May 12, 1931. G. O. WILMS ET AL 1,804,729

ELECTRICAL SWITCH

Filed Oct. 17, 1927 2 Sheets-Sheet 1

Fig. 1.

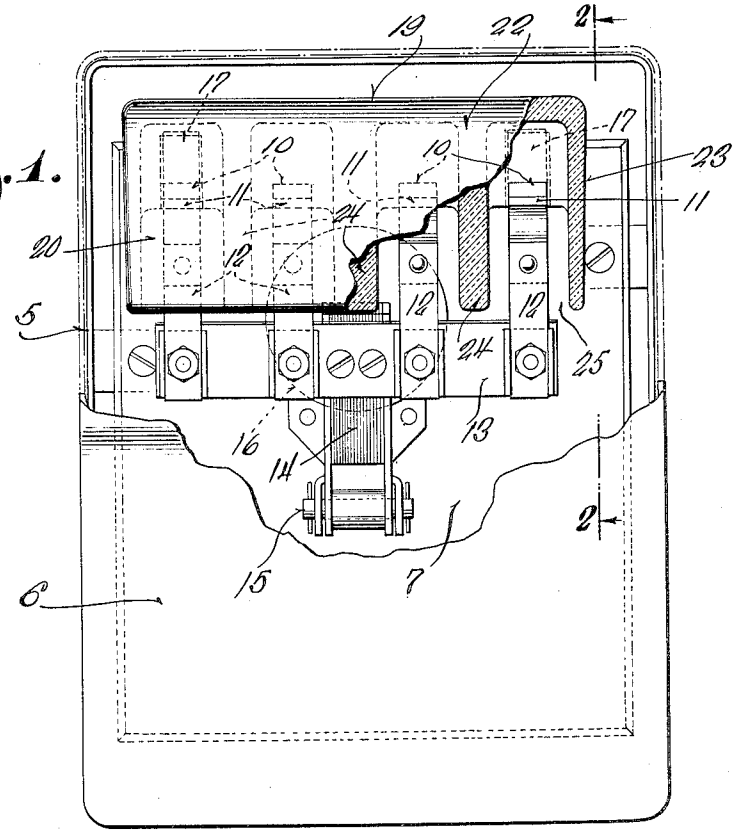

Fig. 2.

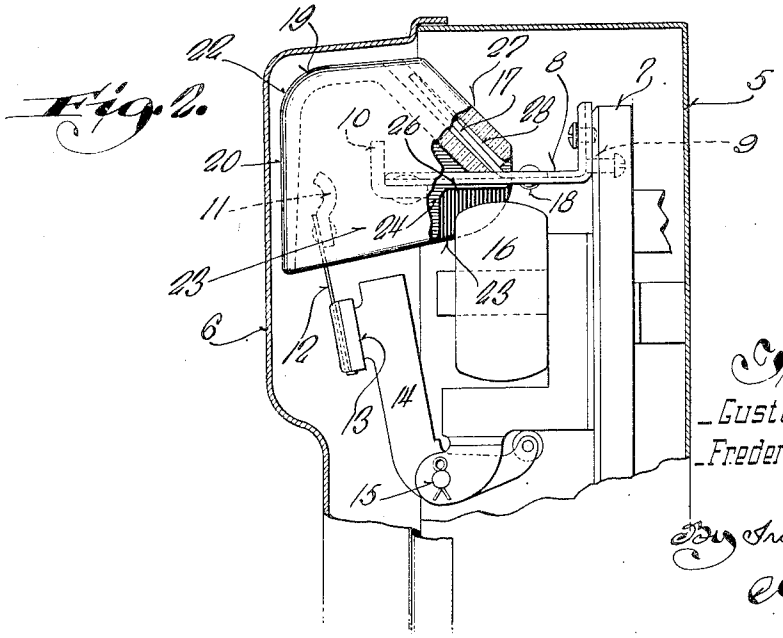

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Fig. 3.

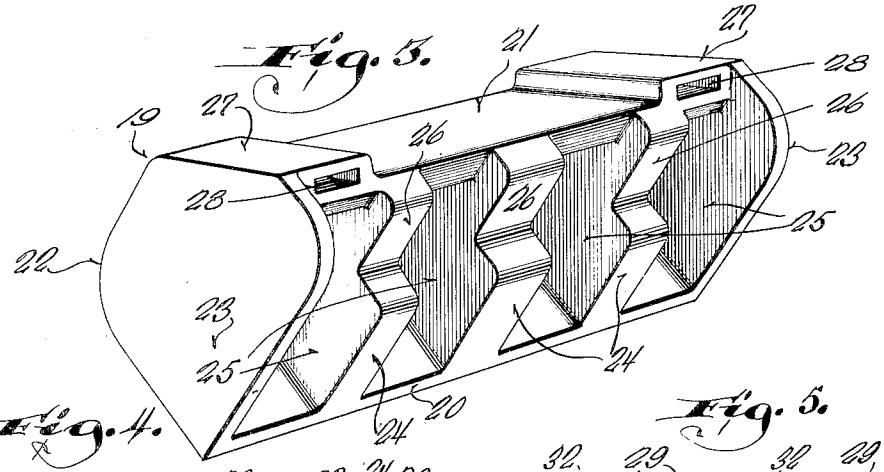


Fig. 4.

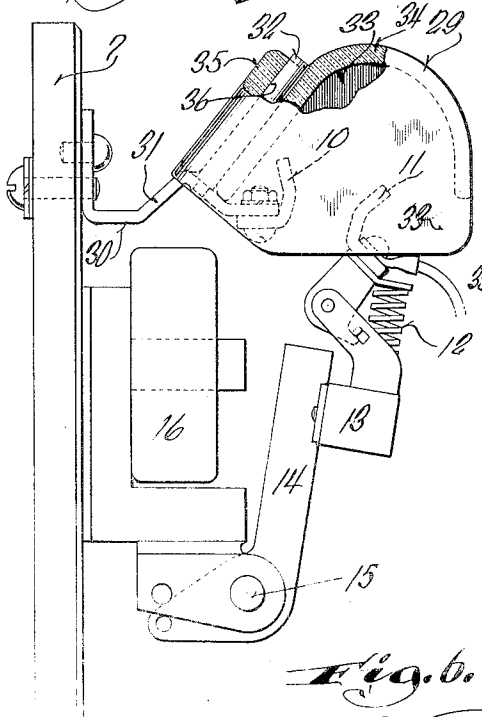


Fig. 5.

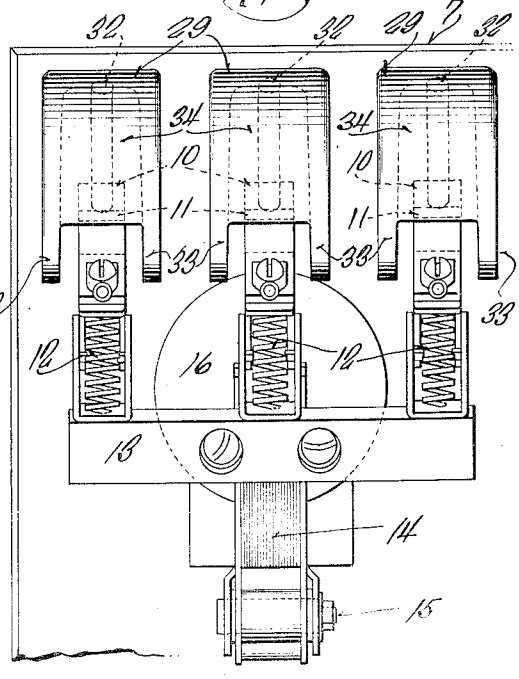
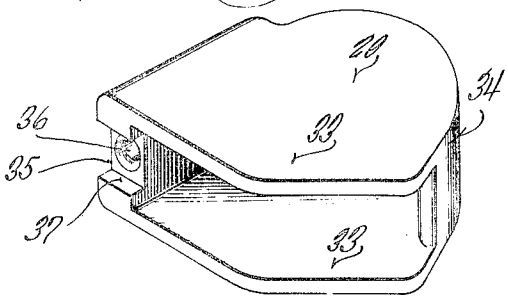


Fig. 6.



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UNITED STATES PATENT OFFICE

GUSTAV O. WILMS AND FREDERICK F. LOOCK, OF MILWAUKEE, WISCONSIN, ASSIGNORS, BY MESNE ASSIGNMENTS, TO THE RELIANCE COMPANY, OF WILMINGTON, DELAWARE, A CORPORATION OF DELAWARE

ELECTRICAL SWITCH

Application filed October 17, 1927. Serial No. 226,665.

This invention relates to certain new and useful improvements in means for minimizing destructive arcs occurring between switch contacts at the time of the rupture of a circuit therebetween, and has as an object the provision of an improved hood enclosing the contacts.

Many types of devices have been designed to overcome destructive arcing forces, such as the well-known arc chute consisting of plates disposed on each side of the contacts and the provision of magnetic blowout means of which Letters Patent Number 967,280, issued Harold E. White, August 16, 1910, is an example.

The types of arc minimizing means heretofore employed have only partially offset the effects of the arc and have also been open to the objection of bulkiness and the consequent inability to house the same within a casing made to fit the switch proper, and this invention has as another object the provision of an improved means for limiting and reducing the formation of destructive arcs at the contacts of switches which is of reduced size to require no increase in the size of the casing enclosing the switch mechanism and which will efficiently prevent the destruction of the contacts by the formation of an arc therebetween upon separation under load.

Another object of this invention resides in the provision of an improved device of the character described which consists of a hood entirely enclosing the contacts and which is open only at the point of entrance of the contacts.

A further object of this invention resides in the provision of an improved device of the character described which is in the form of an elongated hood member having spaced transverse walls or partitions dividing the same into sections or compartments to adapt the hood member for use with a plurality of pairs of contacts.

A still further object of this invention resides in the provision of an improved hood member of the character described which is formed of a refractory material such as porcelain and coated to prevent the chemical reaction occurring upon the separation of the contacts within an area confined by porcelain which is normally such as to tend to maintain an arc.

With the above and other objects in view which will appear as the description proceeds, our invention resides in the novel construction, combination and arrangement of parts substantially as hereinafter described and more particularly defined by the appended claims, it being understood that such changes in the precise embodiment of the herein disclosed invention may be made as come within the scope of the claims.

In the accompanying drawings, we have illustrated two complete examples of the physical embodiment of our invention constructed according to the best modes we have so far devised for the practical application of the principles thereof, and in which:

Figure 1 is a front view, of a switch mechanism equipped with our invention, a part of the enclosing casing being broken away and the switch mechanism proper being partly in front elevation and partly in section;

Figure 2 is a view, taken transversely through the upper end portion of the switch mechanism on the plane of the line 2—2 of Figure 1, the switch mechanism proper being partly in side elevation and partly in section;

Figure 3 is a perspective view of the improved arc hood detached from the switch mechanism;

Figure 4 is a view, partly in section and partly in side elevation, of a switch mechanism apart from its enclosing housing and equipped with a slightly modified form of arc hood;

Figure 5 is a front elevational view of a switch mechanism equipped with the type of arc hood illustrated in Figure 4, and

Figure 6 is a perspective view of one of the arc hoods of the modified construction.

Referring now more particularly to the accompanying drawings in which like numerals designate like parts throughout the several views, 5 designates a box or housing preferably of metal construction having a

hinged or otherwise removably mounted cover 6 in which is fixed a base or panel 7 of slate or other insulating material from which the switch mechanism is supported.

The switch mechanism may be of any design or construction, the one illustrated in the drawings consisting of a plurality of spaced laterally extended standards or arms 8 fixed to the upper end of the panel, as at 9, and having stationary contacts 10 on their outer ends adapted to be engaged by moveable contactors 11 having a suitable spring connection 12 with a cross arm 13 of insulating material. The cross arm is fixed to the outer free end portion 14 of an armature pivotally mounted, as at 15, to cooperate with an actuating magnet 16 supported from the panel 7.

The standards of arms 8 are preferably of channel shape in cross section and the inner-most arms have upwardly and outwardly inclined supports 17 riveted or otherwise secured thereto, as at 18, which provide means for mounting a hood member 19 forming the arc reducing or limiting means now about to be described.

The hood 19 is preferably of refractory material such as porcelain or the like and is in one piece and of the shape best shown in Figures 2 and 5 having converging front and rear walls 20 and 21, respectively, connected by a curved wall 22 and end walls 23, intermediate spaced partitions 24 dividing the hood into a plurality of compartments 25 in which the pairs of cooperating contacts extend. The wall 21 terminates short of wall 20 and the rear portion of the partitions 24 is stepped, as at 26, to accommodate the coil 16 and its mounting frame. The wall 21 has enlargements 27 on its rear surface which are apertured, as at 28, to receive the supports 17 and thus mount the hood as best shown in Figure 2 with the contacts 10 and 11 entirely disposed within their respective compartments which are open to the atmosphere only at the side of entrance of the contacts.

If the arc hoods are formed of porcelain, a coating of enamel or other suitable material is applied to prevent the chemical reaction which is set up when an arc is enclosed in porcelain.

In the form of my invention illustrated in Figures 4, 5 and 6, individual arc hoods 29 are provided. In this instance, the supports 30 for the stationary contacts 10, which are secured at one end of the panel 7, have their medial portions bent substantially V-shaped, as at 31, and from one of the sides of the V-shaped portions studs 32 extend upwardly and outwardly, the studs being secured to the medial portions of the supports by riveting or any other suitable means. Each of the arc hoods 29 consists of spaced sides 33 connected by a curved wall 34 and a straight wall 35, which continues tangentially therefrom, the distance between the ends of the walls 34 and 35 being open to the atmosphere and providing the point of entrance of the movable contacts. The wall 35 has a longitudinal aperture 36 to receive the stud 32 and the lower portion of the wall 34 is cut away, as at 37, to receive the adjacent portions 31 of the supporting arm upon which the hood rests. Thus it will be seen that each arc hood 29 is readily removably supported by its arm 30 and substantially encloses the adjacent pair of contacts 10 and 11 to limit the arc formed upon opening of the switch. Forming the arc hoods separately, as illustrated in this form of my invention, allows ready individual inspection of the contacts, as it is only necessary to lift the desired hood to immediately expose the contacts to view.

It has been found by experiment that the smaller the area within the compartment surrounding the contacts, the more efficient the suppression of the arc tending to form upon the separation of the contacts. It has also been found that the cross-sectional shape of the compartment as shown is especially efficient, although its shape may be varied, and the sides of the compartment are in close relation to the contacts and the arc spreads on the walls and is cooled, the hood dissipating the heat by radiation.

From the foregoing description taken in connection with the accompanying drawings, it will be readily apparent to those skilled in the art to which an invention of the character described appertains that I have provided an arc hood which is simple in construction, readily removably engageable over the contacts, and which effectively limits the formation of an arc at the opening of the contacts materially reducing the duration of time through which the arc holds on, thus greatly increasing the capacity of the switch with which it is used.

What we claim as our invention is:

1. A device for limiting destructive arcing between the contacts of an electric switch, comprising a hood formed of insulating material closed on all sides except its bottom to form a confining chamber substantially encasing the contacts, and means readily removably mounting the hood.

2. The combination with an electric switch having a stationary contact, a movable contact and means mounting the stationary contact, of an arc suppressing hood closed on all sides except its bottom to form a confining chamber encasing the contacts, and cooperating means carried by the hood and the stationary contact mounting means for readily detachably mounting the hood, said cooperating means having a free sliding engagement and enabling the hood to be lifted to expose the contacts.

3. In combination with an electric switch having a stationary contact, a movable contact and means for mounting the stationary contact, of a hood adapted to substantially encase the contacts on all sides except the bottom, and means removably mounting the hood from the stationary contact mounting means and including a member carried by the last mentioned means.

4. In combination with an electric switch having a stationary contact, a movable contact and means mounting the stationary contact, of a hood member closed on all sides except its bottom and having a recess in one wall, and a supporting member extended from the stationary contact supporting means seated in said recess to support the hood member with the contacts positioned therein, said supporting member being disposed in a plane parallel with the direction of movement necessary to lift the hood from the contacts.

5. In combination with an electric switch having a plurality of pairs of stationary and movable contacts, of a hood member of insulating material and having separated compartments formed therein into which the pairs of contacts extend, said compartments being substantially closed on all sides except their bottoms to closely confine the contacts and limit destructive arcing thereat, and means readily removably mounting the hood member.

6. The combination with an electric switch including a stationary contact and a movable contact, of a hood member substantially enclosing the contacts on all sides save the bottom, and means mounting the hood member whereby it is free to be moved to expose the contacts.

7. The combination with an electric switch including a stationary contact, a movable contact and means mounting the stationary contact, of a hood member substantially enclosing the contacts on all sides save the bottom, a supporting member carried by the stationary contact mounting means, and means connecting the hood member with said supporting member whereby the hood member is free to be moved to expose the contacts.

8. In combination with an electric switch having separable contacts, means for limiting destructive arcing between the contacts as they are separated, comprising a hood formed of insulating material and open to the atmosphere only at its bottom, and means mounting the hood in a position whereby the contacts enter the hood from the bottom and are substantially encased thereby on all sides save the bottom.

9. In combination with an electric switch having a plurality of pairs of separable contacts, means for limiting destructive arcing between the pairs of contacts as they are separated and confining said arcs to their respective pairs of contacts, comprising a member having a number of pockets corresponding to the number of pairs of contacts, and means mounting said member so that a pair of contacts is received in each pocket, the pockets being substantially closed except at their bottom portions through which the contacts enter the same whereby the pockets form relatively confined enclosures for the contacts.

10. In combination with an electric switch having a plurality of pairs of side by side separable contacts, and inverted substantially trough like hood member of insulating material, side wise spaced partitions in the hood member dividing the same into side by side pockets, and means readily detachably mounting said hood member over the contacts with a pair of contacts disposed in each pocket with the partitions between adjacent pairs of contacts, said pockets being substantially closed except at their bottoms so that the contacts operate within relatively confined enclosures whereby destructive arcing between the contacts of each pair is limited and the arcs formed upon separation of the contacts are confined to their respective contacts.

11. In combination with an electric switch having a plurality of pairs of side by side separable contacts, means surrounding each pair of contacts on all sides except the bottom whereby the destructive arcing between the contacts of each pair is limited and the arcs formed upon separation of the contacts confined to their respective contacts.

12. In combination with an electric switch having a plurality of pairs of side by side separable contacts, a unit having wall members closely confining each pair of contacts on all sides except the bottom so that the pairs of contacts operate within relatively confined enclosures.

In testimony whereof we have hereunto affixed our signatures.

GUSTAV O. WILMS.
FREDERICK F. LOOCK.