E. M. HEWLETT.

OIL SWITCH.

APPLICATION FILED NOV. 7, 1904. RENEWED MAR. 12, 1912.

1,091,659. Patented Mar. 31, 1914.

Fig. 1.

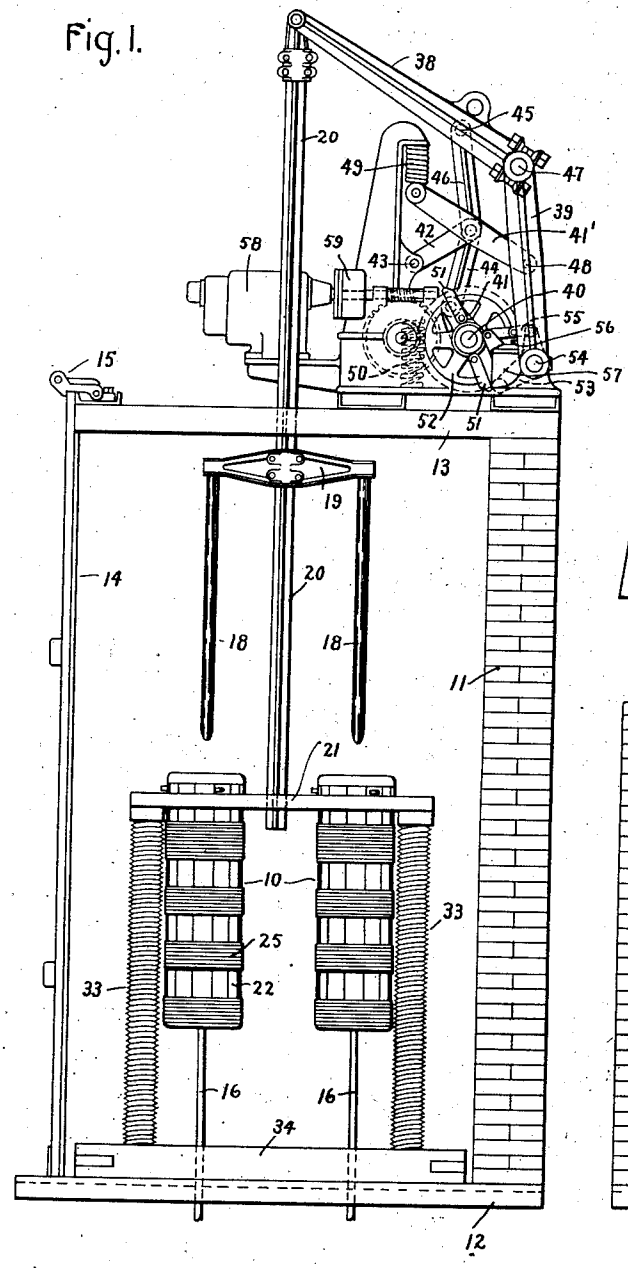


Fig. 2.

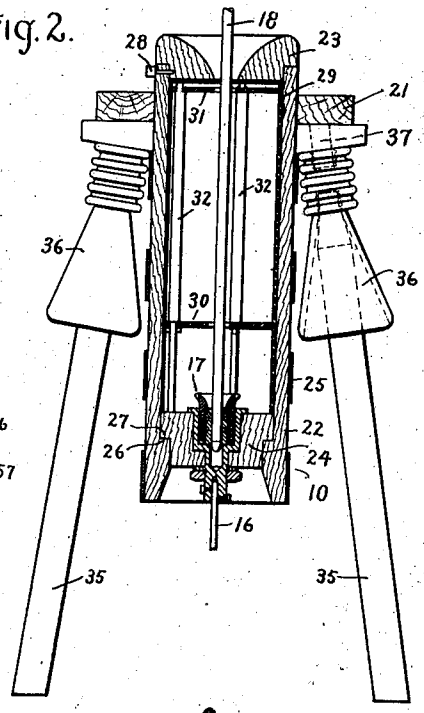
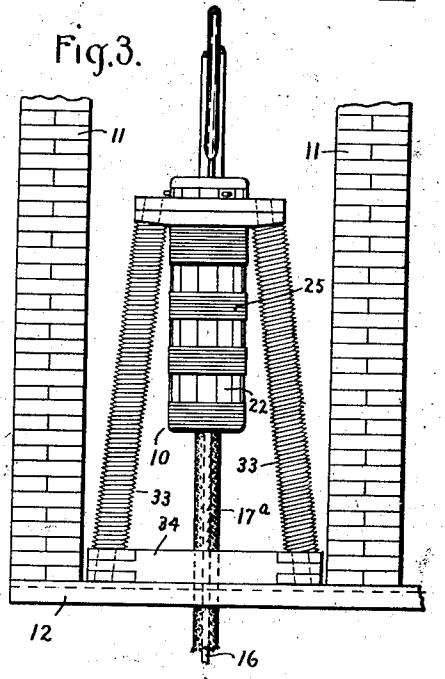


Fig. 3.



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Att'y.

UNITED STATES PATENT OFFICE.

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OIL-SWITCH.

1,091,659. Specification of Letters Patent. Patented Mar. 31, 1914.

Application filed November 7, 1904, Serial No. 231,665. Renewed March 12, 1912. Serial No. 683,348.

To all whom it may concern:

Be it known that I, EDWARD M. HEWLETT, a citizen of the United States, residing at Schenectady, county of Schenectady, State of New York, have invented certain new and useful Improvements in Oil-Switches, of which the following is a specification.

The present invention relates to electric switches and more particularly to switches of the oil break type in which the circuit is broken under oil contained in a suitable inclosure surrounding the rupture point of the contacts. These switches are particularly designed for controlling circuits of high potential and large amperage and the present invention has to do particularly with the oil pot and its supporting structure, the object being to construct the pots and their supports so as to greatly increase the capacity of the switch without materially increasing the dimensions of the pots. Heretofore in switches of this type it has been the practice to construct the oil pots of metal, and to have one of the switch contacts in electrical connection therewith. The other contact is arranged so as to pass through an opening in the cover of the pot which is made of insulating material. In this construction the shortest distance between live parts as the switch is being opened is not between the two switch contacts but between the movable switch contact and the walls of the oil pot. In order to accommodate such a construction, to high potential work it is necessary to construct the pots so that the arc cannot strike across from the moving contact to the walls of the pot, and for this purpose it is usual to employ a lining of fiber or other insulating material on the interior of the pot. However, in case the stroke of the moving contact is such as to withdraw it from the pot, there is nothing to prevent the arc forming between the moving contact and the exterior of the oil pot. By means of the present invention these difficulties are overcome without materially increasing the size of the pot, and they are accomplished by constructing a pot wholly of non-conducting material, such as wood. In such a construction, as the contacts are separated, the shortest distance between the live parts of opposite polarity is between the tips of the contacts themselves, and the shortest path extends through the oil pot. In carrying out the invention I further increase the insulating properties of the switch by providing novel supports for the oil pots also composed of non-conducting material.

For a better understanding of the invention reference should be had to the following description taken in connection with the accompanying drawing, and the novel features of the invention will be specifically pointed out in the appended claims.

In said drawing, Figure 1 is a side elevation of a standard type of switch employing oil pots and supports constructed in accordance with the present invention; Fig. 2 is a detail sectional view of one of the oil pots mounted on a slightly modified supporting structure; and Fig. 3 is a view taken at right angles of that of Fig. 1 illustrating the oil pot and support shown therein.

In the type of switch shown, the oil pots 10 are located within fire-proof cells formed by brick walls 11 built upon a suitable base 12 of insulating material and provided with an insulating cap 13 of slate or other refractory non-conducting material. For the purpose of inspection and access to the interior of the cell, suitable doors 14 having latches 15 are provided. Suitable terminals 16 pass through the base 12 and are electrically connected to the fixed contacts 17 in the oil pots 10. These terminals may be left bare as shown in Fig. 1 or insulated as shown at 17^a in Fig. 3. The circuit is completed between these contacts by means of the movable contacts 18 which are electrically and mechanically connected by the yoke 19. These contacts bridge the fixed contacts 17 and are movable into and out of the oil pots to make and break the circuit as clearly illustrated. The yoke 19 which carries the contacts 18 is rigidly secured to a reciprocating wooden rod 20 which is guided by an opening in the horizontal frame 21 which supports the oil pots 10. This rod 20 extends through a suitable opening in a cap 13 of the oil switch structure and suitable operative mechanism is located on the top of the structure for giving the rod 20 its reciprocating movement.

Referring now more particularly to the oil pot and its support which constitute the subject of the present invention, the oil pot, which is designated 10, is composed of a tubular portion made up of a plurality of

staves 22 and suitable heads 23 and 24, all composed of suitable non-conducting material, preferably wood. The staves 22 are closely fitted and cemented together and the exterior is provided with a wrapping 25 of Manila twine or other suitable non-conducting material.

As clearly shown in Fig. 2 the lower ends of the staves 22 are provided on their interior sides with shoulders 26 upon which coöperating shoulders 27 on the head 24 rest. The upper head 23, which is provided with an opening for the passage of the movable contact 18, is secured to the staves by suitable wooden pins 28. All the parts of the pot are securely held together by some durable cement, such as casein cement. For the purpose of still further increasing the insulating properties of the pot, and to prevent undue charring of the interior of the same due to the arc, an interior lining 29 of fiber or other durable non-conducting material is provided. The interior of the pot is also provided with two baffle-plates 30 and 31, preferably composed of insulating material, such as fiber, having central openings for the passage of the movable contact 18 and rigidly connected together by the longitudinally extending rods 32. By means of this baffle-plate construction when the arc is drawn between the contact 17 and the lower end of the contact 18, the oil in the neighborhood is compressed by the arc gases and escapes through the vent or opening in the lower baffle-plate 30 and materially assists in extinguishing the arc as the contact 18 is drawn through said opening. The oil escaping through the vent in the lower baffle-plate 30 is caught by the upper baffle-plate 31 and deflected against the walls of the oil pot, so that the cover of the pot is shielded from the oil thrown by the arc, and throwing of oil from the pot is prevented. In assembling the parts the baffle-plate structure comprising the plates 30, 31 and the rods 32 is a unitary structure and may be slipped into place just before the head 23 is put on. Obviously this baffle-plate structure may be used in pots of other types and composed of other material. The oil pots 10, which are arranged in pairs, are suitably secured near their upper ends to the horizontal frame 21 which is also composed of non-conducting material, such as wood. This frame is supported on a plurality of legs 33 also composed of wood or other non-conducting material. The lower ends of these legs are secured to a rectangular frame 34 which is adapted to rest upon the base 12 of the oil switch structure and to loosely fit the interior of the cell. To still further increase the insulating properties of the oil pot and its support, the legs 33 may be replaced by legs 35 likewise composed of wood, which are fitted at their upper ends into the interior of a glass or porcelain insulator 36, as clearly shown in Fig. 2. In this construction the upper end of the insulator is also provided with a socket into which a suitable wooden pin or projection 37 extends.

In Fig. 1, I have shown a standard type of operating mechanism by which the rod 20 is given its reciprocating movement. This mechanism comprises a rock arm 38 to the outer end of which the rod 20 is secured and which is pivotally secured at its other end to the upper end of a rock arm 39. The outer end of the rock arm 38 is adapted to move in a vertical right line and the power for producing this movement is obtained from a rock shaft 40 provided with a crank 41. The right line movement of the outer end of the rock arm 38 is obtained by means of a system of links which constitutes a parallel motion mechanism. This system comprises a link 41′ which is connected at its center by a link 42 to a fixed point 43. This same central point is connected to the crank 41 by a connecting rod 44 and to a point 45 on the rock arm 38 by a link 46. The length of the link 42, one-half the length of the link 41′ and the distance between the points 45 and 47 are equal. The length of the link 46 is also equal to the distance between the points 47 and 48. With this construction the outer ends of the arms 38 and 41′ move in vertical right lines, the latter between the coiled actuating springs 49 and 50. From this construction it will be seen that when the crank 41 assumes a substantially vertical position springs 49 or 50 will be compressed by the outer end of the link 41′. Obviously then if the shaft 40 be rotated so as to compress either one of these springs, and held in this position, the switch will be either in an open or closed position, and the appropriate spring will be compressed and ready to throw the switch to the opposite position whenever the shaft 40 is released. For the purpose of holding the shaft in these positions stops 51 are provided on a gear wheel 52. These stops rotate with the shaft and are adapted to be engaged by a stop 53 pivoted at the point 54 and normally held in engaging position by a toggle 55. The toggle 55 may be broken in any desired way to rock the stop 53 so as to free the appropriate stop 51 and allow the actuating spring to throw the switch. In the present instance a plunger 56 is employed for this purpose. It is located directly beneath the center of the toggle 55 and is actuated by means of a magnet coil located within the casing 57. The switch may be set by rotating the shaft 40 either by hand or otherwise. In the present instance I have shown an electric motor 58 which is geared through a suitable train of gearing to the shaft 40 for this purpose. In this train of gearing is a magnetic clutch

59 which may be cut in or out to stop the rotation of shaft 40 at the appropriate point.

Obviously certain changes and alterations may be made in the structure constituting the novel disclosure in the present case without departing from the spirit and scope of my present invention, I therefore do not wish to be limited to the specific matter illustrated but aim to cover by the terms of the appended claims all such alterations and modifications.

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

1. In an electric switch, a wooden oil pot comprising a tubular shell provided with end heads, a fixed switch contact located in one head, a coöperating contact movable through an opening in the other head into and out of engagement with said fixed contact, and transverse baffle-plates of non-conducting material located therein and provided with openings through which said movable contact is adapted to pass.

2. An electric switch comprising an oil pot having ends of insulating material, a fixed contact mounted on one of said insulating ends, a movable contact mounted to reciprocate through the other insulating end and make and break contact with said fixed contact under oil, and supports in engagement with said oil pot near the end opposite said fixed contact.

3. In an electric switch an oil pot comprising a reservoir compartment and a pressure retaining compartment connected by an opening for directing the oil put under pressure in said pressure retaining compartment against the arc to extinguish it, contacts insulated from the walls of said reservoir chamber and arranged to break in said pressure retaining chamber, and a support for said oil pot in engagement with the walls of said reservoir compartment.

4. In an electric switch, an oil pot containing oil, a partition in said pot having an opening to direct oil put under pressure by the arc against the arc to extinguish it, separable contacts insulated from the walls of said pot and arranged to break under oil on one side of said partition, and supports in engagement with the walls of said pot on the other side of said partition.

5. An electric switch comprising two oil vessels, each forming a pressure-retaining chamber with a vent in one wall, a fixed contact mounted in each vessel on an insulator which forms part of the walls of said vessel, and a bridging contact mounted to move into said chambers through said vents to engage with said fixed contacts under oil in said vessels, and to move out of said chambers through said vents as the switch is opened, whereby arcs are drawn through said vents and oil put under pressure by the arcs is directed against the arcs to extinguish them.

6. In an electric switch, the combination with two oil pots containing oil, a fixed contact secured in each pot and insulated from the walls of said pot, and a pressure-retaining compartment having a vent in one wall and forming part of each pot, of a bridging contact mounted to break with both said fixed contacts in said pressure-retaining compartments under oil and to move out of said compartments through said vents as the switch opens, whereby the arcs are drawn through said vents and the oil put under pressure in said chambers by the arcs is directed against the arcs to extinguish them.

7. In an electric switch, the combination with an oil pot having a reservior compartment and a pressure retaining compartment with an opening in one wall to establish communication between said compartments and to direct the oil put under pressure by the arc against the arc to extinguish it, and separable contacts arranged to break under oil in said compartment, of a supporting rod in engagement with one wall of said pot and with said wall of said pressure retaining chamber to prevent movement of said wall by the pressure in said chamber.

8. In an electric switch, the combination with an oil pot, of a baffle-plate structure comprising a plurality of supporting rods resting on the bottom of the pot and extending lengthwise thereof, a transversely extending baffle plate secured to said rods, and provided with an opening for directing oil, and separable contacts arranged to break between said baffle plate and the bottom of said pot and to draw the arc in the path of the oil directed by the opening in said baffle plate whereby the oil is directed against the arc to extinguish it.

9. In an electric switch, the combination with an oil pot, of contacts arranged to separate therein, and a baffle-plate structure, comprising a plurality of supporting rods extending lengthwise thereof, and transversely extending baffle-plates secured thereto and provided with openings for the passage of one of said contacts.

10. In an electric switch, the combination with an oil pot, of contacts arranged to separate therein, and a baffle-plate structure comprising a plurality of supporting rods resting upon the bottom of the pot and located in close proximity to the interior of the walls thereof, and transversely extending baffle-plates secured thereto and dividing the interior of the pot into a plurality of compartments and provided with openings for the passage of one of said contacts.

11. An electric switch comprising an oil pot, separable contacts both insulated from the oil pot and arranged to break under oil, and a pressure retaining chamber with walls which surround said contacts, said chamber having in one wall an insulated vent

through which one of said contacts passes out of said chamber in opening the circuit, whereby the arc is confined and simultaneously the oil put under pressure by the arc is directed against the arc to extinguish it.

12. An electric switch comprising an oil pot, a fixed contact mounted on an insulator which forms part of the walls of said pot, a coöperative movable contact mounted to make and break contact with said fixed contact, and a pressure retaining compartment inclosing said fixed contact and having in one wall an insulated vent through which the movable contact passes to a point outside of said compartment in breaking the circuit and thereby draws the arc through said vent, whereby the oil put under pressure in said compartment by the arc is directed against the arc to extinguish it.

13. In an electric switch, an inclosing vessel comprising a reservoir compartment and a pressure retaining compartment having in one wall an opening into said reservoir compartment, a fixed contact extending into said vessel and surrounded by the walls of said pressure retaining compartment, an insulating support for said contact forming part of the walls of said vessel, and a movable contact mounted to move into the pressure retaining compartment through said opening to make contact therein with the fixed contact and to move out through said opening into the reservoir compartment as the switch opens, whereby the oil in said compartment is put under pressure by the arc and is directed against the arc to extinguish it.

14. An electric switch comprising an insulating oil vessel partially filled with oil, relatively movable coöperating contacts mounted to separate in said vessel beneath the oil therein, one of said contacts being mounted on the bottom of said vessel, and insulated supporting legs with their upper ends in engagement with said oil vessel near the upper edge thereof to hold said oil vessel in a vertical position and to insulate it from ground.

15. A circuit interrupting device comprising a pressure retaining chamber containing insulating fluid and having a vent in one wall thereof, current carrying means in said chamber separable to break the circuit in said chamber, and means in the path of fluid discharged from said chamber through said vent for intercepting and deflecting said fluid.

16. A circuit interrupting device comprising a vessel containing oil and a pressure retaining chamber having in one wall thereof a vent toward the top of said vessel, current carrying terminals separable in said chamber to produce in said chamber a break in the circuit, and means between the top of said vessel and said vent and in the path of fluid discharged from said vent for intercepting and baffling said fluid.

17. A circuit interrupting device comprising a pressure retaining chamber containing oil and having in one wall thereof a vent, relatively movable coöperating contacts separable in said chamber to break the circuit therein and thereby produce an arc adjacent said vent, and a baffle plate mounted in a position to intercept fluid put under pressure by the arc and discharged from said vent, said baffle plate being mounted in the path of the fluid discharged and being shaped to compel the fluid moving away from said vent to change its direction of flow.

18. A circuit interrupting device comprising a pressure retaining chamber having a vent in one wall thereof, a stationary contact in said chamber, a movable contact mounted to separate from said fixed contact in said chamber and to move out of said chamber through said vent to break the circuit, and a baffle member concentric with the path of movement of said movable contact for diverting from the path of said movable contact the fluid projected from said vent.

In witness whereof, I have hereunto set my hand this 4th day of November, 1904.

EDWARD M. HEWLETT.

Witnesses:
BENJAMIN B. HULL,
HELEN ORFORD.