March 10, 1942. J. R. CALDWELL 2,276,257

ELECTRIC SWITCH

Filed April 25, 1940 2 Sheets-Sheet 1

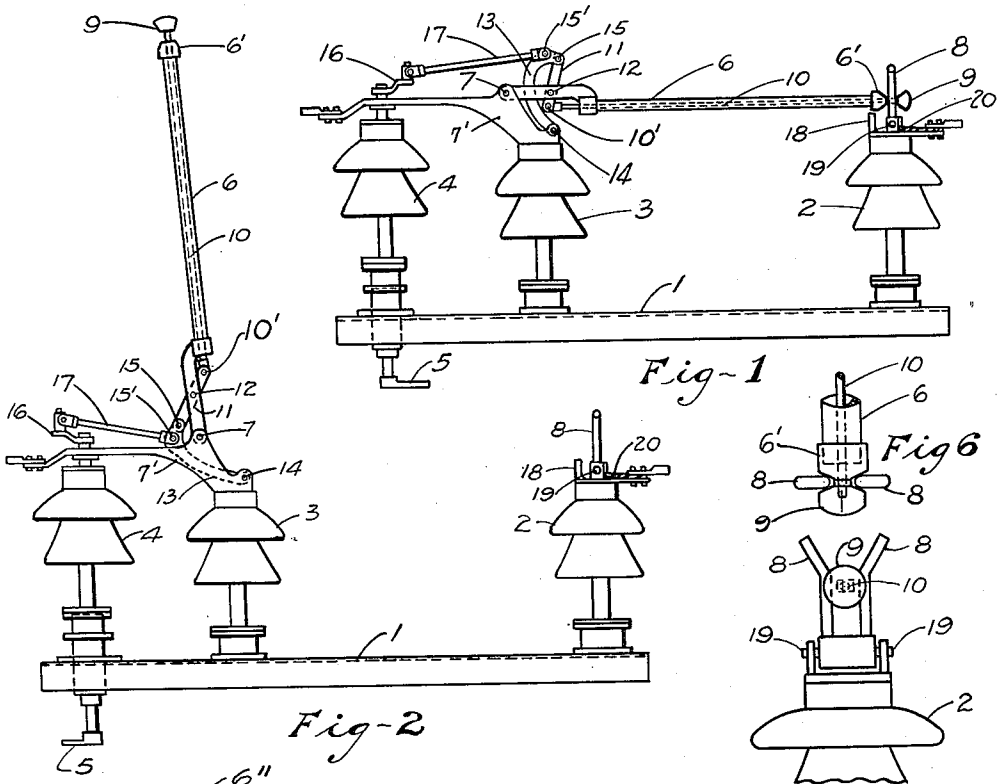


Fig-1

Fig-2

Fig 6

Fig-5

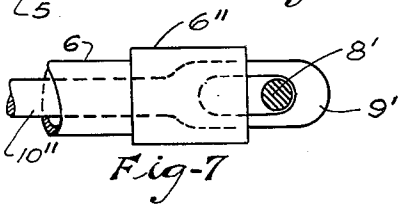


Fig-7

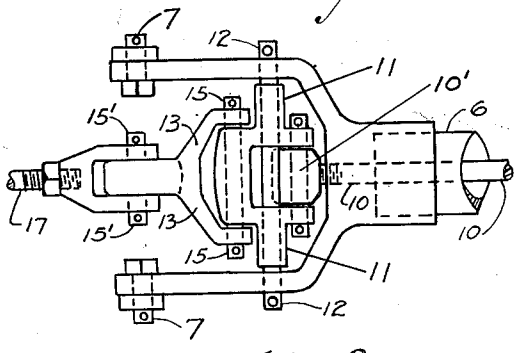


Fig-3

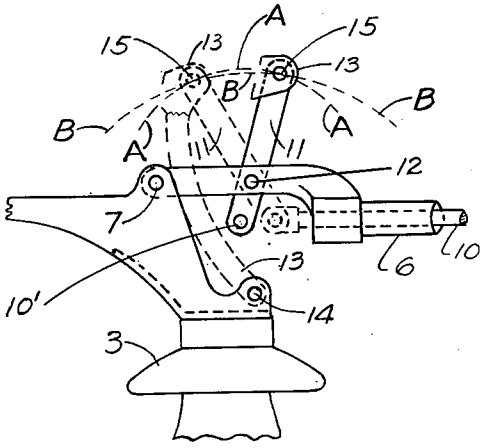


Fig-4

INVENTOR

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March 10, 1942. J. R. CALDWELL 2,276,257

ELECTRIC SWITCH

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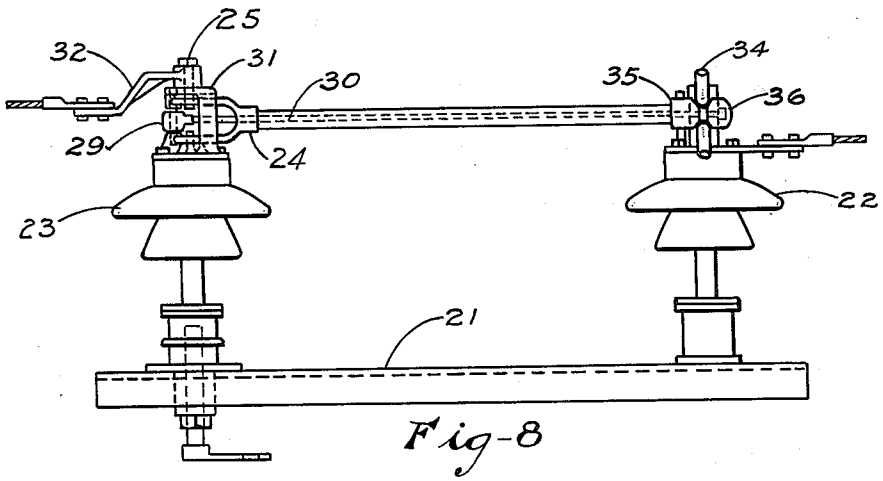
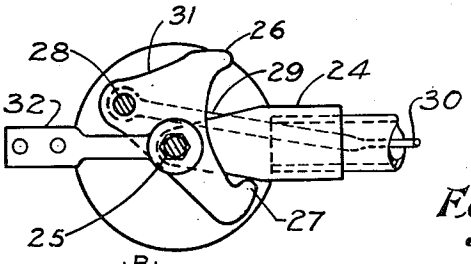


Fig-8



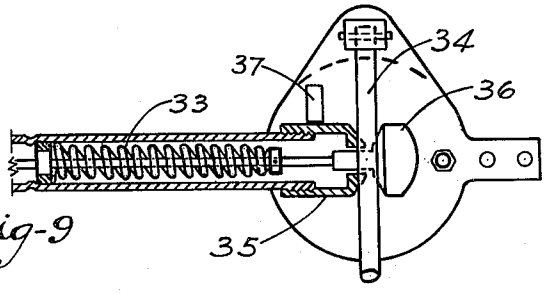


Fig-9

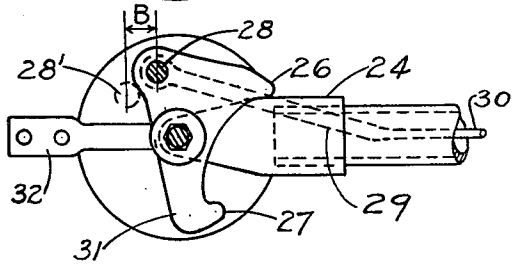


Fig-10

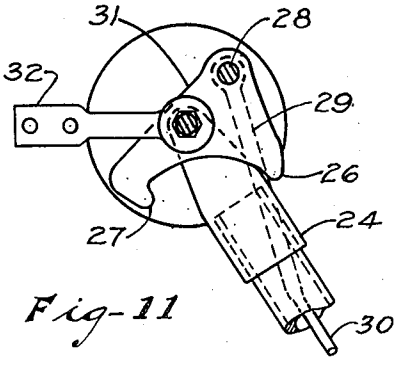


Fig-11

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Patented Mar. 10, 1942

2,276,257

UNITED STATES PATENT OFFICE

2,276,257

ELECTRIC SWITCH

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Application April 25, 1940, Serial No. 331,496

7 Claims. (Cl. 200—48)

This invention relates to the type of high voltage switch in which a swing arm mounted upon an insulated support is moved into and out of engagement with a contact member mounted upon another insulated support spaced away from the first support. One of the purposes of the invention is to provide means to impose heavy pressure supplemented by a rubbing motion between the swing arm and the contact member, and later to release that pressure before the swing arm starts its opening motion; another purpose is to bring the swing arm into its closed position with a motion that is progressively decelerated, thereby providing a cushioned stop; and other purposes will be evident from the specification and claims. The invention may be embodied in several forms of switch.

One unit embodying the invention is shown in closed circuit position in Fig. 1; Fig. 2 shows the same switch in open position; Fig. 3 shows an enlarged plan view of the hinge members of this unit; Fig. 4 is a side view of the same members in smaller scale; and Figs. 5 and 6 give an end view and also a top view of the contact members. Fig. 7 shows an alternate design of contact. Figs. 8, 9, 10 and 11 show my invention embodied in a switch having only two insulators, one of which rotates and swings the switch-arm in a horizontal plane, instead of in a vertical plane as already described. Fig. 8 shows a side view of the switch unit in the closed position; Fig. 9 is a partial top view of the same position; Fig. 10 is a top view of one end of the switch when about to be opened; and Fig. 11 shows the same end of the switch when fully opened.

The base 1 carries two stationary insulators 2 and 3, and the rotatable insulator 4 which is controlled as by the crank 5. The swing arm 6 is pivoted at 7 and moves into and out of engagement with the forked spring contact member 8, 8. At the end of the swing arm 6 is a block 9 movable longitudinally by means of the rod 10, which in turn is moved by the link 11 which is pivoted to the swing arm at 12. Another arm 13 is pivoted at 14 and connected to the link 11 at 15. The crank 16 is integral with the movable insulator 4, and is connected by the link 17 and the pivot 15' to the arm 13. The block 6' rests on the stop 18 when the switch is in closed position. The contact fork 8, 8 has a limited movability about the pivot 19, and a flexible shunt 20 insures good conductivity.

As shown in Fig. 3, the arm 13 is free to pass between the forked pivotal joint 7, and it is proportioned to clear the pivot joint 10' between 10 and 11. The pivotal joints 15 and 15' may be on the same axis if desirable.

Operation is as follows: In fully closed position there is compressive stress on the link 17. The link 11 and the rod 10 thereby act to draw the block 9 closer to the terminal block 6' of the arm 6, so that the forked contact 8, 8 is clamped with a heavy wedge pressure between the blocks 6' and 9, as indicated in Fig. 6. The link 11 acts as a lever whose fulcrum is at 12, and as 15 is moved back and forth the pivot 10' and therefore the rod 10 are simultaneously moved in the opposite directions and over a shorter travel than 15 takes.

When the crank 5 is first operated to open the switch, the linkage moves from the position shown by full lines in Fig. 4 to the position shown by dotted lines. With the arm 6 stationary, the long end of the link 11 tends to follow the arc AAA, while the end of the arm 13 tends to follow the arc BBB. There is enough clearance in the various joints to allow for the slight difference between the two arcs for the short travel required to release the clamping pressure against 8, 8. Meanwhile, the block 6' rests upon the stop 18, and, as the pressure relaxes, the sides of the fork 8, 8 move together slightly and there may or may not be some motion of the assembled fork, 8, 8 about the pivot 19. The arm 6 is now free to move upwardly.

Further opening motion of the arm 13 around its pivot 14 carries the pivot 15 along the arc BBB back towards the insulator 4. But the length of the link 11 keeps the pivots 15 and 12 at a fixed distance from each other and therefore when 15 leaves the arc AAA to follow the arc BBB the link 11 starts to raise the pivot 12 and this rotates the arm 6 around its fixed pivots 7, ultimately moving the switch to fully open position shown in Fig. 2. The reverse operations close the switch, bringing the arm 6 to a cushioned stop as the arcs AAA and BBB near the portion of their travel where they substantially coincide, and where 6' rests upon the stop 18. Further closing motion of the arm 5 draws the block 9 closer to the block 6', and the leverages are such that several hundred pounds pressure may easily be applied against the fork 8, 8. This moves the arms of the fork 8, 8 slightly wider apart and this wedging action between the parts has a rubbing effect which insures a clean contact free from dirt and having high conductivity.

Many variations may be made in the designs of equipment embodying this invention. As shown in Fig. 7, the forked contact member 8, 8 may become a single horn 8', and the members

9', 10'' would then be formed as a loop which passes over the end of this single horn 8'. The clamping action would then draw the loop partially into the open end of the block 6''; thereby establishing high-pressure contact between the contact horn 8' and the block 6''.

The two-insulator type of my switch is shown in Figs. 8, 9, 10 and 11, where the base 21 carries the stationary insulator 22 and the rotatable insulator 23 which supports the swing arm 24, which has limited motion about the forked pivot-joint 25, between the stops 26 and 27. The pin 28 engages with the terminal 29 of the rod 30. The keeper 31 supports the upper ends of the pivots 25 and 28, and also carries the swivelled line-terminal 32. A suitable shunt, not shown, may be used to connect the arm 24 directly with the terminal 32.

Housed inside the tubular arm 24 is a compression spring 33 which biases the rod 30 away from the insulator 23. The terminal contact 34 is similar to the contacts 8, 8 except that it is held horizontal. The blocks 35 and 36 are similar to blocks 6' and 9, and these parts all function similarly.

Operation is as follows: When in the closed position, rotation of the insulator 23 causes the pin 28 to move about the axis of rotation, which corresponds with the pivot 25. Therefore, the rod 30 and the block 36 release the pressure on contacts 34. The stop 26 comes against arm 24 and further rotation of the insulator 23 swings the arm 24 to the open position indicated in Fig. 11. The spring 33 biases the various members to keep the same relative positions as the switch is being closed; but when the stop 37 stops further motion of the arm 24, then further rotation of the insulator 23 causes the pin 28 to move through its line of travel as indicated by B, thereby compressing the spring 33, drawing in the block 36 and developing heavy pressure against the contacts 34.

The drawings and specifications are intended to illustrate, not to limit the scope of this invention, as many other variations of design may be made without departing from the spirit and purpose of the invention.

I claim:

1. In an electric switch two spaced insulated supports, a forked member comprising two contact arms mounted upon one support, a swing arm mounted upon the other support and cooperable in direct contact with the said forked member, a wedge member on the end of the swing arm movable longitudinally of the arm and transversely between the said forked contact arms to spread the said arms, together with operating means to move the said wedge member.

2. In an electric switch two spaced insulated supports, a pair of forked contact members mounted upon one support, a swing arm mounted upon the other support, a wedge member on the end of the swing arm, together with operating means to cause relative movement between the said wedge member and the said forked contact members transversely to the said contact members.

3. In an electric switch, two spaced insulated supports, a contact member mounted upon one support, a swing arm movable about a single stationary axis upon the other support and cooperable with the said contact member, a rod operable longitudinally with the swing arm, a link pivotally mounted upon the swing arm and connected to the said rod, a rocker mounted upon a stationary pivot supported by the said other support and movably connected with the said link, together with means to move the said rocker and thereby operate the switch.

4. In an electric switch, one stationary and one rotative insulated support in spaced relation, a contact member on the stationary support, a swing arm mounted upon a pivot upon the rotative support and movable about an axis parallel to the axis of the rotative support, a pressure member movably supported near the end of the swing arm and cooperable with the said contact member, a second pivot spaced from the first pivot upon the movable support, and a tension operating member connecting the said second pivot with the said pressure member and operable to pull the said pressure member bodily into close contact with the said contact member.

5. In an electric switch, two spaced insulated supports, a contact mounted upon one support, a swing arm mounted upon a pivot on the other support and cooperable with the said contact, a pressure member near the swing end of the said arm together with an operating tension member to move the said pressure member bodily towards the said pivot and tightly against the said contact.

6. In an electric switch, two spaced insulated supports, a forked spring contact mounted upon one support, a swing arm mounted upon the other support and cooperable with the said contact, together with a separately movable pressure contact member carried at the end of the swing arm and operable in direct rubbing contact with the said forked spring contact to spread the said forked spring contact.

7. In an electric switch two spaced insulated supports, a forked member comprising two contact arms mounted upon one support, a swing arm mounted upon the other support and cooperable in direct contact with the said forked member, a wedge contact face supported by the swing arm near the end of the swing arm, together with operating means to produce relative motion between the said forked member and the said wedge contact face to spread the said forked member, the said relative motion being transverse to the forked member and longitudinal to the said swing arm.

JOHN R. CALDWELL.