

June 23, 1942.

W. H. FRANK ET AL
SWITCH

2,287,676

Filed Feb. 19, 1941

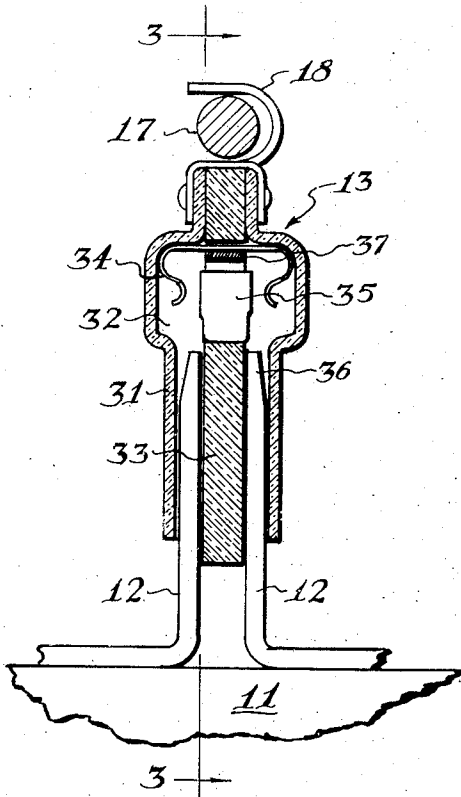


Fig. 1

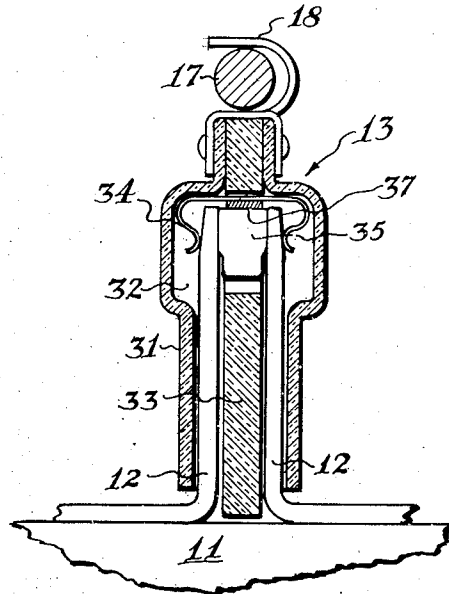


Fig. 2

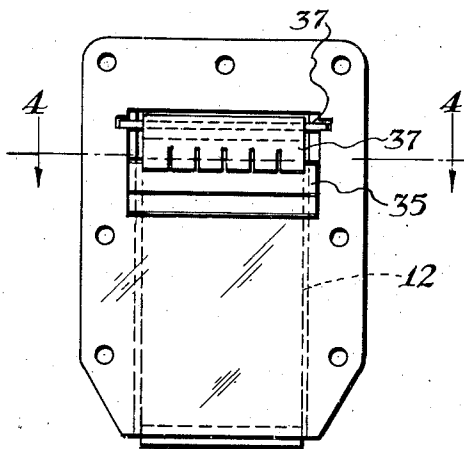


Fig. 3

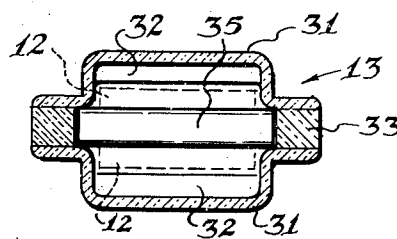


Fig. 4

INVENTOR.
William H. Frank &
BY Lawrence E. Fisher
Daniel H. Cullen

UNITED STATES PATENT OFFICE

2,287,676

SWITCH

William H. Frank and Lawrence E. Fisher, Detroit, Mich., assignors to Bulldog Electric Products Company, Detroit, Mich., a corporation of West Virginia.

Application February 19, 1941, Serial No. 379,602

9 Claims. (Cl. 200—163)

In a prior application, Serial No. 320,115, filed February 21, 1940, there is disclosed a head and contact set forming part of a switch having a snap spring actuated rocker handle connected to a bail in turn detachably fastened to a plurality of movable switching heads, containing the movable contacts of the contact sets. This application relates to heads and contact sets for that type of switch, and it is understood that although the disclosure hereof is restricted to the heads and contact sets per se, that the entire switch is considered as disclosed herein, being herein incorporated, by reference to the disclosure of application Serial No. 320,115.

An object is to provide a novel contact set and switching head for switches of the character described, such as are shown in the appended drawing. In the drawing,

Figs. 1 and 2 show a lost motion type movable contact construction for a switching head in closed and open circuit positions, respectively.

Figs. 3 and 4 are section views on lines 3—3 and 4—4 of Figs. 1 and 2 respectively.

A switch of the character under consideration comprises a sheet metal box having a springy back on which is resiliently mounted an insulating base 11 equipped with stationary contact prongs 12 over which telescope the movable contact heads 13. These have in them movable contacts which electrically interconnect the prongs when they are moved as far as possible towards the box back by the operating bail 17 which is shown as removably received within open sided hooks 18 connected to the forward ends of the heads.

A handle and an overcenter spring are provided for operating the bail, and although such parts are not specifically shown, they are considered as incorporated herein by reference.

Each movable contact head may include an insulation housing 31 provided with cells 32 between which is a barrier 33, which mounts, non-movably, an outside springy U shaped contact 34 for embracing the prongs 12, and an inside contact 35 for fitting between them, and comprising a copper block. The inside contact provides an arcing tip for the spring, and is mounted to move relative to the barrier 33, in its plane.

The prongs 12 have their ends bevelled, as seen at 36, so that the spring 34 may bias the prongs towards each other during switch closing to put great pressure on block 35, but without excessive friction on switch closing movement.

The bevels 36 help the handle and spring of the switch on switch opening movement, and the

wedging action does not excessively impede switch closing movement, because of the momentum of the parts. The bail, being biased downward by the switch spring, prevents the bevels 36 from wedging the switch open when it is closed.

A retainer 37 helps maintain spring 34 in place in barrier 33, and the overlapping of the ends of the block 35 by the outer plates of the housing 31 helps maintain block 35 in place in the barrier 33.

When the switch handle is moved to circuit closing position, the slug or block first engages the prongs and slides between them and then stays put while the barrier and the spring move down to and along the prongs, to compress them, for contact pressure. Thus there is little resistance to circuit closing movement until spring 34 wedges itself well onto bevels 36, long after slug 35 has reached and slid down between the prongs. Such movement terminates when the momentum of the parts on such movement is equalized by the pressure created by the engagement at 34—36, and that pressure helps establish and maintain contact pressure in closed circuit, with a minimum of direct force applied at the handle.

However, when the handle is pushed for open circuit movement, the energy stored in spring 34 and in the prongs 12 which are compressed by that spring, tends to help effect contact separation, thus easing the burden of separating contacts. For contact separation, spring 34 will leave the prongs and release them before slug 35 is pulled upwardly, and thus there is little resistance offered to upward movement of the slug.

Now having described the switch head hereof, reference should be had to the claims hereof which point out and distinctly define the invention.

We claim:

1. A switch having a back from which forwardly projects stationary contact prongs, a movable contact set mounted to move rectilinearly towards and away from said back for engaging or leaving said stationary contacts, the movable contact consisting of two parts, with one part being a flexible strap embracing the stationary contacts, and the other being a contact block fitting between the prongs, and adapted to be engaged and gripped thereby, the block being mounted to have lost motion travel with respect to the strap in the direction of movement of the strap and block, whereby the strap embraces the prongs to squeeze them together and grip the block only after the block has moved into the space between them, and

free the prongs to release their grip on the block before the block moves out of the space between them the strap being arranged to engage the stationary contacts after and disengage them before the block does.

2. A switch having a back from which forwardly projects stationary contact prongs, a movable contact set mounted to move rectilinearly towards and away from said back for engaging or leaving said stationary contacts, the movable contact consisting of two parts, with one part being a flexible strap embracing the stationary contacts, and the other being a contact block fitting between the prongs and adapted to be engaged and gripped thereby, the block being mounted to have lost motion travel with respect to the strap in the direction of movement of the strap and block, whereby the strap embraces the prongs to squeeze them together and grip the block only after the block has moved into the space between them, and frees the prongs to release their grip on the block before the block moves out of the space between them, the free ends of the prongs, on their outer surfaces, being bevelled to cooperate with the ends of the strap and provide a wedging action between the strap and the prongs, the strap being arranged to engage the stationary contacts after and disengage them before the block does.

3. In a switch, a contact set consisting of two stationary parallel prongs and a movable contact mounted on, so as to be guided by the prongs in its motion and comprising two parts, one being a block adapted to fit between and engage the facing surfaces of the prongs and the other being adapted to embrace the prongs and be gripped thereby, engaging them on their outsides, to squeeze them together, with the latter part of the movable contact comprising a flexible steel strap, and the other being a contact block fitting between the prongs, the block being mounted to have lost motion travel with respect to the strap in the direction of movement of the strap and block, the strap being arranged to engage the prongs after and disengage them before the block does, whereby the strap embraces the prongs to squeeze them together and grip the block only after the block has moved into the space between them, and frees the prongs to release their grip on the block before the block moves out of the space between them.

4. In a switch, a contact set consisting of two stationary parallel prongs and a movable contact mounted on, so as to be guided by the prongs in its motion and comprising two parts, one being a block adapted to fit between and engage the facing surfaces of the prongs and the other being adapted to embrace the prongs and be gripped thereby, engaging them on their outsides, to squeeze them together, with the latter part of the movable contact comprising a flexible steel strap, and the other being a contact block fitting between the prongs, the block being mounted to have lost motion travel with respect to the strap in the direction of movement of the strap and block, the strap being arranged to engage the prongs after and disengage them before the block does, whereby the strap embraces the prongs to squeeze them together and grip the block only after the block has moved into the space between them, and frees the prongs to release their grip on the block before the block moves out of the space between them, the free ends of the prongs, on

their outer surfaces, being bevelled to cooperate with the ends of the strap and provide a wedging action between the strap and the prongs.

5. In a switch, two stationary contact surfaces movable with respect to each other in a direction normal to the surfaces, and having bevels, two movable contact surfaces movable along the stationary contact surfaces for wiping contact, a wedge for engaging the bevels and wedging the stationary surfaces to move with respect to each other in the normal direction, means for moving the movable surfaces towards and away from the stationary surfaces in a direction that provides wiping contact, and for moving the wedge towards and away from the bevels, with lost motion provided between the movement of the movable surfaces and the movement of the wedge, whereby the wedge wedges onto the bevels only after the movable surfaces are in wiping contact with the stationary surfaces, to move the stationary surfaces against the movable surfaces, and leaves the bevels before the movable surfaces leave the stationary surfaces, the wedge maintaining its wedging contact with the bevels after it has wedged onto the bevels except when the wedge is moved away from the bevels towards its starting position, for circuit opening.

6. In a switch, two stationary contact surfaces movable with respect to each other in a direction normal to the surfaces, and having bevels, two movable contact surfaces movable along the stationary contact surfaces for wiping contact, a wedge for engaging the bevels and wedging the stationary surfaces to move with respect to each other in the normal direction, means for moving the movable surfaces towards and away from the stationary surfaces in a direction that provides wiping contact, and for moving the wedge towards and away from the bevels, with lost motion provided between the movement of the movable surfaces and the movement of the wedge, whereby the wedge wedges onto the bevels only after the movable surfaces are in wiping contact with the stationary surfaces, to move the stationary surfaces against the movable surfaces, and leaves the bevels before the movable surfaces leave the stationary surfaces, the wedge maintaining its wedging contact with the bevels after it has wedged onto the bevels except when the wedge is moved away from the bevels towards its starting position, for circuit opening, and spring means for then maintaining the wedge on the bevels.

7. In a switch, two stationary contact surfaces movable with respect to each other in a direction normal to the surfaces, and having bevels, two movable contact surfaces movable along the stationary contact surfaces for wiping contact, a wedge for engaging the bevels and wedging the stationary surfaces to move with respect to each other in the normal direction, means for moving the movable surfaces towards and away from the stationary surfaces in a direction that provides wiping contact, and for moving the wedge towards and away from the bevels, with lost motion provided between the movement of the movable surfaces and the movement of the wedge, whereby the wedge wedges onto the bevels only after the movable surfaces are in wiping contact with the stationary surfaces, to move the stationary surfaces against the movable surfaces, and leaves the bevels before the movable surfaces leave the stationary surfaces, the wedge maintaining its wedging contact with the bevels after it has wedged onto the bevels except when the

wedge is moved away from the bevels towards its starting position, for circuit opening, and spring means for then maintaining the wedge on the bevels, and means for moving the spring means into position to hold the wedge on the bevels after the wedge has wedged onto the bevels.

8. In a switch, two stationary contact surfaces movable with respect to each other in a direction normal to the surfaces, and having bevels, two movable contact surfaces movable along the stationary contact surfaces for wiping contact, a wedge for engaging the bevels and wedging the stationary surfaces to move with respect to each other in the normal direction, means for moving the movable surfaces towards and away from the stationary surfaces in a direction that provides wiping contact, and for moving the wedge towards and away from the bevels, with lost motion provided between the movement of the movable surfaces and the movement of the wedge, whereby the wedge wedges onto the bevels only after the movable surfaces are in wiping contact with the stationary surfaces, to move the stationary surfaces against the movable surfaces, and leaves the bevels before the movable surfaces leave the stationary surfaces, the wedge maintaining its wedging contact with the bevels after it has wedged onto the bevels except when the wedge is moved away from the bevels towards its starting position, for circuit opening, the wedge being a U spring which embraces the bevels and thus tends to wedge itself off the bevels and return to its starting position.

9. In a switch, two stationary contact surfaces movable with respect to each other in a direction normal to the surfaces, and having bevels, two movable contact surfaces movable along the stationary contact surfaces for wiping contact, a wedge for engaging the bevels and wedging the stationary surfaces to move with respect to each other in the normal direction, means for moving the movable surfaces towards and away from the stationary surfaces in a direction that provides wiping contact, and for moving the wedge towards and away from the bevels, with lost motion provided between the movement of the movable surfaces and the movement of the wedge, whereby the wedge wedges onto the bevels only after the movable surfaces are in wiping contact with the stationary surfaces, to move the stationary surfaces against the movable surfaces, and leaves the bevels before the movable surfaces leave the stationary surfaces, the wedge maintaining its wedging contact with the bevels after it has wedged onto the bevels except when the wedge is moved away from the bevels towards its starting position, for circuit opening, the wedge being a U spring which embraces the bevels and thus tends to wedge itself off the bevels and return to its starting position, and spring means for then maintaining the wedge on the bevels.

WILLIAM H. FRANK.
LAWRENCE E. FISHER.