May 13, 1941. W. H. FRANK ET AL 2,241,905

SWITCH

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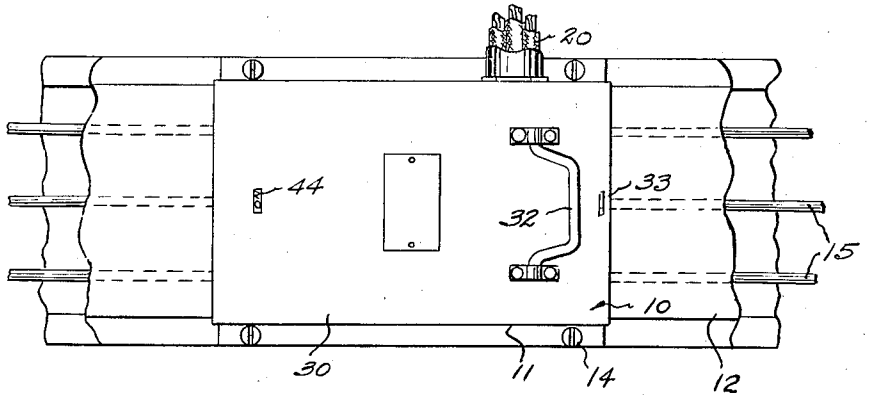


Fig. 1

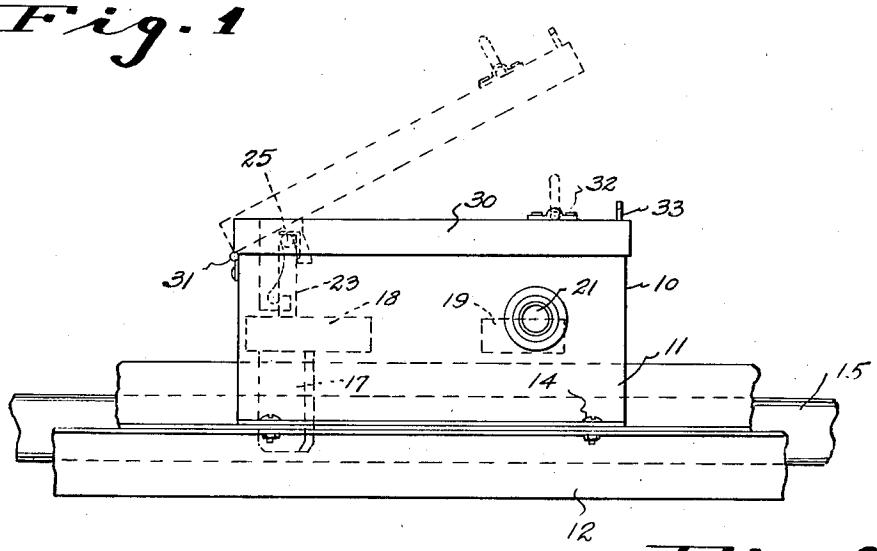


Fig. 2

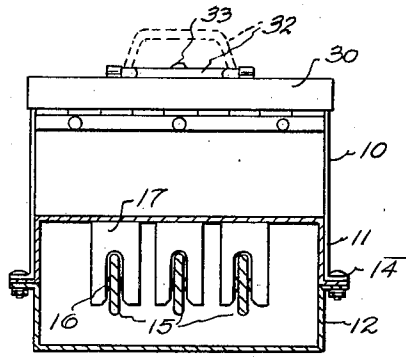


Fig. 3

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SWITCH

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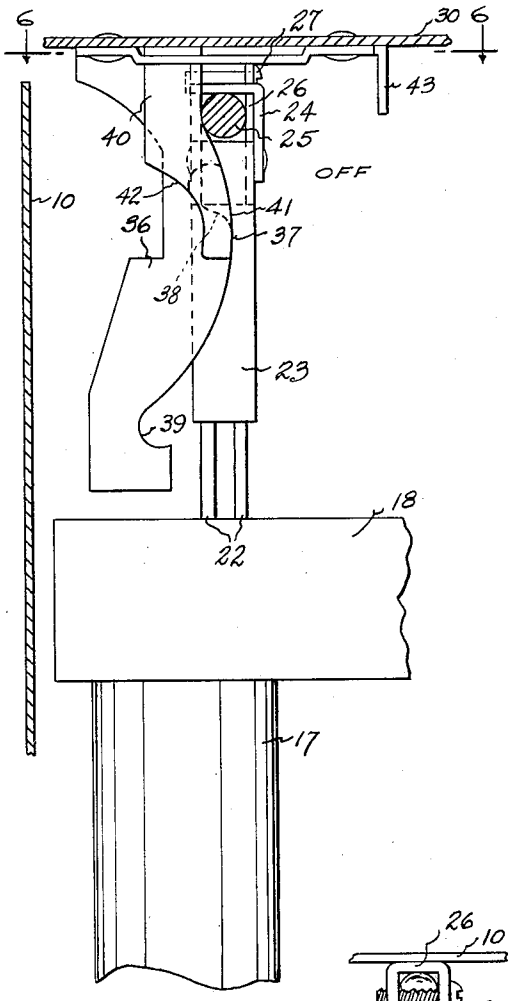


Fig. 5

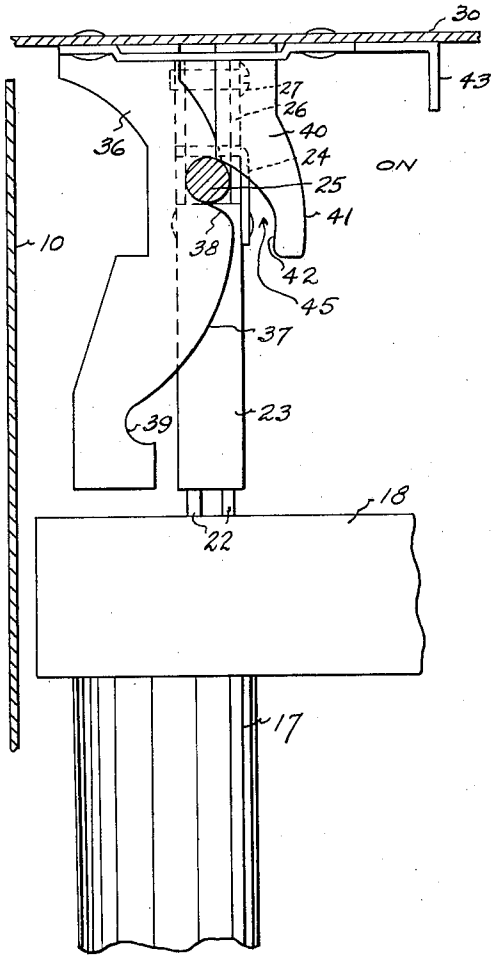
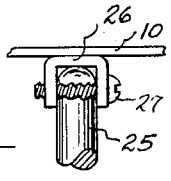


Fig. 4



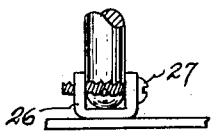


Fig. 6

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SWITCH

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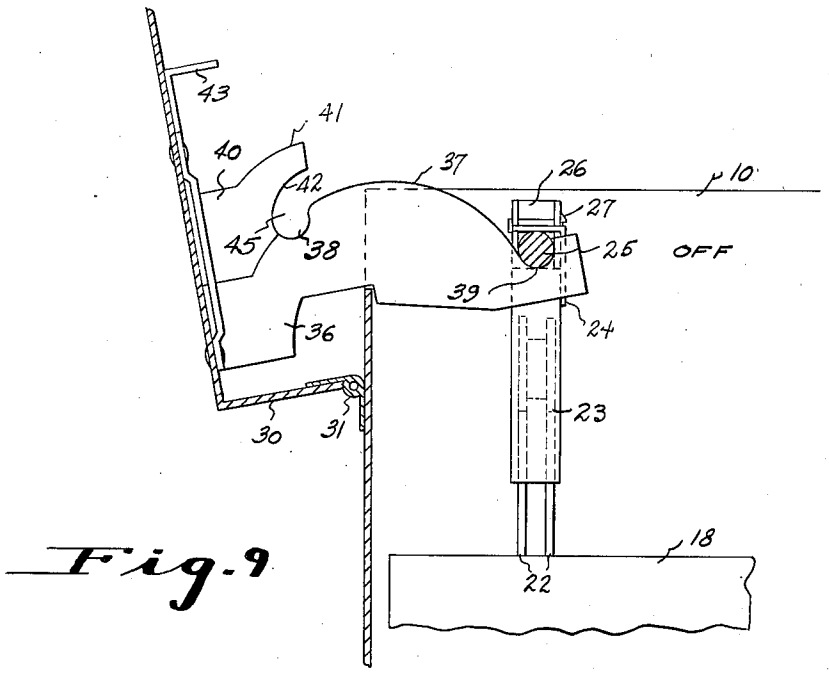


Fig. 9

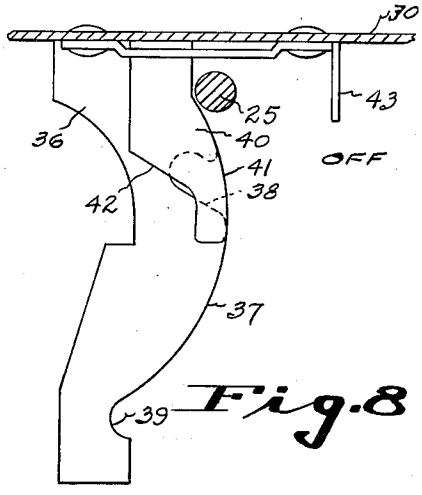


Fig. 8

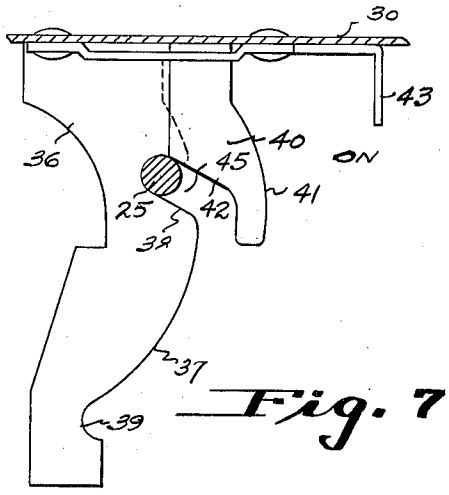


Fig. 7

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UNITED STATES PATENT OFFICE

2,241,905

SWITCH

William H. Frank and Lawrence E. Fisher,
Detroit, Mich.

Application June 13, 1938, Serial No. 213,356

6 Claims. (Cl. 200—51)

This application relates to switches.

Details and features of the switch here shown constitute important objects of the invention hereof and will best be understood upon reference to the appended drawings. In these drawings—

Fig. 1 shows a switch, in top plan view, and in position on a fragment of bus duct;

Fig. 2 shows the same in side view;

Fig. 3 shows the same in end view;

Figs. 4 and 7 are fragmentary views showing parts in the "on" position, with cover closed;

Figs. 5 and 8 are similar views showing the parts in the "off" position, with cover closed;

Fig. 6 is a detail as if in section on line 6—6 of Fig. 5;

Fig. 9 is a fragmentary view, with some of the parts in "on" position, and others in "off" position, and with the cover open.

The switch herein illustrated comprises an open bottom and top sheet metal box 10 having extended sides 11 embracing a sheet metal duct 12, the sides having flanges secured to duct flanges by means of bolts 14. Within the duct are naked bus bars 15 adapted to be engaged by contacts 16 disposed within insulating tubes 17 secured to an insulation block 18 forming part of the switch and enclosed within the box 10, the block 18 extending from side to side of the box and being supported on such sides and having thereon fuse clips (not shown) receiving terminals of fuses within the box and extending lengthwise thereof, the other ends of these fuses being received within fuse clips mounted on an insulation block 19 supported in the block from the sides thereof and having thereon terminal binding means connected to the fuse clips and adapted to bind and connect terminals of branch circuit conductors 20 entering the box through openings 21.

Mounted on the block 18 are prongs 22 arranged in pairs. Of each pair of prongs 22, one is connected to a contact 16 and the other to an adjacent fuse clip. Bridging the prongs of a pair establishes a circuit from the contact 16 to the fuse clips and through the fuse to a branch circuit conductor.

For bridging pairs of prongs 22 there are provided switching heads 23 containing bridging contacts. Within these switching heads are included bridging contacts 30a adapted to establish the circuit between the prongs 22. Secured to the switching heads 23 are brackets 24 partially surrounding an operating rod 25 extending transversely of the box and having its ends disposed in U-shaped guides 26 secured to the side walls of the box. The guides extend vertically along the sides of the box and guide the rod 25 in its vertical movement in the box. For preventing disassociation of the rod from the guides there are provided screws 27 threaded into flanges of the guides above the rod. Removal of these screws permits removal of the operating rod and the heads secured thereto, as a unit.

For causing and controlling movement of the heads, through movement of the rod 25, there is provided an actuating and controlling mechanism. The latter includes a cover 30 hingedly connected to the box at 31 and having a handle 32 and a latch 33. The cover functions not only as an actuator for the heads, but also as a cover for the box. Immovably secured to the cover and depending therefrom is a bracket 36 having a cam surface 37—38—39. Slidably mounted on the under surface of the cover is a hook shaped element 40 movable towards and away from the bracket 36 and having a cam surface 41—42. The element 40 is formed with a handle 43 and with "on" and "off" markings visible through an opening 44 in the cover, to align therewith and indicate the position of element 40 and thus the condition of the switch.

The operation and function of the parts are substantially as follows:

Starting with the switch closed and the door closed, Figs. 4 and 7, the operating rod 25 is found within a slot 45 between cam surfaces 38 and 42, and element 40 is remote from bracket 36. When the cover is pulled open slightly and at the very start of movement of the cover from the closed position, Figs. 4 and 7, to the open position, Fig. 9, cam surface 38 pulls up on the rod 25 and moves the switching heads to switch open position. All this takes place at the very start of the movement of the cover out of its closed position and long before the cover is open sufficiently to permit access to the interior of the box. Continued movement of the cover towards its open position causes the cam surfaces 37 to pick up the rod 25 and thus hold the rod and the switching heads in the switch open position. At the end of cover opening movement, cam notch 39 picks up the rod 25 and the latter functions as a means for preventing further opening movement of the cover; the weight of the cover helps hold the heads 23 in "off" position.

If the cover be returned to its closed position with the parts left in the condition they were in formerly, namely that of Figs. 4 and 7, return movement of the cover will accomplish nothing, so far as moving the rod 25 is concerned, until

the very end of such return movement, at which time slot **45** will pick up rod **25** and force the latter downwardly to the closed circuit position. Thus circuit closing is accomplished only after the cover has been practically completely closed.

On the other hand, if it is desired to close the cover without closing the switch, then element **40** is moved manually towards bracket **36**, namely from the position of Figs. 4 and 7, to that of Figs. 5 and 8, to eliminate the slot **45** and cause cam surfaces **41** and **37** to align. After this is done, return movement of the cover will not tend to move the rod **25** but during the entire return movement of the cover, the cam **37—41** will continue to hold the rod elevated in the position of Figs. 5 and 8 or switch open condition.

It will be observed that the operator may elect, when the cover is open, whether cover closing is to close the switch or to leave the switch open; that opening of the cover automatically opens the switch, regardless of any desire to the contrary on the part of the operator; that the switch is open at all times that the cover is sufficiently open to permit access into the box; that switch opening takes place at the very start of cover opening; that switch closing if it does take place, takes place only after the cover has practically completely closed the box; and that at no time is it possible to obtain access into the interior of the box when the switch is closed.

It will further be observed that all of the foregoing desirable attributes are obtained simply and efficiently and that all operations are controlled merely by movement of the cover and by manipulation of the cover parts and that such manipulation may take place only when the cover is open.

We claim:

1. A switch comprising an open top box, closely adjacent parallel stationary prongs within the box, one adapted to be connected to a supply line and the other to a branch conductor, an insulation head movable on and so arranged as to closely surround the free ends of the prongs at all times, a bridging contact within the head which bridges the prongs when the head is moved farthest away from the open top of the box and which clears the prongs when the head is moved nearest the open top of the box, a hinged cover for the open top of the box, and cams on the lower surface of the cover for engaging the head and causing it to move along the prongs whereby cover movement will cause movement of the head towards or away from the open top of the box, the head remaining in the box and on the prongs in all its movements and being separate from, though operably connected to, the cover and its cams.

2. A switch comprising an open top box, closely adjacent parallel stationary prongs within the box, one adapted to be connected to a supply line and the other to a branch conductor, an insulation head movable on and so arranged as to closely surround the free ends of the prongs at all times, a bridging contact within the head which bridges the prongs when the head is moved farthest away from the open top of the box and which clears the prongs when the head is moved nearest the open top of the box, a hinged cover for the open top of the box, and cams on the lower surface of the cover for engaging the head and causing it to move along the prongs whereby cover movement will cause movement of the head towards or away from the open top of the box, the head remaining in the box and on the prongs in all its movements and being separate from, though operably connected to, the cover and its cams, the cams being so arranged that only the initial part of the movement of the cover out of its closing position causes movement of the head towards the open top of the box, the latter part of such movement of the cover being free of movement of the head.

3. A switch comprising an open top box, closely adjacent parallel stationary prongs within the box, one adapted to be connected to a supply line and the other to a branch conductor, an insulation head movable on and so arranged as to closely surround the free ends of the prongs at all times, a bridging contact within the head which bridges the prongs when the head is moved farthest away from the open top of the box and which clears the prongs when the head is moved nearest the open top of the box, a hinged cover for the open top of the box, and cams on the lower surface of the cover for engaging the head and causing it to move along the prongs whereby cover movement will cause movement of the head towards or away from the open top of the box, the head remaining in the box and on the prongs in all its movements and being separate from, though operably connected to, the cover and its cams, the cams being so arranged that only the initial part of the movement of the cover out of its closing position causes movement of the head towards the open top of the box, the latter part of such movement of the cover being free of movement of the head, the cam which operates to move the head away from the open top of the box being adjustable to two positions, in one of which it causes movement of the head away from the open top of the box, upon movement of the cover into its closing position, and in the other of which it does not cause movement of the head away from the open top of the box, upon movement of the cover into its closing position.

4. A switch comprising an open top box, a stationary contact within and mounted on the base of the box, a movable contact mounted on and carried by the stationary contact and arranged for rectilinear movement to and from the base, being guided in its movement by the stationary contact, a hinged cover for the open top of the box, and cams on the lower surface of the cover for engaging the movable contact and causing it to move along the stationary contact whereby cover movement will cause rectilinear movement of the movable contact to and from the base, guided by the stationary contact, the movable contact remaining in the box and in association with the stationary contact at all times and in all its movements and being separate from, though operably connected to, the cover and its cams.

5. A switch comprising an open top box, a stationary contact within and mounted on the base of the box, a movable contact mounted on and carried by the stationary contact and arranged for rectilinear movement to and from the base, being guided in its movement by the stationary contact, a hinged cover for the open top of the box, cams on the lower surface of the cover for engaging the movable contact and causing it to move along the stationary contact whereby cover movement will cause rectilinear movement of the movable contact to and from the base, guided by the stationary contact, the movable contact remaining in the box and in association with the stationary contact at all times and in all its movements and being separate from, though operably connected to, the cover and its cams,

the cam which operates to move the movable contact towards the base being adjustable to two positions, in one of which it causes movement of the movable contact towards the base upon closing movement of the cover, and in the other of which it does not cause movement of the movable contact towards the base upon closing movement of the cover.

6. A switch comprising an open top box, a stationary contact within and mounted on the base of the box, a movable contact mounted on and carried by the stationary contact and arranged for rectilinear movement to and from the base, being guided in its movement by the stationary contact, a hinged cover for the open top of the box, and cams on the lower surface of the cover for engaging the movable contact and causing it to move along the stationary contact whereby cover movement will cause rectilinear movement of the movable contact to and from the base, guided by the stationary contact, the movable contact remaining in the box and in association with the stationary contact at all times and in all its movements and being separate from, though operably connected to, the cover and its cams, the cam which operates to move the movable contact towards the base being adjustable to two positions, in one of which it causes movement of the movable contact towards the base upon closing movement of the cover, and in the other of which it does not cause movement of the movable contact towards the base upon closing movement of the cover, the cams being so arranged that only the initial part of the movement of the cover out of its closing position causes movement of the movable contact away from the base, the latter part of such movement of the cover being free of movement of the movable contact.

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