Sept. 28, 1948. R. N. ROWE 2,450,256

ELECTRIC SWITCH

Filed July 31, 1945

Fig. 1.

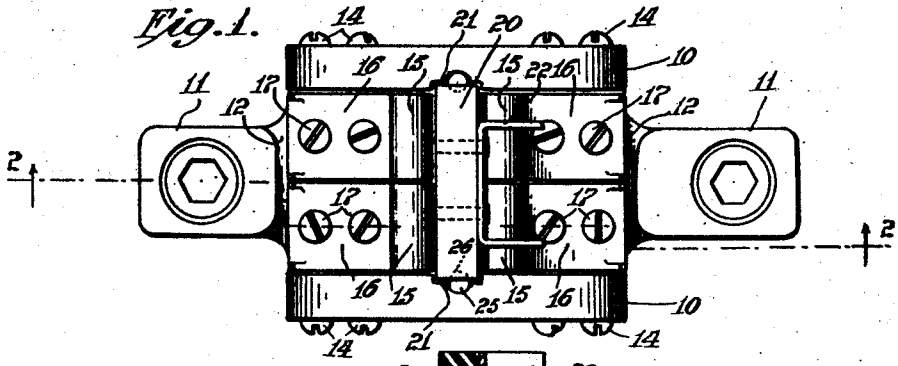


Fig. 2.

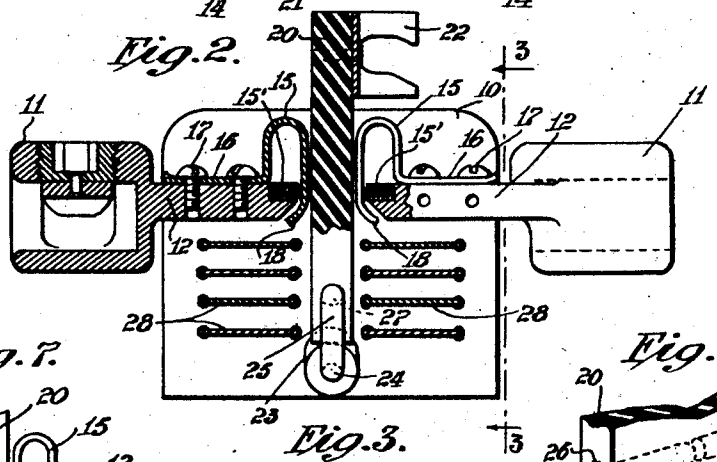


Fig. 7.

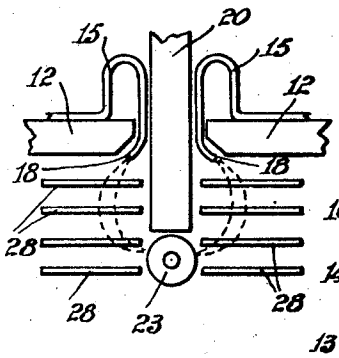


Fig. 3.

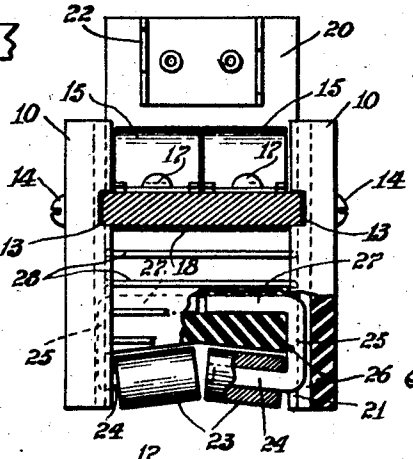


Fig. 5.

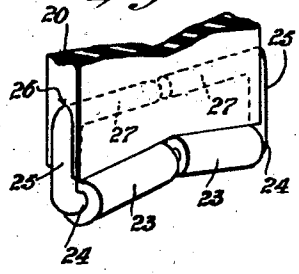


Fig. 6.

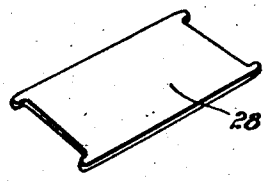
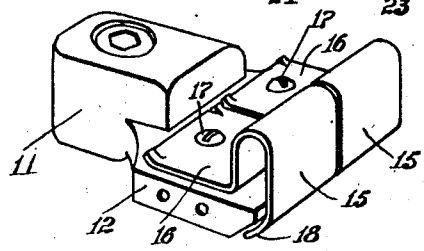


Fig. 4.



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Patented Sept. 28, 1948

2,450,256

UNITED STATES PATENT OFFICE

2,450,256

ELECTRIC SWITCH

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Application July 31, 1945, Serial No. 608,074

14 Claims. (Cl. 200—151)

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My invention relates particularly to high capacity switches. One object is to provide a construction which is compact, rugged and reliable and capable of carrying heavy currents safely.

Another object is to minimize the effect of arcing by deionizing and quickly extinguishing the same.

When a double break contact is used, as for instance in the Rowe Patent 1,894,543, two arcs are formed in opening the circuit. By locating the opposite stationary contacts close enough together the magnetic fields of the two arcs will repel each other so that the arcs will bow away from each other. I accordingly arrange discrete cooling grids, pins, screens, plates or other arc dispersing devices along the opposite sides of the path of the movable switch contact so as to quickly disperse the arcs.

In the form shown I have mounted the stationary contacts directly on the ends of the terminal lugs which are specially designed for this purpose. The movable switch member has two contact rollers inclined toward each other and so arranged that the final breaking of the circuit occurs near the center of the stationary contacts. On opposite sides of the movable switch member I provide a number of spaced metallic plates either magnetic or non-magnetic so that in opening the circuit the arcs are drawn between the contacts and dissipated without damage to the switch.

The movable switch member includes an insulating member which is moved between the stationary contacts and the arc dispensing grids when the circuit is broken, thus greatly opposing any tendency of an arc to persist.

Fig. 1 is a plan view of the parts of a switch embodying one form of my invention.

Fig. 2 is a partial longitudinal section and side view of the same, the movable switch member being shown in the open circuit position.

Fig. 3 is a partial cross sectional view of the same.

Fig. 4 is a perspective view of one of the compact terminal and contact members.

Fig. 5 is a perspective view of a part of the movable switch member with the attached contact rollers.

Fig. 6 is a perspective view of one of the arc disrupting plates.

Fig. 7 is a diagrammatic view showing how the arcs mutually repel each other when the circuit is opened.

In the form shown the stationary and movable parts of the switch are carried by insulating side

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plates or barriers 10, 10. Each of the oppositely disposed terminal lugs 11 is of any suitable type and is provided with a base plate 12 preferably cast integral with it. The base plates are mounted in grooves 13 and held in place by screws 14.

Each contact part 15 is resilient and has a foot 16. Preferably there are two parts with their feet mounted directly on each base plate and secured by screws 17. The tip 18 of each contact part is curled around the edge of the base plate to ensure smooth action of the movable switch member. Each resilient contact is reenforced by a spring 15' supported in a recess in the base plate 12.

The movable switch member has an insulating slide or carrier 20 which is guided in grooves 21 in the side plates and slides between the oppositely disposed stationary contacts 15, 15. This carrier has a lug 22 by which any suitable form of actuating mechanism (not shown) may be connected to the carrier.

The movable switch member has two contact means in the form of rollers 23, 23 mounted to turn loosely on inclined bearings 24, 24 which may conveniently be formed on the ends of side bars or anchors 25, 25 located in grooves 26 in the edges of the carrier and held by projections 27 extending into the edges of the carrier. These contact rollers are so mounted that they are given a rolling and rocking motion during their movement between the stationary contacts which affords a flexibility that insures good electrical contact and smooth movement therebetween. These rollers are so arranged that their inner ends are close together and near the center line of the stationary contacts providing two contact portions extending in diverging relation forwardly of their direction of movement to disengage said stationary contacts so that when the switch member is moved to break the circuit these inner ends of the rollers are the last to leave the contacts and hence the arc is drawn from the central part of the contacts where there is the greatest area of metal for cooling the arc.

The contacts 15 are spaced sufficiently close so that when the double break occurs the two arcs formed will have a direct magnet effect upon each other. The insulating carrier 20 is penetrated by the magnetic field but serves to prevent accidental direct arcing across the stationary contacts.

Combined with this peculiar arrangement of contact rollers and as a final means for dissipating the arc I provide a series of discrete metal-

lic plates 28 which are mounted in the side plates or barriers 10 at each side of the path of the rollers and spaced apart from each other beginning at a point adjacent the stationary contacts. In breaking the circuit the rollers pass through this space and by their action the arc is deionized and quickly extinguished. It will thus be seen that the insulating carrier 20 follows the switch contact members 23 between the stationary contacts 18, 18 and between the opposed groups of the discrete grid members 28 so as to assist in the final extinguishment of any arc that might tend to persist.

In the present invention the diameter of the contact rollers is made so small for a given capacity of switch that the arc formed on one side of the roller has a definite magnetic effect on the oppositely formed arc and the two arcs mutually bend away from each other. Arc dispersing structures arranged as above can thereby dissipate the bent arcs.

By this combination of features I have found it possible to secure long life and reliability of action in a very compact structure.

I claim:

1. In an electric switch, a pair of resilient spaced contacts, an insulating carrier slidable between said contacts and having two contact rollers arranged on independent axes extending at an obtuse inclined angle with respect to each other.

2. In an electric switch, a pair of resilient spaced contacts, an insulating carrier slidable between said contacts, U-shaped members having bearings carried by opposite edges of said carrier and a contact roller mounted on each bearing beyond the end of the carrier and rotatably movable on said bearing between said resilient contacts.

3. In an electric switch, two opposed switch contacts, a terminal lug directly secured to each contact and a switch member slidable between said contacts, said member consisting of two rollers arranged with their axes inclined toward each other.

4. In an electric switch, two opposed switch contacts, a terminal lug directly secured to each contact and a switch member slidable between said contacts, said member consisting of two rollers arranged with their axes inclined toward each other and arranged to break the circuit at the inner ends of the rollers.

5. In an electric switch, two opposed switch contacts, a terminal lug directly secured to each contact and a switch member slidable between said contacts, said member consisting of two rollers arranged with their axes inclined toward each other and arc disrupting plates arranged on both sides of the rollers during the movement of the switch member.

6. In an electric switch, two pairs of opposed resilient switch contacts, a terminal lug integrally secured to each contact and a switch member slidable between said pairs of contacts, said member including a slidable carrier, two bearings loosely supported by said carrier with their axes inclined toward each other, a roller loosely mounted on each of said inclined bearings and adapted to contact one resilient contact on each side of the slidable carrier.

7. In an electric switch, two pairs of opposed resilient switch contacts, an insulating carrier slidable between said contacts, two bearings loosely supported by said carrier with their axes inclined toward each other, a roller loosely

mounted on each of said inclined bearings and adapted to contact one of the resilient contacts on each side of the slidable carrier, and arc dissipating devices supported adjacent said stationary contacts and spaced along opposite sides of the path of movement of the carrier and its rollers for dissipating the arc as the roller contacts move to open circuit position.

8. In an electric switch of the double break type, a pair of spaced stationary contacts of opposite polarity in close proximity to each other, an insulating carrier slidable between said switch contacts, two inclined roller contacts carried by said carrier and adapted to move between and beyond said stationary contacts, arc dissipating devices supported adjacent said stationary contacts and spaced along the opposite sides of the path of movement of the carrier and its contact for dissipating the arc as the contacts move to open circuit position.

9. In an electric switch, a pair of insulating walls spaced apart from each other and having guide grooves, metallic base plates mounted edgewise in the grooves between said walls, resilient contacts supported on said base plates between the walls and spaced apart from each other, terminal lugs integral with the base plates, an insulating carrier slidable between said resilient contacts, a roller contact carried at the end of said carrier and discrete arc dispersing members mounted between said walls adjacent to said stationary contacts and on opposite sides of the path of movement of the insulating carrier and roller contact.

10. In an electric switch, insulating side plates, stationary contacts supported between said plates, a switch member slidable between said contacts and having contact faces inclined from the center outwardly and in a direction forwardly of the direction of movement in opening the circuit so that the circuit is broken at the center of the contact faces and discrete metallic arc dissipating members supported by said side plates and arranged on opposite sides of the path of movement of the switch member.

11. An electric switch construction comprising spaced insulating plates, a pair of switch contacts supported between said plates, an insulating carrier slidable between said plates and having contact means with contact surfaces inclined from the center outwardly so that the central portion of the contact means is the last part of the contact means to break circuit between said switch contacts.

12. In an electric switch, a pair of spaced contacts, an insulating carrier reciprocable between said contacts, a contact roller movable with said carrier between said contacts, a U-shaped connection between said carrier and said roller, said connection having one arm pivoted in said carrier and having one arm forming a bearing for said roller at the end of said carrier.

13. In an electric switch, a pair of spaced apart stationary contacts, movable contact means and means mounting said movable contact means for slidable movement into and out of engagement with said stationary contacts, said movable contact means being provided with at least two contact portions extending in diverging relation forwardly of their direction of movement to disengage said stationary contacts.

14. In an electric switch, a pair of spaced apart stationary contacts, movable contact means, means mounting said movable contact means for slidable movement into and out of engagement

with said stationary contacts, said movable contact means being provided with at least two portions extending from substantially the center of said movable contact means outwardly in diverging relation forwardly of their direction of movement to disengage said stationary contacts so that said center is the last to disengage said stationary contacts.

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