July 12, 1932. C. E. HAMMELL 1,866,563

ELECTRIC SWITCH

Filed May 8, 1930 2 Sheets-Sheet 1

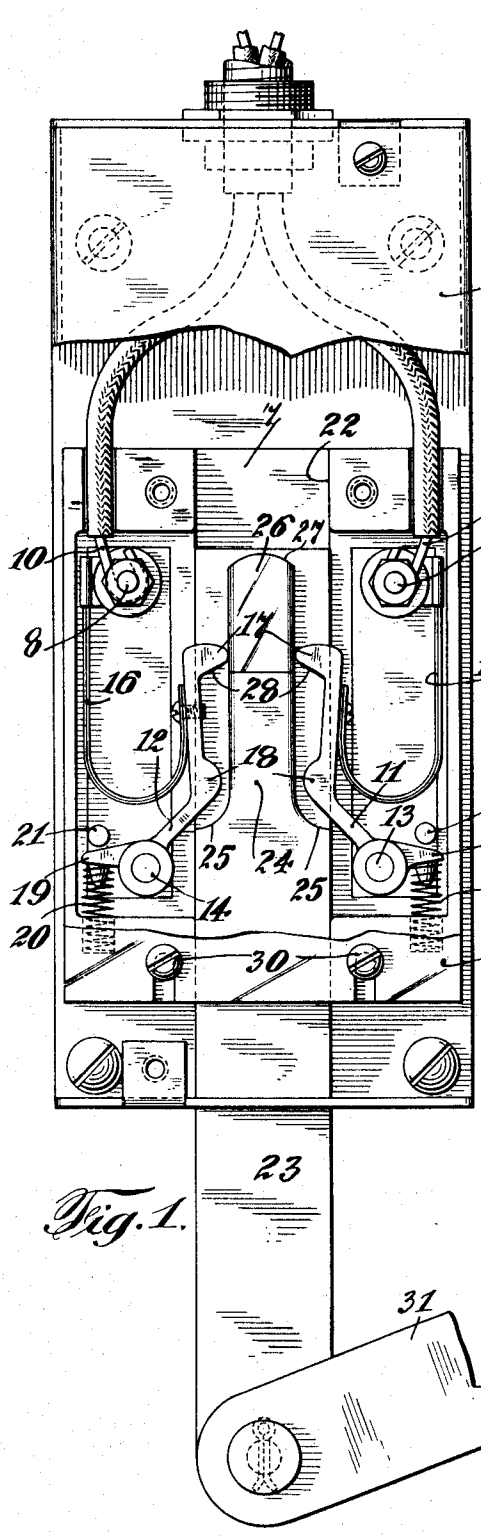


Fig. 1.

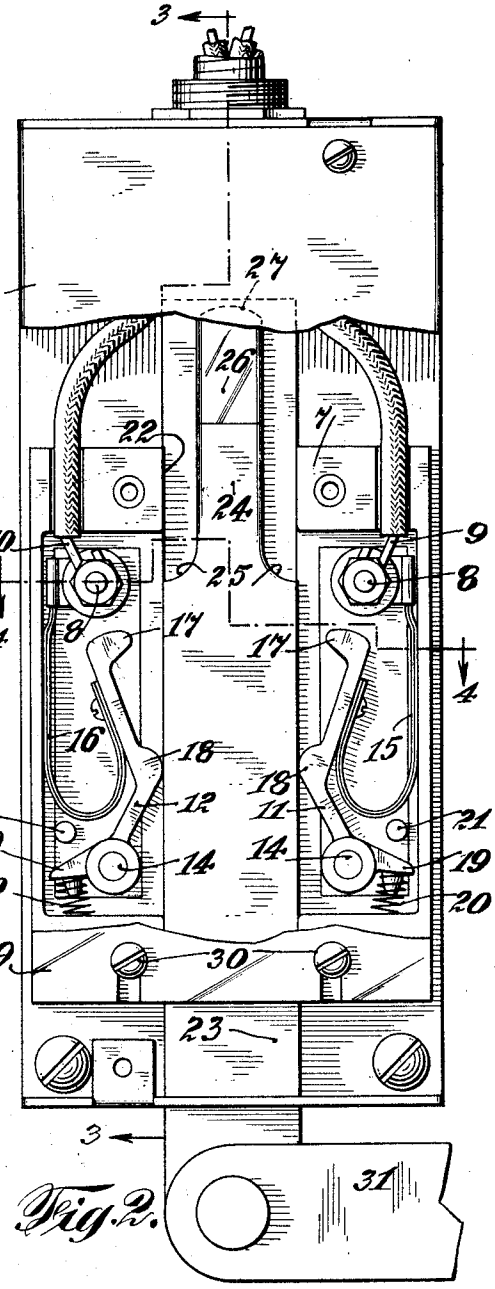


Fig. 2.

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ELECTRIC SWITCH

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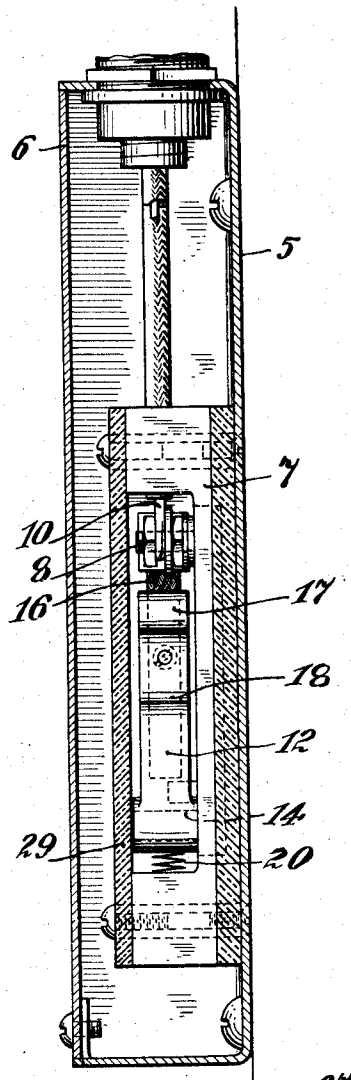


Fig. 3.

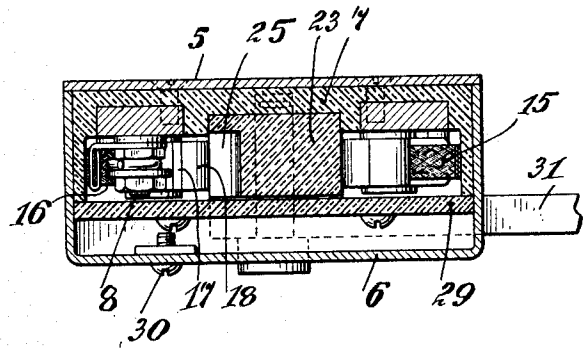


Fig. 4.

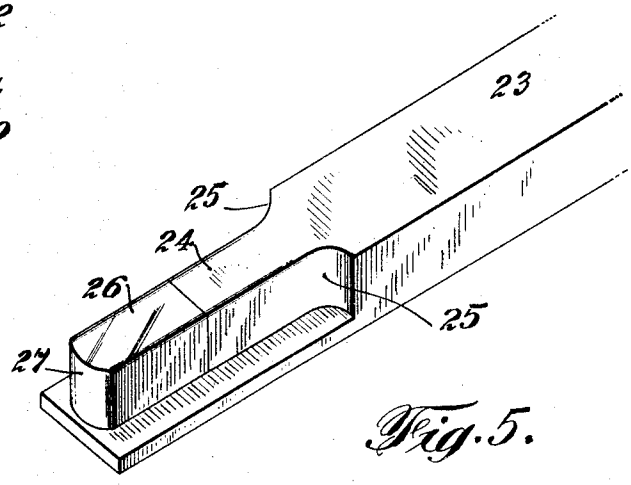


Fig. 5.

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UNITED STATES PATENT OFFICE

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ELECTRIC SWITCH

Application filed May 8, 1930. Serial No. 450,617.

This invention relates to electric switches, and has for its primary object and purpose to provide a simply constructed and reliably operating, quick breaking switch whereby arcing between the circuit closing contacts will be largely obviated.

It is another important object of the invention to provide a quick breaking switch which is particularly designed for automatic actuation in the operating or control circuit of an elevator or other vehicle. Such switches are actuated at frequent intervals by suitable connections with door operating means so that the elevator or other vehicle cannot be operated until the door is closed. It is therefore, of first importance that arcing between the switch contacts shall be avoided so far as possible to prevent deterioration of the switch parts which would result in uncertain and imperfect control of the vehicle operating means and possibly result in serious injury to passengers.

In one practical embodiment of my invention particularly intended for use in connection with the gate operating means of an elevator, I provide pivotally mounted contacts in the elevator control circuit and a slidable switch bar of insulating material having a conducting head with which the contacts are adapted to engage to close the circuit. The contacts and the slide bar are provided with cooperating parts so that as said bar is moved in one direction, the contacts are simultaneously actuated and disengaged from said conducting head.

With the above and other objects in view, the invention consists in the improved electric switch, and in the form, construction and relative arrangement of its several parts, as will be hereinafter more fully described, illustrated in the accompanying drawings, and subsequently incorporated in the subjoined claims.

In the drawings, wherein I have illustrated one simple and practical embodiment of the present invention, and in which similar reference characters designate corresponding parts throughout the several views,—

Figure 1 is a plan view, a part of the switch case being broken away, showing one practical type of my improved switch, the contacts being shown in circuit closing position;

Fig. 2 is a similar view showing the contacts after movement to circuit breaking position;

Fig. 3 is a longitudinal section taken on the line 3—3 of Fig. 2;

Fig. 4 is a horizontal section taken on the line 4—4 of Fig. 2, and

Fig. 5 is a detail fragmentary perspective view of the slidable switch bar.

Referring in detail to the drawings, the switch box or case includes a suitable body 5 adapted to be rigidly fixed to a stationary support and the cover plate 6 closing one side of the case.

Within the case, an insulating base 7 of suitable material is rigidly secured and in said base adjacent one end thereof, the spaced binding posts 8 are fixed. With these binding posts, the ends of the current conducting wires 9 and 10 respectively, constituting parts of the control circuit of the elevator or other vehicle are connected.

In longitudinally spaced relation to each of the binding posts 8 the contact members 11 and 12 respectively, are pivotally mounted upon the studs 13 and 14 suitably fixed in the base 7. To each of these contact members, one end of a flexible conductor 15 and 16 respectively, is suitably attached, the other ends of said conductors being connected with the respective binding posts 8.

Each contact member 11 and 12 is in the form of an angular lever having an inwardly projecting nose 17 at its free end. In spaced relation to this nose and at the juncture of the angular portions of the lever, each contact member is provided with a shoulder 18. At its pivoted end each contact is formed with a laterally projecting lug 19 engaged by a spring 20 which yieldingly holds the contact in circuit closing position. Pivotal movement of the contacts 11 and 12 towards each other under the action of the springs 20 is limited by the stop pins 21 which are adapted to be engaged by the lugs 19.

The insulating base 7 is centrally formed with a longitudinally extending guide way 22

in which a rectangular slide bar 23 extending through an opening in one end wall of the switch case 5 is movable. This slide bar at its inner end, has formed on one side thereof a central rib 24, and the contact members 11 and 12 when in circuit closing position overlie the slide bar 23 at opposite sides of this rib. The rib 24 is comparatively short and the curved shoulders 25 are formed at one end thereof to cooperate with the shoulders 18 of the pivoted contacts as will be later described.

At the other ends of the rib 24, a head of copper or other metal of good electrical conductivity indicated at 26 is secured, said head constituting in effect a continuation of the rib 24 and terminating in a convex end face 27 which may at times cooperate with the inclined faces 28 of the inwardly projecting nose pieces 17 of the pivoted contacts.

As shown in Figs. 1 and 2 of the drawings, the base 7 is suitably recessed at opposite sides of the guide way 22 to receive the various switch parts, and a slab or cover plate 29 of insulating material is secured upon the base 7 by the screws indicated at 30.

Exteriorly of the switch box or case, the lever or other part shown at 31 is connected with the outer end of the switch bar 23. This actuating lever for the switch bar may be operatively connected with a suitable part of the operating mechanism for the gate of an elevator or other vehicle.

With the switch in closed position as shown in Fig. 1 of the drawings, it will be seen that the terminal nose pieces 17 of the pivotal contacts are engaged against opposite sides of the metal conductor head 26 on the switch bar 23 so that the current passes from the circuit wire or conductor 9 through the conductor 15 and contact member 11 through the head 26 and contact 12 and conductor 16 to the circuit wire or conductor 10.

When the lever or other part 31 of the door operating mechanism is actuated upon the opening of the door, the slide bar 23 is moved into the switch box. This movement is very rapid, and the shoulders 25 on the switch bar simultaneously engage and cooperate with the shoulders 18 on the two pivoted contacts, thereby moving said contacts in opposite directions upon the pivot studs 13 against the action of the springs 20. The nose terminals 17 of these contacts are thus instantaneously moved laterally out of engagement with the conductor head 26 at substantially the instant that the extreme inner end of said head reaches the contacting points of the nose pieces 17. Thus, there simultaneously occurs the lateral movement of the pivoted contacts and the rectilinear movement of the metal conductor head 26 out of the zone of electrical conductivity between said parts. There is thus secured a very rapid and instantaneous break of the circuit which substantially precludes the formation of an arc between either of the pivoted contacts and the movable conductor head 26. It is particularly to be noted that the shoulders 25 and 18 are of such form that for each increment of movement of the switch bar after said shoulders are engaged with each other, the movement of the pivoted contacts 11 and 12 is multiplied. In other words, the switch bar may be so set as to permit of a half inch travel before the shoulders 25 thereon contact with the shoulders 18, and in a further $\frac{1}{16}$ inch movement of the switch bar there will be a $\frac{1}{8}$ inch movement of each contact, a succeeding movement of the switch bar to the same extent continuing the movement of each contact to a position substantially $\frac{1}{4}$ inch from the switch bar. A 2 inch movement of the switch bar may subsequently take place without change in the movement of the pivotal contacts. Of course, this specific example of the multiplication of the movement of the pivoted contacts is merely suggestive and implies no limitation.

When the movement of the part 31 is reversed, the slide bar 23 will of course, be pulled outwardly from the switch box from the position shown in Fig. 2, and as the rib 24 on said bar comes into position between the shoulders 18 of the pivoted contacts, said contacts are urged inwardly towards each other by the springs 20 to again engage their nose pieces 17 with the opposite sides of the conductor head 26 whereby the circuit is closed.

If at any time the operating connection 31 should be removed or accidentally broken so that the slide bar 23 would move to a position where the extremity of the conductor head 26 would be below the nose pieces 17 of the pivoted contact members, the breaking of the circuit would be assured since the ends of the contact members would be prevented from engaging each other by reason of the limiting stops 21. When the slide bar 23 is again moved inwardly into the switch case, the convex or rounded end face 27 of the conductor head 26 will cooperate with the inclined faces 28 of the ends of the contact members so that the latter will be readily expanded or moved to the position shown in Fig. 1 of the drawings.

From the foregoing description considered in connection with the accompanying drawings, the construction and manner of operation of the illustrated embodiment of my present invention will be clearly understood.

While I have referred to my improved switch as being particularly designed for use in connection with the door operating means of elevators and other vehicles, it will be understood that the same is also applicable to various other uses. Accordingly, it is to be understood that in the practical application of the invention the same may be sus-

ceptible to more or less modification in the form, proportion and relative arrangement of the several elements, and I therefore, reserve the privilege of resorting to all such legitimate changes therein as may be fairly embodied within the spirit and scope of the invention as claimed.

I claim:

1. In an electric switch, a movable contact, a switch bar of insulating material and a current conducting member carried thereby movable as a unit relative to said contact, means for yieldingly urging the contact to circuit closing position in engagement with said conducting member, and directly coacting means on the switch bar and the contact operative in a continuous movement of said switch bar in one direction to progressively move the contact to circuit breaking position and maintain the contact in such position during continuing movement of said switch bar.

2. In an electric switch, spaced movable contacts, a switch bar of insulating material mounted between and movable relative to said contacts and carrying a circuit conducting member, means yieldingly urging the contacts into engagement with said member in one position of the switch bar to close the circuit, and directly coacting means on the switch bar and each of the contacts to simultaneously progressively move, said contacts to circuit breaking position and maintain the contacts in such position during uninterupted movement of the switch bar in one direction.

3. In an electric switch, spaced movable contacts, a switch bar of insulating material mounted between and movable relative to said contacts and carrying a circuit conducting member, means yieldingly urging the contacts into engagement with said member in one position of the switch bar to close the circuit, and directly coacting means on the switch bar and each of the contacts to simultaneously progressively move said contacts to circuit breaking position, in multiples of the increments of movement of the switch bar, and maintain the contacts in such position during uninterrupted movement of the switch bar in one direction.

4. In an electric switch, spaced movable contacts, a switch bar of insulating material mounted between and movable relative to said contacts and carrying a circuit conducting member, means yieldingly urging the contacts into engagement with said member in one position of the switch bar to close the circuit, directly coacting means on the switch bar and each of the contacts to simultaneously progressively move said contacts to circuit breaking position and maintain the contacts in such position during uninterrupted movement of the switch bar in one direction, and means operative upon movement of the switch bar in the opposite direction, whereby said bar and the current conducting member are disposed out of operative relation to the contacts, to limit movement of the contacts towards each other and prevent closing of the circuit.

5. In an electric switch, a pivoted contact, a rectilinearly movable current conducting member movable into and out of position for engagement by said contact, and means for moving said member and the contact substantially simultaneously relative to each other to circuit breaking position.

6. In an electric switch, a pivoted contact, a rectilinearly movable current conducting member movable into and out of position for engagement by said contact, means yieldingly urging the contact to circuit closing position, and means for progressively moving the contact to its circuit breaking position in the rectilinear movement of said member out of its contact engaging position.

7. In an electric switch, spaced relatively movable contacts, a current conducting member movable between said contacts into and out of position for engagement thereby, means urging the contacts into circuit closing engagement with said member, and means for progressively moving the contacts simultaneously to circuit breaking positions in the movement of said member out of its contact engaging position.

8. In an electric switch, spaced pivoted contacts, a current conducting member, means yieldingly urging the contacts into engagement with said member to close the circuit, and a slide bar connected with said member to move the same out of engagement with the contacts, and said bar having means cooperating with the contacts to progressively move the latter during such movement of said member to their circuit breaking positions.

9. In an electric switch, spaced pivoted contacts, a current conducting member, means yieldingly urging the contacts into engagement with said member to close the circuit, and a slide bar connected with said member to move the same out of engagement with the contacts, said contacts and the slide bar having cooperating shoulders acting to pivotally move the contacts progressively to circuit breaking position during such movement of the current conducting member.

10. In an electric switch, spaced pivoted contacts, a current conducting member rectilinearly movable between and beyond one end of said contacts, spring means urging said contacts into circuit closing engagement with said member, stops limiting movement of said contacts towards each other, and an operating slide bar for said conducting member, said bar and the pivoted contacts having cooperating means for pro-

gressively moving said contacts towards their circuit breaking positions as said conducting member is moved out of circuit closing position beyond the ends of said contacts.

11. In an electric switch, a circuit making and breaking contact and a current conducting member respectively movable along angularly related paths relative to each other into and out of circuit closing contact, and means for simultaneously operating said member and the contact, the movement of the contact to circuit breaking position being multiplied in each increment of movement of the current conducting member.

12. In an electric switch, a current conducting member and a circuit making and breaking contact movable along angularly related paths into and out of circuit closing position, an operating switch bar connected with the current conducting member, and coacting means on the switch bar and said contact operating in the movement of the said bar in one direction to impart to the contact movement towards a circuit breaking position in multiples of the increments of movement simultaneously imparted to said current conducting member.

In testimony that I claim the foregoing as my invention, I have signed my name hereto.

CHARLES E. HAMMELL.