Oct. 9, 1928. 1,687,319

F. L. BENZON

ELECTRICAL PANEL BOARD

Filed Jan. 20, 1923 2 Sheets-Sheet 1

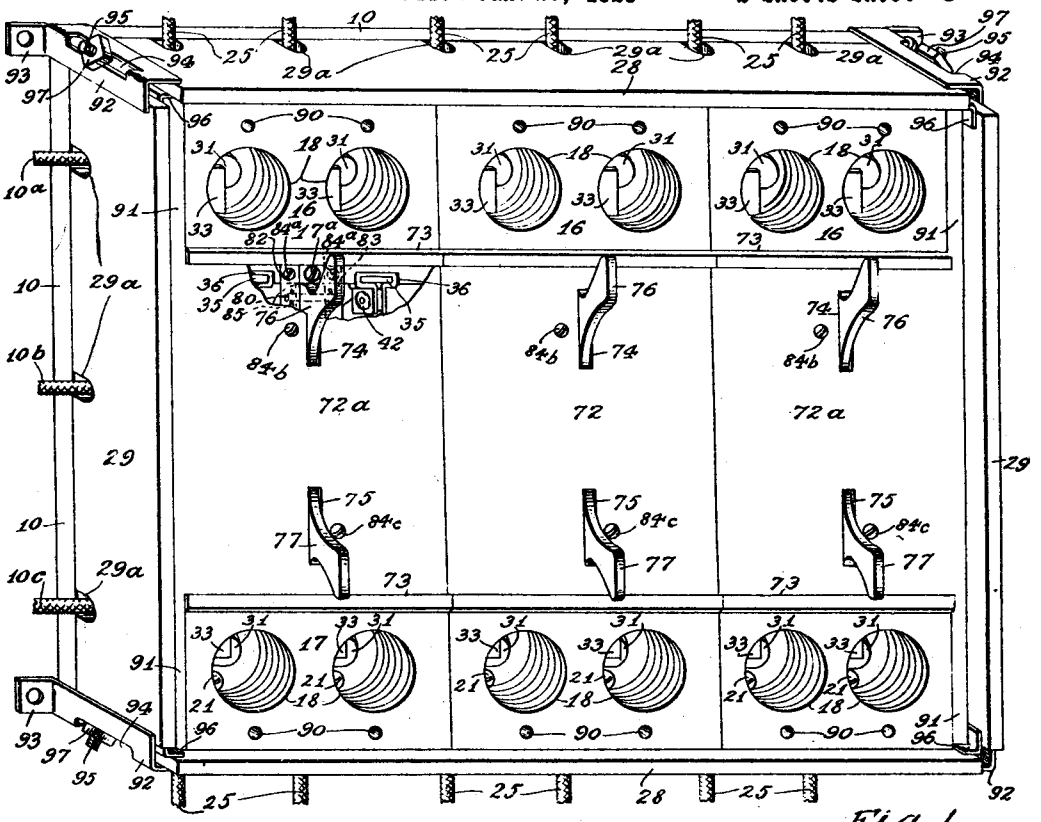


Fig. 1

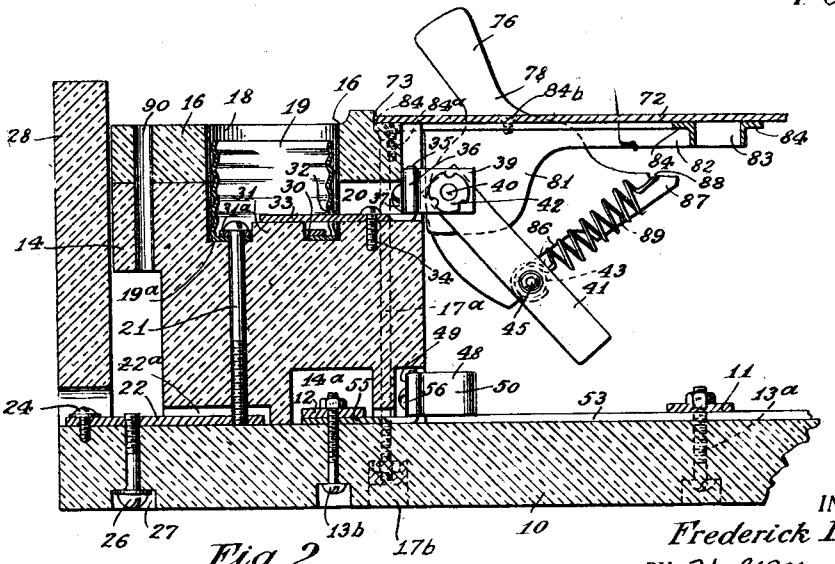


Fig. 2

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2 Sheets-Sheet 2

Fig. 3

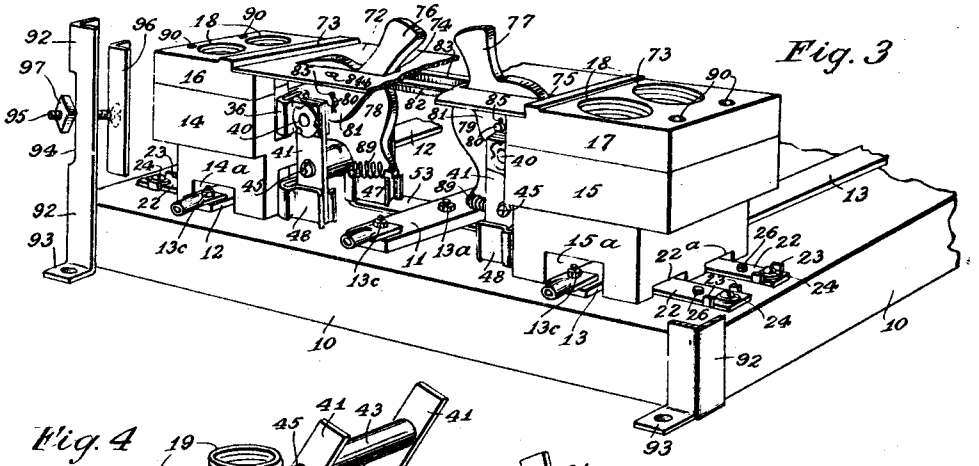


Fig. 4

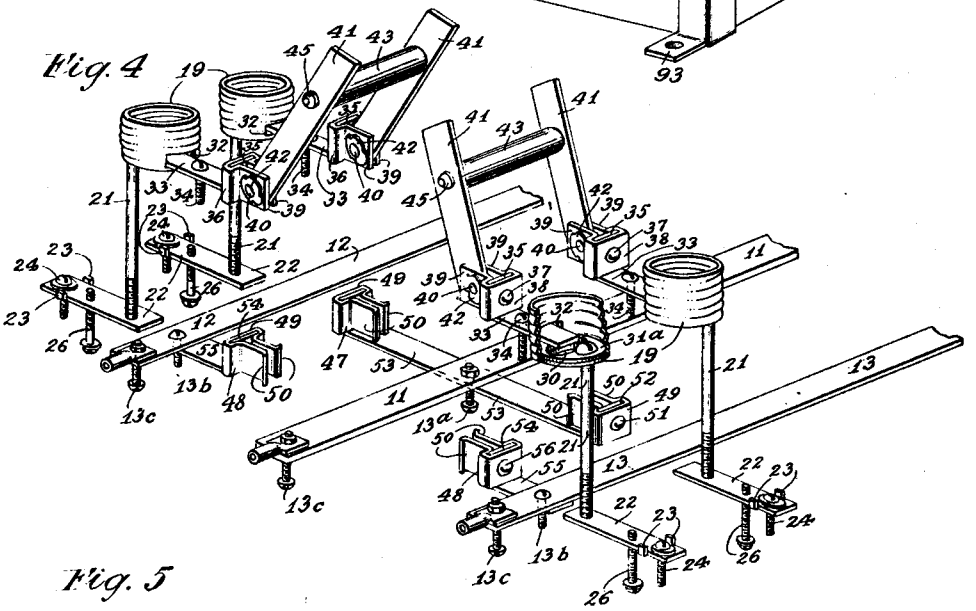


Fig. 5

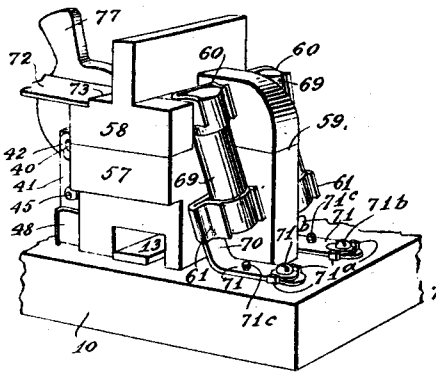
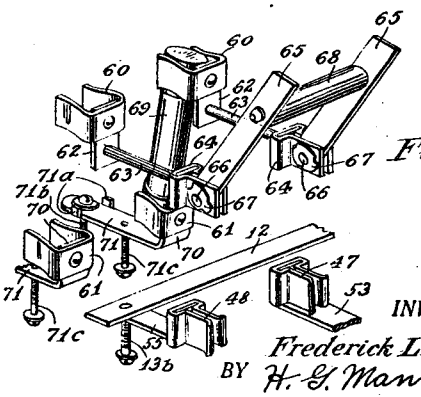


Fig. 6



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UNITED STATES PATENT OFFICE.

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ELECTRICAL PANEL BOARD.

Application filed January 20, 1923. Serial No. 614,049.

This invention relates to electrical panelboards, and more particularly to a panelboard of the safety or protective type.

One object of this invention is to provide a panelboard for distributing electrical current from two or more main bus bars into side branch circuits by means of knife or lever switches, mounted in such a manner under a protective cover that they may be operated by an insulated handle extending through the protective cover.

A further object is to provide a panelboard of the above nature having spring-operated "quick-break" branch circuit switches adapted to positively open the circuit even if the spring becomes inoperative.

A further object is to provide a panelboard of the above nature having an improved form of fuse holder and switch supporting device.

A further object is to provide a panelboard of the above nature with an improved form of fuse holding device adapted to permit the location of a defective fuse to be determined without removal or inspection of the fuse itself.

A further object is to provide a panelboard of the above nature having a protecting cover or covers to prevent possible danger of shock to persons manipulating the device.

A further object is to provide a panelboard of the above nature so constructed that all parts may be readily replaced from the front of the board without removing the panel from the enclosing cabinet.

A further object is to provide a device of the above nature which will be simple, cheap to manufacture, and very efficient and durable in use.

With these and other objects in view, there have been illustrated on the accompanying drawing two forms in which the invention may be conveniently embodied in practice.

Fig. 1 represents a perspective view of a complete panelboard involving the invention.

Fig. 2 is a longitudinal sectional view of one end of the panelboard taken through one of the fuse-plug sockets.

Fig. 3 is a perspective view of one end of the panelboard, certain parts being removed for greater clearness.

Fig. 4 is a skeleton perspective view of one end of the panelboard, showing the operating parts in their relative positions, with the supporting blocks and base removed for greater clearness.

Fig. 5 is a perspective view, with parts broken away, of one corner of a modified form of panelboard adapted to receive cartridge fuses.

Fig. 6 is a skeleton perspective view of a portion of the operating parts of the modified form of panelboard shown in Fig. 5.

Referring now to the drawings, in which like reference numerals denote corresponding parts throughout the several views, the numeral 10 indicates a base of insulating material, such as slate, adapted to support the remaining elements of the device. The base 10 is normally secured in a vertical position in a cabinet placed either in or upon a wall or partition of a building, as will be hereinafter more fully described. The electrical current is delivered to the panelboard from three insulated wires 10^a, 10^b, 10^c, which are connected to a central bus bar 11 and two side bus bars 12 and 13, said bus bars being supported on the base 10 in any suitable manner, as by screws 13^a, 13^b, 13^c.

Mounted upon the base 10 at the sides of the panelboard are a series of blocks or fuse holder and switch supports 14 and 15 preferably formed of molded insulation, such as porcelain or asbestos-containing material. For convenience, the two adjacent fuse holders for each branch circuit are preferably carried by a single block, as is clearly shown on the drawings, or if desired, a plurality of pairs of fuse holders may be so carried. The blocks 14 and 15 are reduced in width at their bottoms and outer ends, and have vertical grooves 14^a and 15^a of rectangular section on their lower faces adapted to fit over the outer bus bars 12 and 13 respectively, said grooves 14^a and 15^a serving to reduce the danger of short circuits to the minimum.

Mounted on the tops of the fuse holder and switch supports 14 and 15 are a pair of insulating cap members 16 and 17 respectively, said cap members being secured to said supports 14 and 15 in any suitable manner, as by screws 17^a which have their ends secured within counter-bored recesses 17^b. Each of the cap members 16 and 17 is provided with a pair of cylindrical holes 18, 18, fitting around threaded shells 19, 19, which form sockets for fuse plugs of any common type. The threaded shells 19, 19 are seated in recesses 19^a, 19^a, in the fuse holder and switch supports 14 and 15. The caps 16 and 17, together with their associated blocks or

fuse holder and switch supports 14 and 15, will hereinafter be termed the "pedestals".

The cap members 16 and 17 are provided on their lower faces with slots 20, opening into the cylindrical recesses 18, for a purpose to be hereinafter described. Electrically connected to the outer portions of the bases of the shells 19, are a series of horizontal screws 21 which extend through the fuse holder and switch supports 14 and 15 and are threaded at their bottom ends to a series of outwardly extending base strips 22 seated under slots 22ª formed in the bottoms of the blocks 14 and 15. Each of the base strips 22 has a pair of upstanding lugs 23, 23, on its side edges near its outer extremity. Between the side lugs 23, 23, each base strip is apertured to receive a binding screw 24 under the head of which a branch circuit conducting wire 25 is adapted to be clamped. The intermediate portion of each base strip 22 is secured to the base 10 by means of a screw 26, threaded into the base strip, and having its head seated in a counterbored recess 27 in the rear surface of the base 10.

In order to close the edges of the panelboard, a pair of side barriers 28, 28, and a pair of top and bottom bariers 29, 29 are provided. Each of the barriers 28, 29 is arranged at right angles to the base 10 and is provided with a series of curved notches 29ª in its inner edge, said notches being in alinement with the base strips 22 and bridging the branch circuit conducting wires 25. The inner surface of each side barrier 28 is adapted to rest snugly against the outer surface of the adjacent fuse holder and switch support. Each of the threaded shells 19 is provided with a central aperture 30 preferably elliptical in shape, in its base adapted to fit around an upstanding lug 31 on the fuse holder and switch support, said lug serving to prevent the shell 19 from turning. If desired, the shell may be stiffened by means of a washer 31ª, said washer also having an elliptical aperture in alinement with the aperture 30. The shell 19 has the inner side of its base cut away to form a slot 32 through which a conducting strip 33 is adapted to pass said strip having its inner terminal resting upon the lug 31, whereby it is insulated from the base of the shell 19. The strip 33 is adapted to contact with the base of the fuse plug, not shown, when the latter is screwed into position. The strip 33 is held rigidly in position upon the fuse holder and switch support by means of a screw 34, and has its inner terminal bent upwardly at 35. The upwardly bent terminal 35 fits within a hinge member 36, and is rigidly secured, as by a screw 37, to the rear section 38 of said hinge member, the latter having a pair of parallel resilient side arms 39 extending toward the center of the panel.

The side arms 39 of each hinge member are provided with a pair of alined apertures to receive a pivot pin 40 for supporting the inner end of one of the knife switch arms 41. In order to form friction bearings for the knife switch arms, a pair of spring washers 42 are located on each pivot pin 40 between the heads of said pin and the outer surface of the side arms 39. The knife switch arms 41 of each switch are connected together near their midpoints by a cylindrical rod 43 of insulating material and provided with hollow cylindrical recesses at its ends, adapted to receive any suitable form of securing means such as expansion bolts 45.

The free ends of the knife switch arms 41 are adapted to slide into electrical engagement with a pair of switch jaws 47, 48, similar to the hinge members 36, previously described. Each of the switch jaws 47 and 48 is provided with a base section 49 and a pair of parallel side sections 50, the tips of which are slightly curved to permit the knife switch arms to slide easily theretbetween. The base section of each of the switch jaws 47 is rigidly secured, as by a screw 51, to an upstanding arm 52 of a conducting base strip 53 which is relatively long and extends across the panel behind the central bus bar 11, said base strip 53 being secured to said bus bar 11 by means of the screw bolt 13ª previously described.

The switch jaws 48 are secured to upstanding arms 54 on relatively short conducting strips 55, by means of screws 56. The short strips 55 have their extremities disposed under the bus bars 12 and 13 respectively, and are secured to said bus bars by means of the screws 13ᵇ having their lower ends disposed in blind holes 46.

In Figs. 5 and 6, a modified form of panelboard, adapted to hold cartridge fuses, is shown. In this form of panelboard, the operating parts are mounted on fuse holder and switch supports 57, having detachable cap members 58. A transverse rib 59 is formed on the outer edge of each of the supports 57 and caps 58, in order to prevent accidental contact between the resilient cartridge holding clips 60, 60, 61, 61. The upper cartridge clips 60, 60, as more clearly shown in Fig. 6, are screwed or otherwise secured to the upstanding conducting strips 62, 62, the latter being rigidly secured to conducting rods 63, 63, arranged parallel to the base 10, and passing through suitable apertures in the fuse holder and switch support 57. The rods 63 have their inner ends connected to hinge members 64, similar in all respects to the hinge members 47 and 48, previously described. A pair of knife switch arms 65, 65, are pivoted in said hinge members 64, 64, on pins 66, 66, being frictionally held between the jaws of said hinge members by means of the spring washers 67. As in the case of the knife switch arms 41, 41, previously described, the arms

65, 65 are rigidly connected by means of an insulating rod 68, and a pair of expansion bolts.

In the modified form of panelboard shown in Figs. 5 and 6, a pair of cartridge fuses 69, 69, is provided, said fuses having their upper ends in electrical contact with the upper clips 60, 60, and their lower ends in electrical contact with the lower clips 61, 61. The lower clips 61, 61 are secured, as by screws, to the inclined arms 70 of a pair of L-shaped conducting strips 71, the bases of said strips being secured to the base 10 in any suitable manner, as by the screw bolts 26, previously described. The outer end of each of the conducting strips 71 is provided with a pair of upwardly extending lugs 71^a similar to the lugs 23, and the strip 71 is provided with a binding screw 71^b, similar to the screws 24. A screw 71^c similar to the screw 26 is employed to secure the strip 71 to the base.

Referring again to the preferred embodiment of the invention illustrated in Figs. 1 to 4, the panelboard is protected at the front by means of a series of cover plates 72, 72^a, arranged edge to edge. The cover plates 72, 72^a extend horizontally across the panelboard, and have their side edges seated in shoulders 73 of the cap members 16 and 17. Each of the cover plates 72 is provided with a pair of alined horizontal slots 74 and 75 to receive a pair of handles 76 and 77, said handles being made of insulating material and forming part of a pair of switch operating members 78 and 79 respectively. Each of the switch operating members 78 and 79 is mounted to rotate on a pivot pin 80 within suitable slots in the blocks 14 and 15, said pivot pin being journaled in a pair of side ears 81 depending from a pair of parallel angle bars 82 and 83. The angle bars 82 and 83 have outwardly projecting extensions 84 seated in recesses formed in the shoulders 73 of the cap members 16 and 17, behind the cover plates 72, said angle bars being secured to said cap members by means of screws 84^a, as clearly shown in Fig. 2. The angle bars 82 and 83 are secured to the plates 72 and 72^a by machine screws 84^b, 84^c.

Each of the pivot pins 80 has a head on one end and is perforated at its other end to receive a cotter pin 85 which serves to lock the parts in operative position. Each of the switch operating members 78 and 79 has a substantially semi-circular body section, the inner edge of said body section being provided with a slot 86 and an end lug 87, said lug 87 having a notch 88 adapted to receive one end of a spiral tension spring 89, the other end of said spring being connected to the cross-rod 43. The cross rod 43 has a limited sliding motion within the slot 86 so as to permit the operating member to rotate a short distance before it moves the switch arms. By means of this construction, it will be seen that during this initial rotative movement of the operating arm, the spring 89 will be put under tension. As the operating member is further rotated, the spring 89 will suddenly come into action and will rapidly open the switch. This automatic "quick-break" action will occur when the friction between the knife arms 41 and the switch jaws 47 and 48 becomes less than the tension of the spring.

In order to permit the operator to determine the condition of the fuse plugs without removing them from their sockets, a series of holes 90, 90 is provided near the edges of the pedestals. These holes 90, 90 are arranged in alinement with the base strips 22 so that testing rods or wires may be inserted therein and may be brought into electrical contact therewith. In this way, if a fuse blows out or goes dead, it will be easy to locate the trouble without examining the interior of each fuse.

The covers 72^a at the ends of the panelboard are provided with horizontal side extension pieces 91 formed integral therewith to cover the space inside the barriers 29. The corners of the panelboard are formed by four angle-brackets 92 having perforated supporting ears 93 by means of which the panelboard may be secured in a cabinet. Each of the angle-brackets 92 has a slot 94 formed in its edge, through which extends a screw 95. The screw 95 carries a smaller angle bracket 96 on its inner head end, said angle members 92 and 96 cooperating to clamp the extremities of the adjacent barriers 28 and 29. The clamping action of the angle-brackets may be readily adjusted by means of a nut 97 threaded on the screw 95.

In operation, when it is desired to open a closed switch, the handle 76 will be horizontally rotated about its pivot 80 until the cross rod 43 is engaged by the shoulder at the end of the slot 86. Further rotation of the handle 76 will now cause the switch to start to open, and the switch blades will move at the same speed as the handle 76 until the tension of the spring overcomes the friction between the switch arms and the switch jaws. The switch will then instantly yield to the force exerted by the spring and will automatically open with great speed, thus reducing to the minimum the injury to the electrical contacts due to sparking.

One advantage of this invention is that the blades of the switch are at right angles to the base of the panelboard when the switch is closed. This permits the board to be made narrower than if the blades of the switch were parallel to the base in closed position.

A further advantage is that the parts of the panelboard may be removed from the base without the necessity of taking the base out of its cabinet. This may be accomplished merely by removing the protective cover and the screws 17^a and 21 whereby the knife switch arms, the switch operating members,

the caps, and pedestals may be readily taken off whenever it is desired to repair or replace parts.

Another important advantage of the above construction is that in case the spring of any of the switches for any reason should become broken or inoperative, this fact will not prevent the opening of the switch, as the continued rotation of the handle of the operating member will positively open the switch independently of the spring 89.

A further advantage of this invention is that the outer bus bars are housed in a closed channel formed by the base 10 and the slots 15^a in the bottom of the fuse holder and switch supports. This results in a simple, compact construction, and reduces the danger of short circuits.

While the panelboard herein illustrated is of the three-wire system, it will be understood that it is within the spirit of the invention to construct the panelboard with two bus bars or any other number of bus bars.

While there has been disclosed in this specification two forms in which the invention may be embodied, it is to be understood that this form is shown for the purpose of illustration only, and that the invention is not to be limited to the specific disclosure, but may be modified and embodied in various other forms without departing from its spirit. In short, the invention includes all the modifications and embodiments coming within the scope of the following claims.

Having thus fully described the invention, what is claimed as new, and for which it is desired to secure Letters Patent is:

1. In a protective panelboard, a base, a pair of fuse holder and switch supports, a slotted frame extending between said supports, a knife switch pivoted to each of said switch supports, and a switch operating member pivoted to said frame and having a handle extending through the slot in said frame.

2. In a protective panelboard, a base, a pair of fuse holder and switch supports, a slotted cover extending between said supports, a pair of bars extending between said supports, a knife switch pivoted to each of said switch supports, and a switch operating member pivoted to said bars and having a handle extending through the slot in said cover.

3. In a protective panelboard, a base, a pair of switch supports mounted on said base, a switch associated with each of said switch supports, each switch comprising a movable section pivoted to one of said supports and a stationary section fixed to said base, a cross frame connecting said supports, and switch operating members mounted on said frame and having handles extending therethrough, said switch operating members positively engaging the movable sections for opening and closing said switches.

4. In a protective panelboard, a base, a pair of switch supports mounted on said base, a switch associated with each of said switch supports, each switch comprising a movable section pivoted to one of said supports and a stationary section fixed to said base, a cover for said panelboard located between said supports, bars under said cover secured to both of said supports, and switch operating members pivoted on said bars, said switch operating members having handles extending through said cover and between said bars, said switch operating members positively engaging the movable sections of said switches for opening and closing said switches.

5. In a protective panelboard, a base, a fuse holder mounted on said base, a switch member pivoted to said fuse holder, said switch member lying at right angles to the base when the switch is closed, and means to confine said switch member within a small angle from its closed position when the switch is open, whereby said switch may be assembled close to another similar switch.

6. In a protective panelboard, a base, a stationary switch contact member secured to said base, a fuse holder mounted on said base, said fuse holder having a switch wiper arm pivoted thereto vertically above said contact member and adapted to engage said switch contact member, means pivotally connected to said fuse holder for operating said switch wiper arm, said switch wiper arm being at right angles to said base when the switch is closed, and means providing that the switch member shall lie at a small angle to its closed position when the switch is open.

In testimony whereof, I have affixed my signature to this specification.

FREDERICK L. BENZON.