Jan. 9, 1940. J. F. JIRKA ET AL 2,186,640

SAFETY SWITCH MECHANISM

Filed June 21, 1937 2 Sheets-Sheet 1

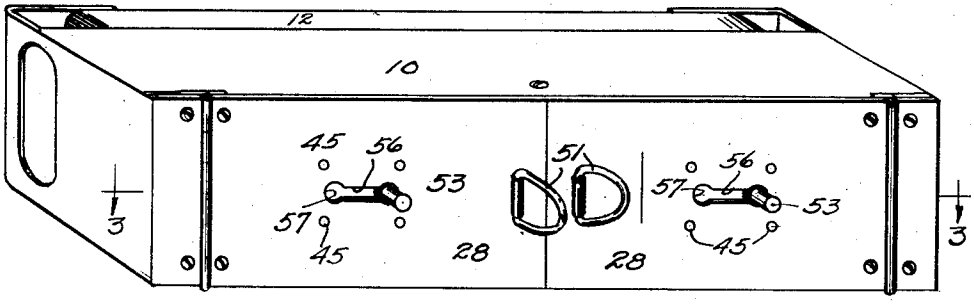


FIG. 1

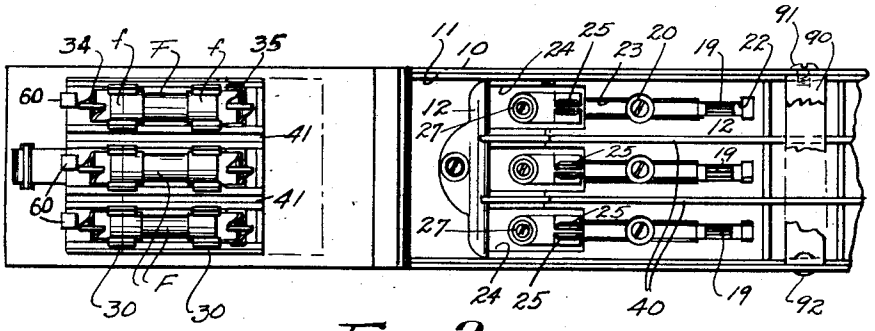


FIG. 2

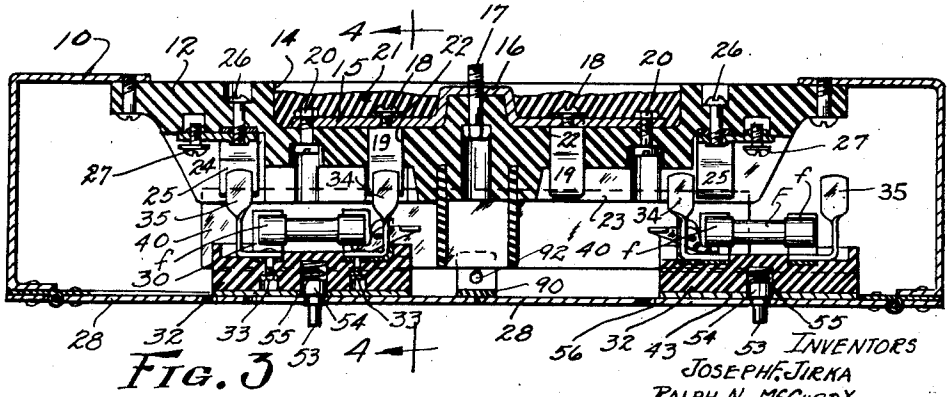


FIG. 3

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SAFETY SWITCH MECHANISM

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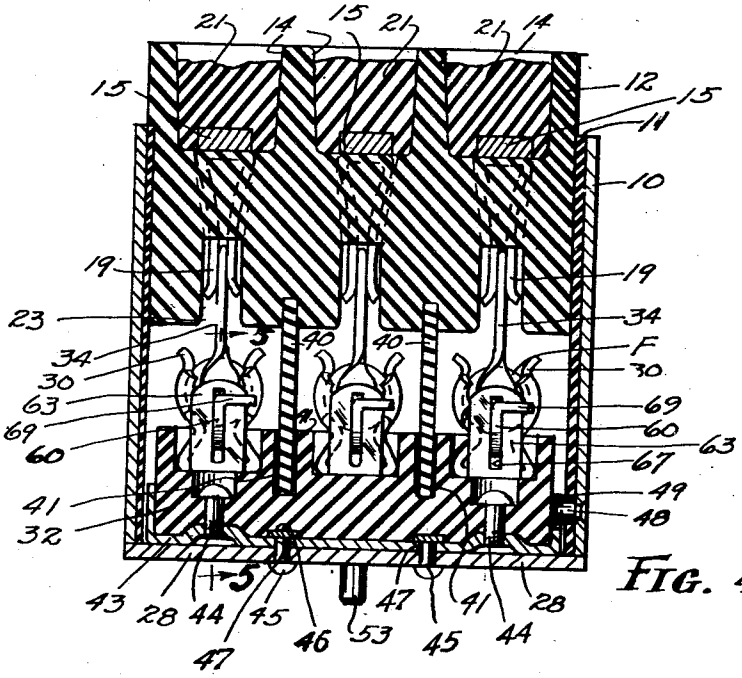
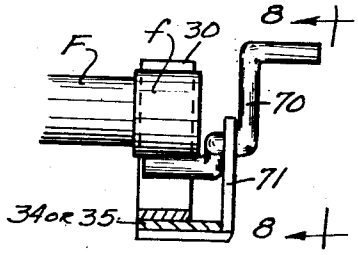


FIG. 4

FIG. 7



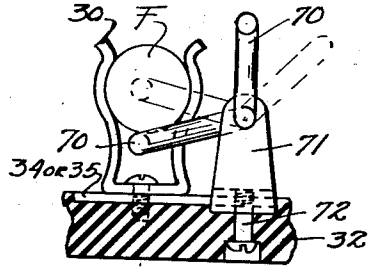


FIG. 8

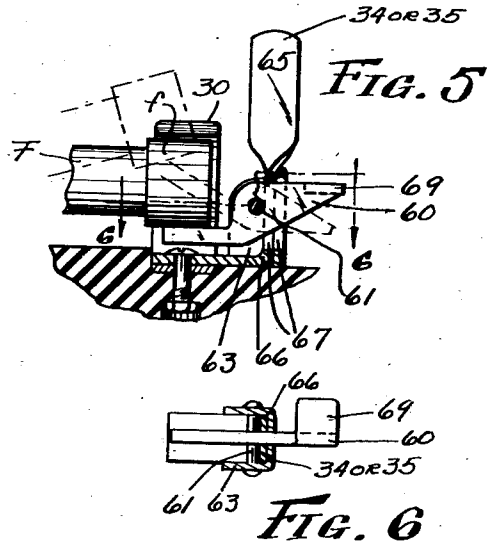


FIG. 5

FIG. 6

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SAFETY SWITCH MECHANISM

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Application June 21, 1937, Serial No. 149,402

2 Claims. (Cl. 200—114)

This invention relates to a safety switch mechanism, and is especially concerned with improvements in fuse equipped electric switches, which are so arranged, that the fuses can only be replaced after they have been disconnected from all electric circuits. This therefore is the general object of the present invention.

Another object of this invention is to provide a fuse retaining mechanism which is so constructed as to present contact between current carrying conductors or connectors when the fuses are being replaced.

A further object of this invention, is the provision of an improved fuse ejector, so arranged that it may be rigidly constructed and safely operated.

Other objects of this invention will become more apparent from the following description, reference being had to the accompanying drawings in which a preferred form of the invention is illustrated. The essential features of the invention will be set forth in the claims.

In the drawings, Fig. 1 is a perspective view of the improved switch mechanism;

Fig. 2 is a fragmentary front elevation of the switch, one fuse holder being in position to permit the removal of the fuses;

Fig. 3 is a horizontal section as indicated by the lines 3—3 of Fig. 1;

Fig. 4 is an enlarged transverse section, the plane of the section being indicated by the lines 4—4 of Fig. 3;

Fig. 5 is a fragmentary sectional detail taken substantially along the line 5—5 of Fig. 4;

Fig. 6 is a sectional detail, the plane of the section being indicated by the offset lines 6—6 of Fig. 5;

Fig. 7 is a sectional detail similar to Fig. 5, but illustrating a modified form of fuse ejection;

Fig. 8 is a sectional detail, as indicated by the lines 8—8 of Fig. 7.

Referring now to the drawings in detail, 10 indicates a rectangular metallic box lined with insulating material 11 and arranged to be secured to a switch panel in the usual manner. Secured to, and extending across the base of the box is a preformed block 12 of insulating material. The rear surface of this block 12 has three longitudinally extending grooves 14 in each of which is mounted a busbar 15. Each bar is deformed as indicated at 16 in Fig. 3 to permit current carrying conductors to be secured thereto by bolts 17 which extend through the block 12. Each bar 15 extends toward either end of the box. However, in as much as the construction of the right hand side of the switch mechanism is the same as the construction of the left hand side, the description in general will be confined to the left hand side.

Secured to each busbar 15 by a bolt 18, and extending outwardly toward the face of the switch through an opening 22 in the block 12, is a forked contact 19. The bars themselves are secured to the block by a bolt 20. After the bolts 18 and 20 have been positioned the grooves 14 are filled with a heated insulating material 21, which solidifies when at normal atmospheric temperatures.

The face of the block 12 is provided with comparatively narrow grooves 23 which extend from respective ends of the block toward and intersecting the slots 22. The outer ends of these slots extend beyond the grooves 14 and are deepened as indicated at 24, to receive forked contact members 25 which are secured to the block 12 by bolts 26 and which are provided with other bolts 27 to enable suitable electric conductors (not shown) to be secured thereto in the usual manner. It is to be noted that all portions of the contacts 19 and 25 lie below the upper surface of the block 12.

The contacts 19 and 25 are arranged to be bridged by a fuse member F which is carried by a hinged cover 28. The fuses F are the usual cylindrical type having metal conductors at their ends which are gripped by a pair of spring contact clamps 30 which are secured to a block of insulating material 32 by bolts 33, and contacting with respective clamps 30, are contact members 34 and 35. When the cover 28 is closed these contacts 34 and 35 engage the contacts 19 and 25 respectively, thus electrically bridging the latter contacts, permitting the flow of current from the busbars 15 to their respective outlet contacts 27.

To prevent arcing of the various contacts when a fuse is "blown" or the cover is opened to open the switch, a plurality of outwardly extending ribs 40, of insulating material, are positioned in grooves formed in the block 12. If desired, these bars may be cemented or otherwise secured in place. When the covers 28 are closed, these ribs 40 extend into slots 41 which are formed in the fuse carrying blocks 32 intermediate the fuses carried thereby.

Each fuse carrier block 32 is secured to a metallic plate 43 by bolts 44. The plate is provided with longitudinally extending slotted openings 47 to receive pins 45 carried by the respective cover 28 and secured to bars 46 positioned on the inside of plates 43, thereby permitting the fuse assemblies to be slid on their covers relative

to the block 12 so that their contacts 34 and 35 will be disengaged from their respective block contacts 19 and 25. The box is provided with a pin 48 (Fig. 4) which either engages a recess 49 in the fuse carrier plate 43 or abuts the end of such plate, dependent upon the position of the fuse block to prevent movement of the fuse carrier when the cover is closed.

When it is desired to shift the fuse assembly to open a circuit, the operator grasps a handle 51 opening the cover 28, and then depresses a plunger 53, carried by the fuse assembly block 32, against the action of its spring 55 so that an enlarged portion 54 of the plunger disengages the enlarged end of a slot 56 formed in the cover. The plunger together with the fuse assembly is then slid relative to its cover until the enlarged portion of the plunger engages the enlarged end 57 of the slot 56. Whereupon when the door is closed, the fuse assembly is out of contact with the base contactors 19 and 25 as shown by the right hand assembly in Fig. 3.

To remove a fuse the cover 28 is opened full and a lever 60 carried by one of the contacts 34 or 35 is rocked about its pivot shaft 61 forcing the fuse from its clamp 30, whereupon a new fuse may be substituted as desired. It is to be noted that all parts of the fuse assembly must be out of contact with all energized parts of the electrical conductors, all of which are carried by the block 12. It is likewise to be noted that, due to the arrangement of the block 12 and the insulation separators 40, that it is practically impossible for a workman to contact any conductor carried by the block 12. Thereby insuring a high degree of safety.

The fuse ejectors are best illustrated in Figs. 4, 5 and 6. As there shown it will be noted that the contacts 34 and 35, carried by the fuse assembly block 32, are twisted so that the upper portion 65 thereof extends in a direction normal to the lower portion 66, and the lower portion is parallel with the end of the fuse F. To support the ejector 60 there is provided a U shaped plate 63 which is substantially as high as the lower portion of the contact 34 or 35, so that it may be restrained against vertical movement by the block 32 and the upper portion of its respective contact. A pivot bar is passed through the legs of the U which embrace the edges of the contact and acts to maintain the U in position on the contact. The ejector passes through slots 67 in both the plate 63 and the lower portion 66 of the contact and is pivotally mounted on the pin 61. One end of the ejector extends beneath the fuse as illustrated in Fig. 5, while the other end projects beyond the contact and is provided with a flattened operating arm 69.

In Figs. 7 and 8 there is illustrated a modified form of ejector. Such ejector comprises a bent rod 70 pivotally mounted on a plate 71 secured to the fuse assembly block 32 and electrically connected to the contact 34 or 35, by bolts 72.

It will be noted that in both instances, the ejector is mounted on the fuse assembly and cannot be reached when the fuse assembly is connected in the circuit. Hence, the ejector may be constructed entirely of metal and engage the metallic ends of the fuse, providing a rigid construction which may be used with utmost safety.

The switch is generally secured to the busbars of a switchboard by screws 17. It will be noted that the switch box 10 is braced across its top by a bar 90. This bar also serves as a stop for the doors when closed. To enable the screws 17 to be positioned without danger of short circuiting, the bar is secured to the box at one end by a rivet 92, in such a manner that the bar may swing about the axis of the rivet to permit access to the screw 17 by a screw driver without danger of the shank of the screw driver striking the bar. The other end of the bar is secured to the switch box 10 by a removable screw 91 which when tightened retains the bar 90 in the position illustrated in Figs 2 and 3.

Having set forth the principles of our invention, and described and illustrated an embodiment thereof for practical use, what we claim and desire to secure by Letters Patent, is:

1. In a safety switch, a stationary boxlike frame, an insulation member carried thereby, a plurality of pairs of electrically spaced contacts secured to said member and located within the contour of said member, a cover hinged to said member, a second insulating member carried by said cover and selectively movable to two positions relative thereto, a plurality of pairs of electrically spaced contacts carried by said second named member, a fuse clamp electrically connected with each of said last named contacts and adapted to receive respective ends of a fuse, said last named contacts being arranged and adapted to coact with the first named contacts when the cover is closed and said second-named insulating member is in one position relative to said cover, and to remain out of contact with the first-named contacts when said second-named insulating member is moved to the second position relative to said cover, said clamps and fuses all extending outwardly from the surface of said second named member, said second named member having a groove between each adjacent pair of contacts, insulation means carried by the first named member and arranged and adapted to project into the grooves in the second named member when the cover is closed, whereby each fuse is separated from the other by an insulation member when the cover is closed, but is accessible when the cover is open.

2. In a safety switch, a stationary frame, a pair of electrically spaced contacts secured to said frame and adapted to be connected to electrical conductors, one of which conductors is electrically energized, a cover hinged to said frame and having a guideway, a contact carrier slidably mounted in said guideway, a pair of spaced electrical contacts carried by said carrier, a fuse clamp electrically connected to each of said last-named contacts and adapted to receive respective ends of a fuse, said last-named contacts being arranged and adapted to coact with the first-named contacts only when the cover is closed, said cover having a slotted opening therein, the opposite ends of which are enlarged, a plunger depressably carried by said carrier, and extending through said slot, a spring carried by said carrier and arranged and adapted to maintain said plunger in an outermost position, said plunger having a shoulder to maintain the plunger in said carrier, and having an annular portion adapted to seat in the enlarged ends of the slotted opening in the cover, and a reduced portion whereby the plunger slides along said slot from one end thereof to the other consequent upon the depression of the plunger.

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