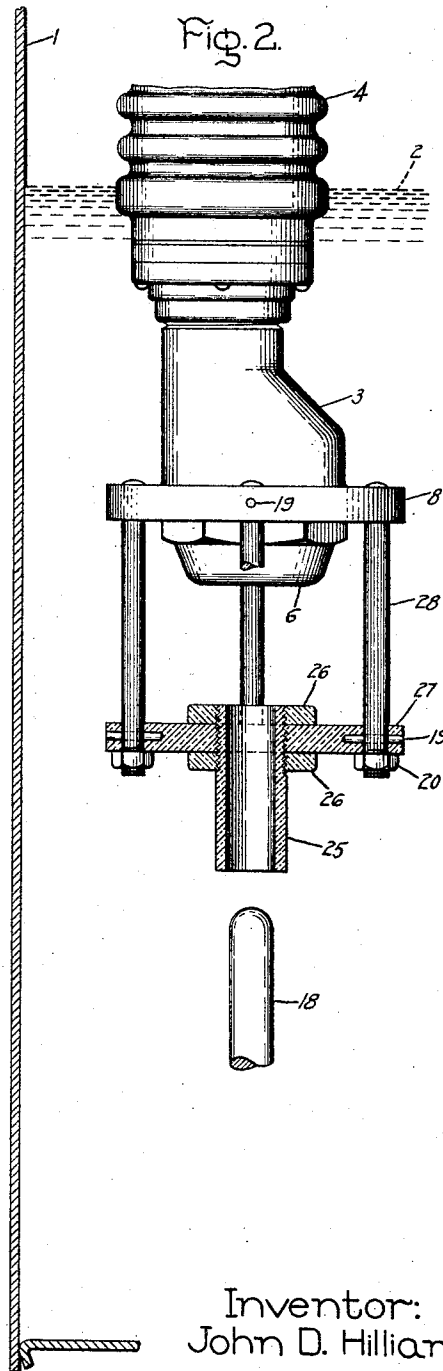
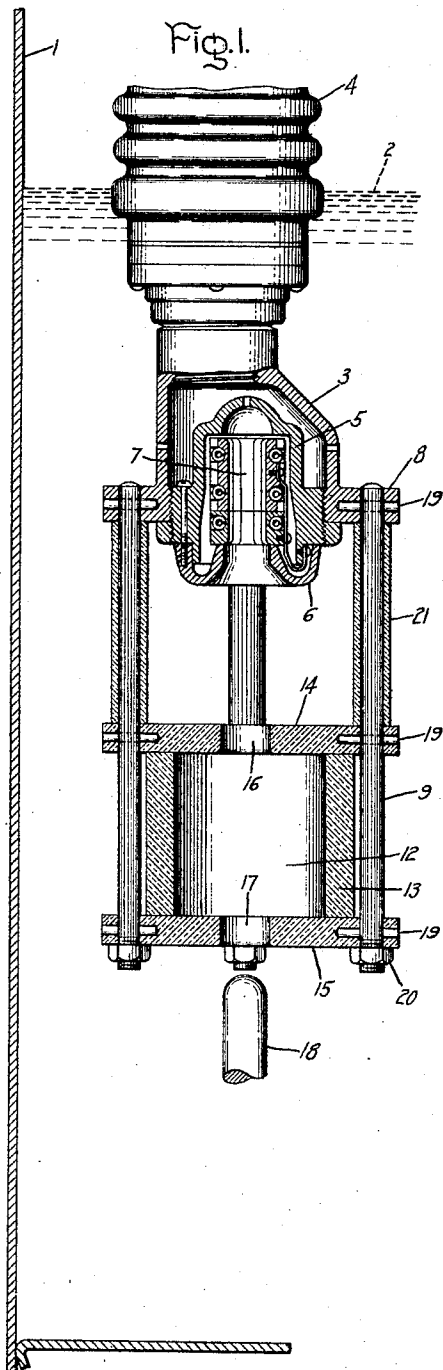
May 27, 1930.

J. D. HILLIARD

1,760,554

ELECTRIC SWITCH

Filed June 21, 1926



Inventor:
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UNITED STATES PATENT OFFICE

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ELECTRIC SWITCH

Application filed June 21, 1926. Serial No. 117,239.

My invention relates to electric switches of the fluid-break explosion chamber type.

With this type of switch as commonly constructed, having the fixed contact in the explosion chamber, the pressure of gas produced by the arc in the explosion chamber as the contacts separate accelerates the opening movement of the switch and also directs a stream of insulating liquid into the arc. In such a switch some gas is also produced when the contacts are brought together to close the circuit and when the switch is called upon to close on a heavy load the quantity of gas suddenly formed in the explosion chamber may be sufficient to produce a pressure therein which by opposing the inward movement of the movable contact somewhat interferes with the closing operation of the switch.

It is an object of my invention to provide an improved electric switch of the fluid-break explosion chamber type which while retaining the circuit interrupting advantages thereof shall avoid the aforementioned circuit closing disadvantages thereof. A further object of my invention is to provide an improved construction of switch of this type wherein the insulating liquid is driven by the gas in a plurality of streams into the arc at different portions thereof.

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 view partly in section of a portion of a fluid break switch involving my invention and Fig. 2 shows a modification thereof.

I have illustrated my invention by way of example as applied to a switch of the type shown in the Huber Patent No. 1,546,173, July 14, 1925. In the drawing, the vessel 1 containing the insulating liquid 2 has the adapter or contact retainer 3 suspended therein by the insulator bushing 4. Screw-threaded into the adapter 3 is the contact carrier 5 to which is attached the arcing ring 6 and within which is the fixed contact 7. The lower portion of the adapter 3 is shown having a flange 8 from which depend the rods 9

which preferably are of insulating material for supporting the enclosing or gas confining member 12 shown as an explosion chamber. This chamber is illustrated as comprising a cylinder 13, a top plate 14 and a bottom plate 15, each of insulating material, the top and bottom plates being provided with openings 16 and 17 respectively for the passage of the movable contact rod 18, relatively small clearance only being required around the rod. I have shown the supporting rods 9 secured in the plates 14 and 15 and in the flange 8 by means of the pins 19 but other means may be employed as required. The plates of the explosion chamber are further secured against displacement by the nut 20 on the lower end of each rod 9 which engages the bottom face of plate 15 and by the sleeve 21 on each rod between the top plate 14 and the flange 8. The chamber may, if desired, be of metal properly insulated as may be required for the current and voltage conditions of the circuit to be interrupted.

When the contact rod 18 is withdrawn from the fixed contact 7 and below the opening 16 in the top plate the pressure of gas in the chamber 12 resulting from the arc drawn therein and acting upon the end of the rod 18 accelerates the opening movement of the switch. Insulating liquid is first directed in a stream from the upper opening 16 upwardly into the arc and as the rod 18 leaves the lower opening 17 a second stream of insulating liquid is directed therefrom downwardly into the arc. Hence two separate streams of insulating liquid are directed from the explosion chamber into the arc at two different portions thereof, thus facilitating the quenching of the arc. Upon closing the switch the potential difference between the contacts may cause an arc to strike between the contacts just prior to their engagement and if the load is very heavy at the instant of closing, considerable gas may be produced close to the fixed contact. With the construction described, however, this gas is free to escape since the explosion chamber is removed from the gas bubble and the supporting rods offer but little resistance to its expansion. The opposing effect of the gas formation on the

closing movement of the switch is therefore negligible.

In the modification illustrated by Fig. 2 I have shown the enclosing or gas confining member as the tubular member 25. This member is suitably secured as for example by the two nuts 26 threaded on the tubular member and engaging opposite sides of the supporting plate 27. Rods 28 suspend the plate 27 from the flange 8 of the adapter 3 as in Fig. 1, the remaining portion of the structure including the insulator bushing 4, vessel 1 and insulating liquid 2 as well as the pins 19 and nuts 20 being also the same as in Fig. 1.

In operation, the modified form illustrated by Fig. 2 functions in a somewhat similar manner to that shown in Fig. 1. A certain amount of acceleration is given to the contact rod 18 in opening by the pressure of gas in the tubular member 25 and streams of insulating liquid are directed from opposite ends thereof into the arc drawn between the contacts. In closing the switch the same advantages obtain as in the form illustrated by Fig. 1. The contact rod 18 after passing through the tubular member 25 comes within striking distance of the fixed contact and the resulting gas bubble being free to expand laterally does not impede the closing movement of the switch.

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

A fluid break switch comprising a receptacle containing insulating liquid, an insulator bushing projecting into the liquid, a fixed contact, a flanged retaining and enclosing member for said contact supported by said bushing, an explosion chamber, and a plurality of spaced rods securing said explosion chamber to the flange of said member in spaced relation with said fixed contact, whereby said contact may be removed without disturbing the explosion chamber.

In witness whereof, I have hereunto set my hand this 18th day of June, 1926.

JOHN D. HILLIARD.

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