Feb. 27, 1940. W. H. FRANK ET AL 2,191,615

SWITCHING APPARATUS

Original Filed Sept. 14, 1936 9 Sheets-Sheet 1

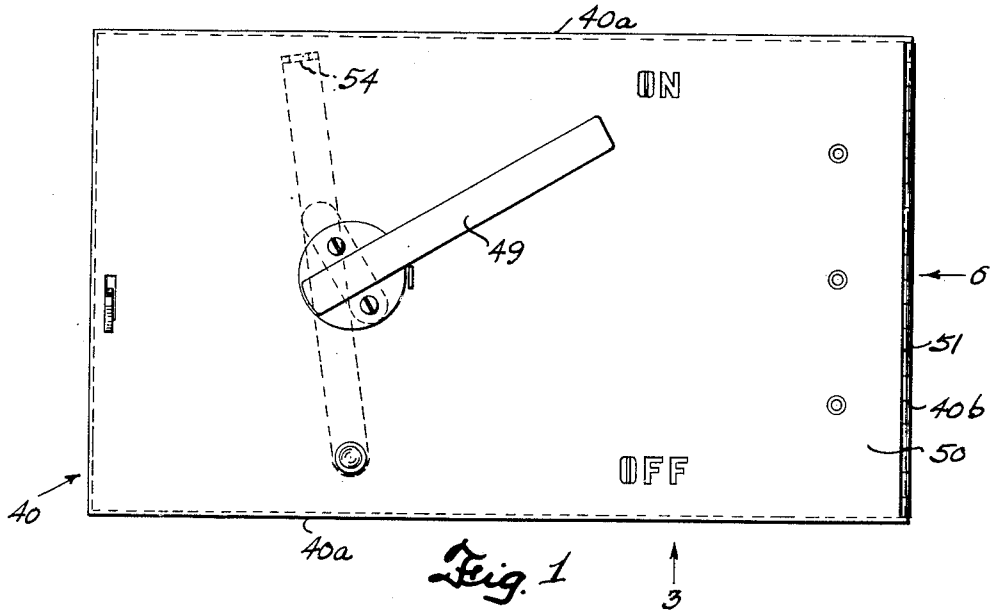


Fig. 1

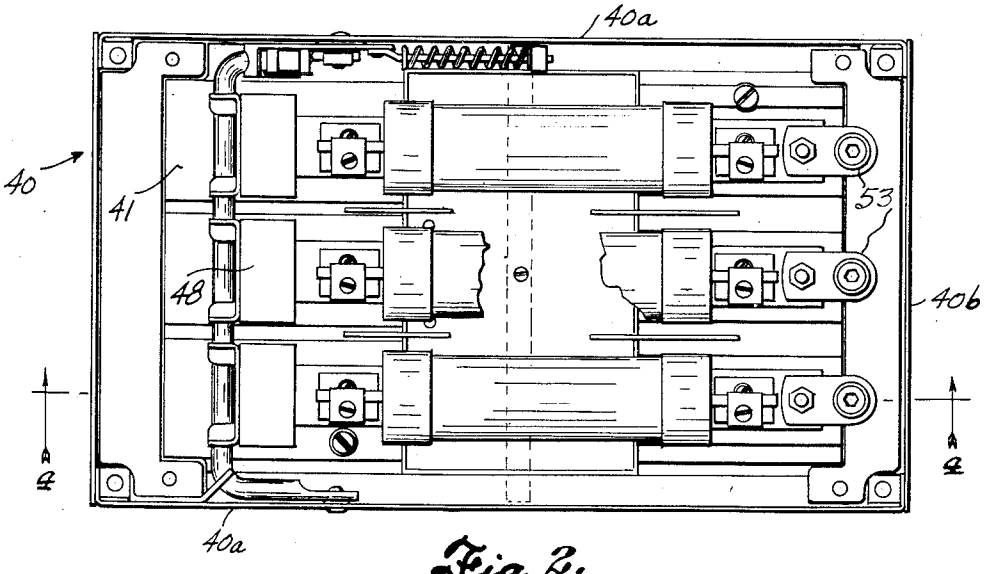


Fig. 2.

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Feb. 27, 1940. W. H. FRANK ET AL 2,191,615

SWITCHING APPARATUS

Original Filed Sept. 14, 1936 9 Sheets-Sheet 2

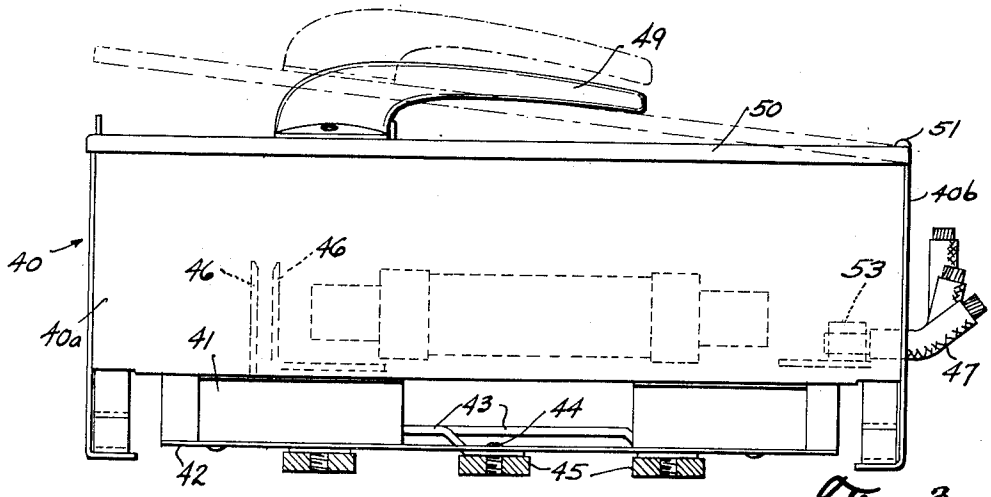


Fig. 3.

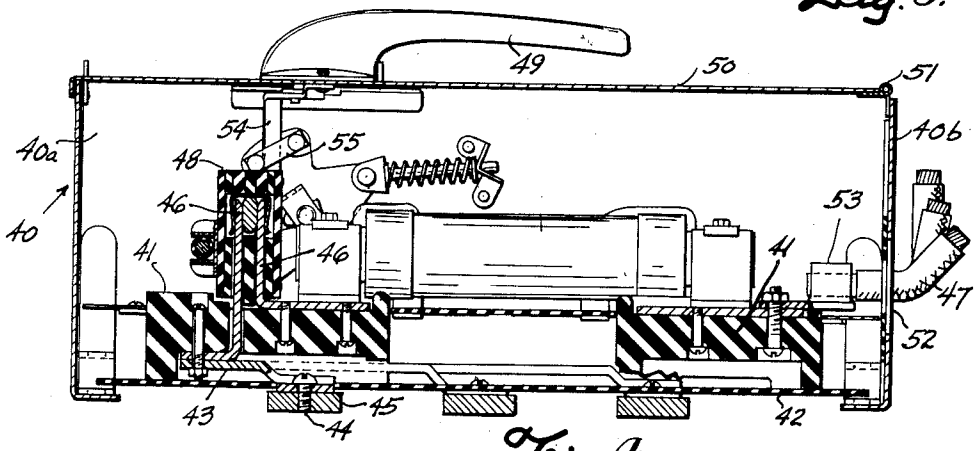


Fig. 4.

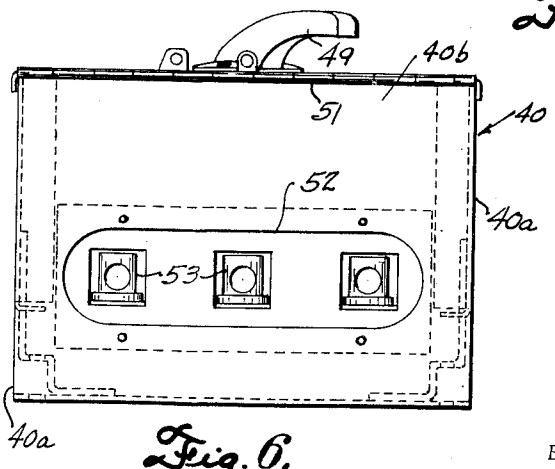


Fig. 6.

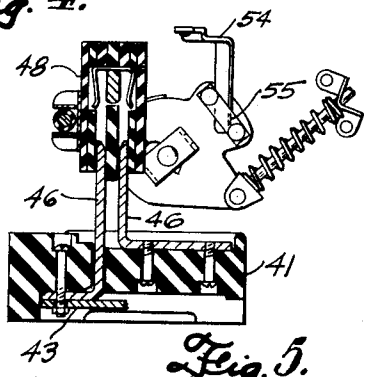


Fig. 5.

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Feb. 27, 1940. W. H. FRANK ET AL 2,191,615

SWITCHING APPARATUS

Original Filed Sept. 14, 1936 9 Sheets-Sheet 3

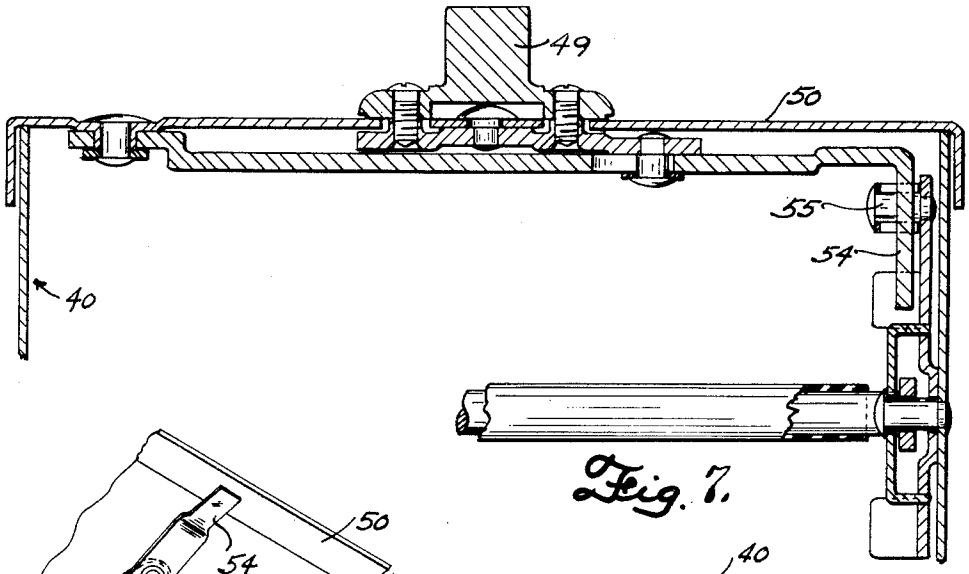


Fig. 7.

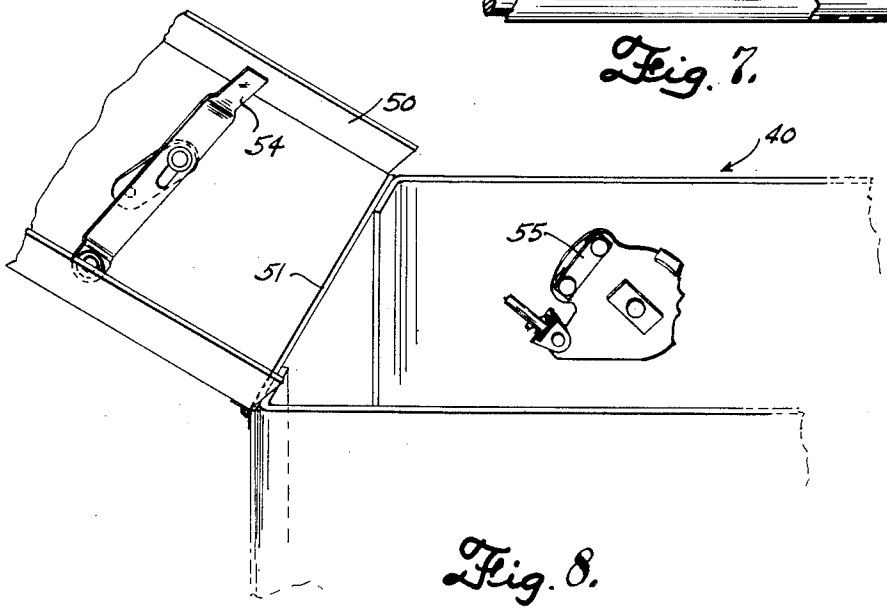


Fig. 8.

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SWITCHING APPARATUS

Original Filed Sept. 14, 1936 9 Sheets-Sheet 4

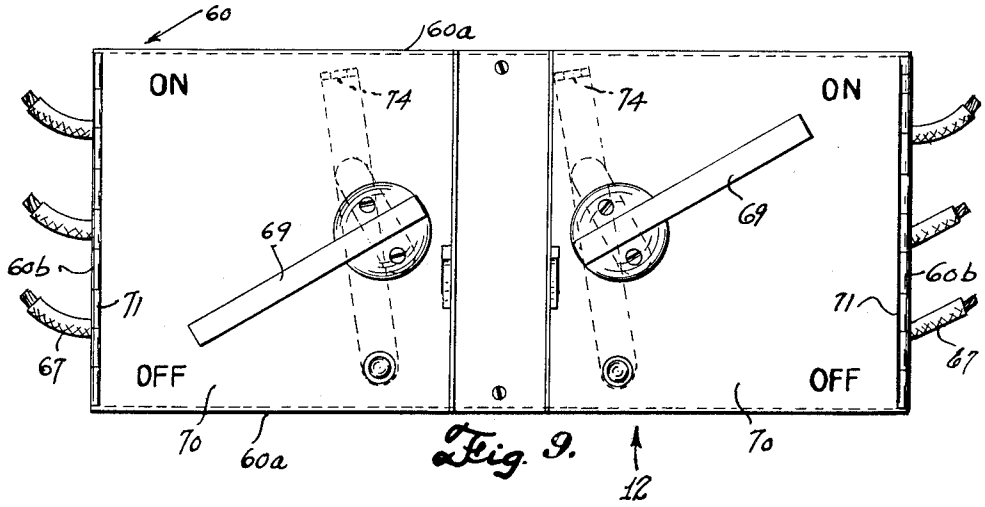


Fig. 9.

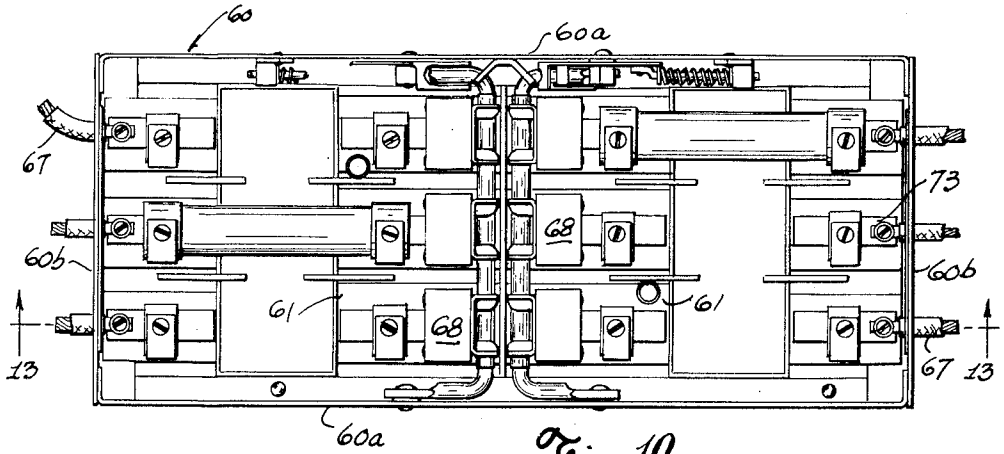


Fig. 10.

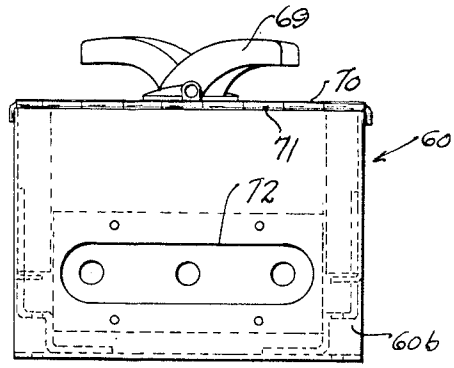


Fig. 11.

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SWITCHING APPARATUS

Original Filed Sept. 14, 1936 9 Sheets-Sheet 5

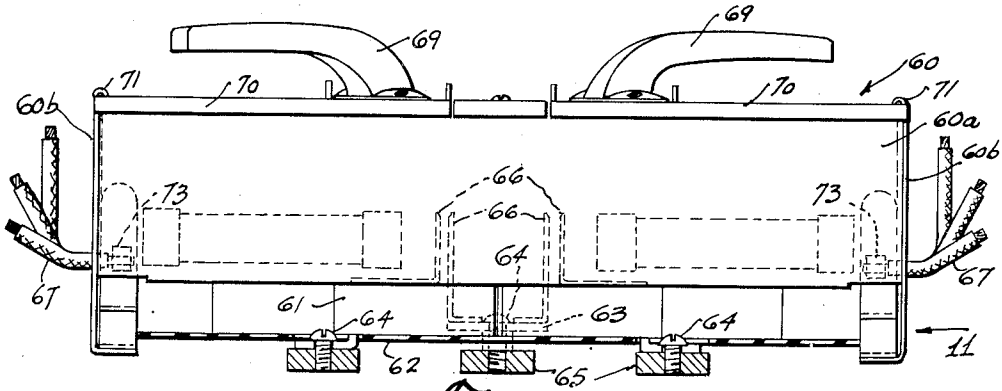


Fig. 12.

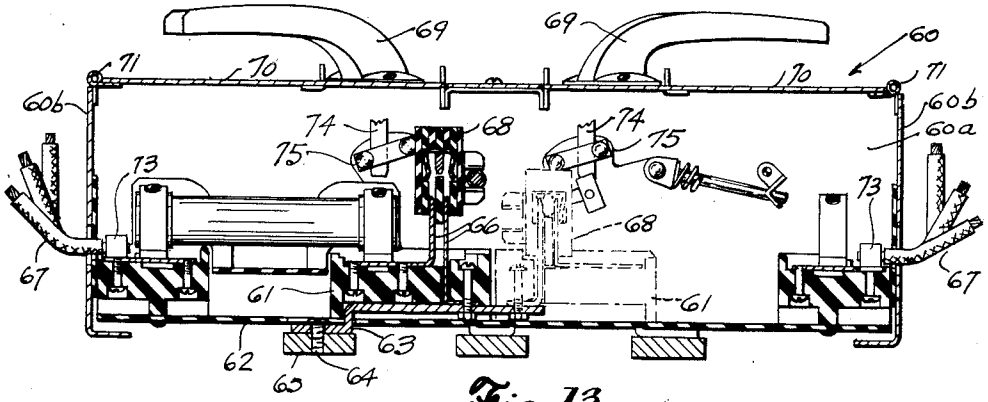


Fig. 13.

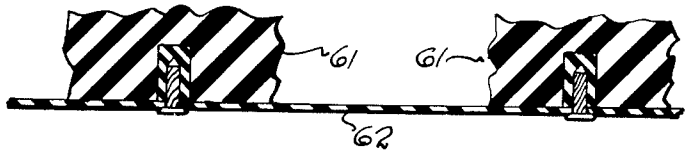


Fig. 14.

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SWITCHING APPARATUS

Original Filed Sept. 14, 1936 9 Sheets-Sheet 6

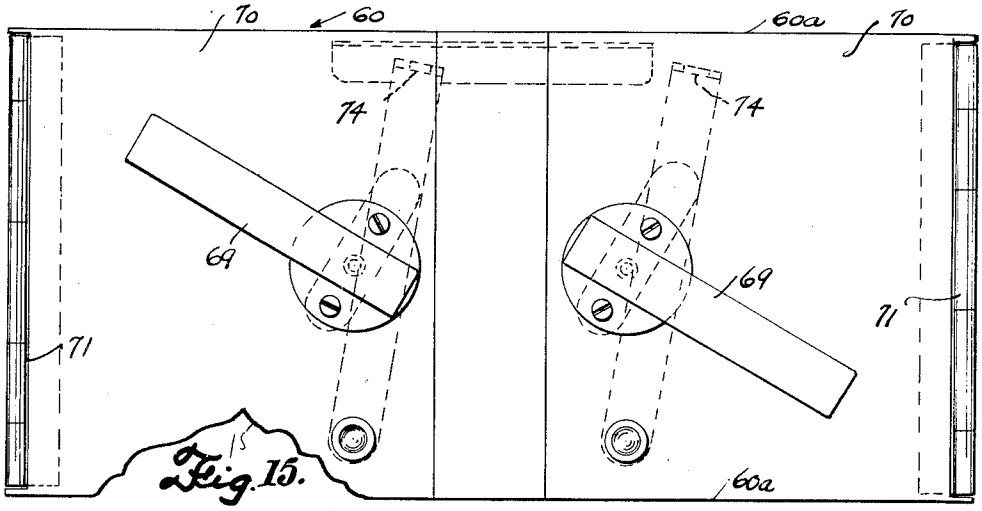


Fig. 15.

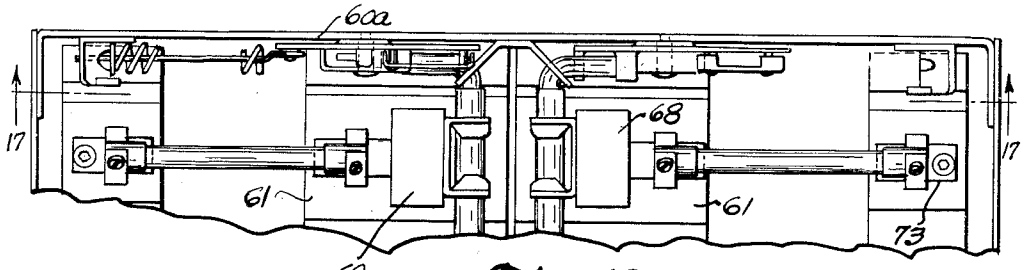


Fig. 16.

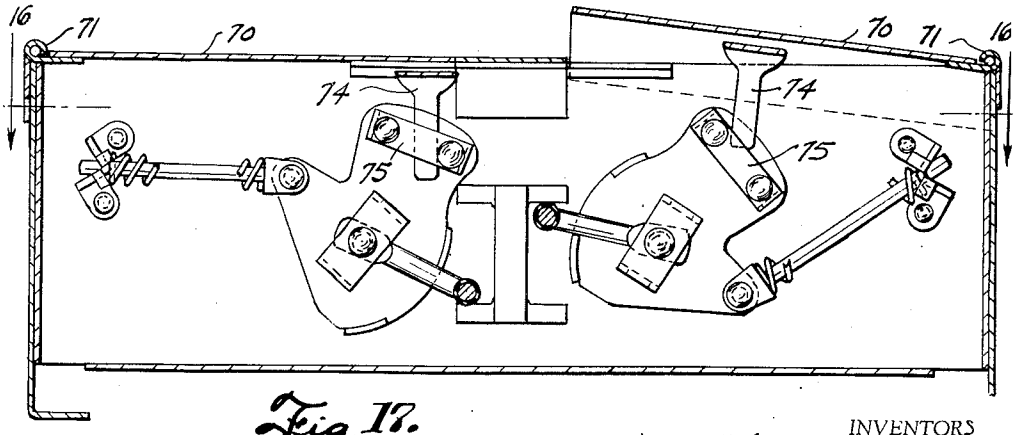


Fig. 18.

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SWITCHING APPARATUS

Original Filed Sept. 14, 1936 9 Sheets-Sheet 7

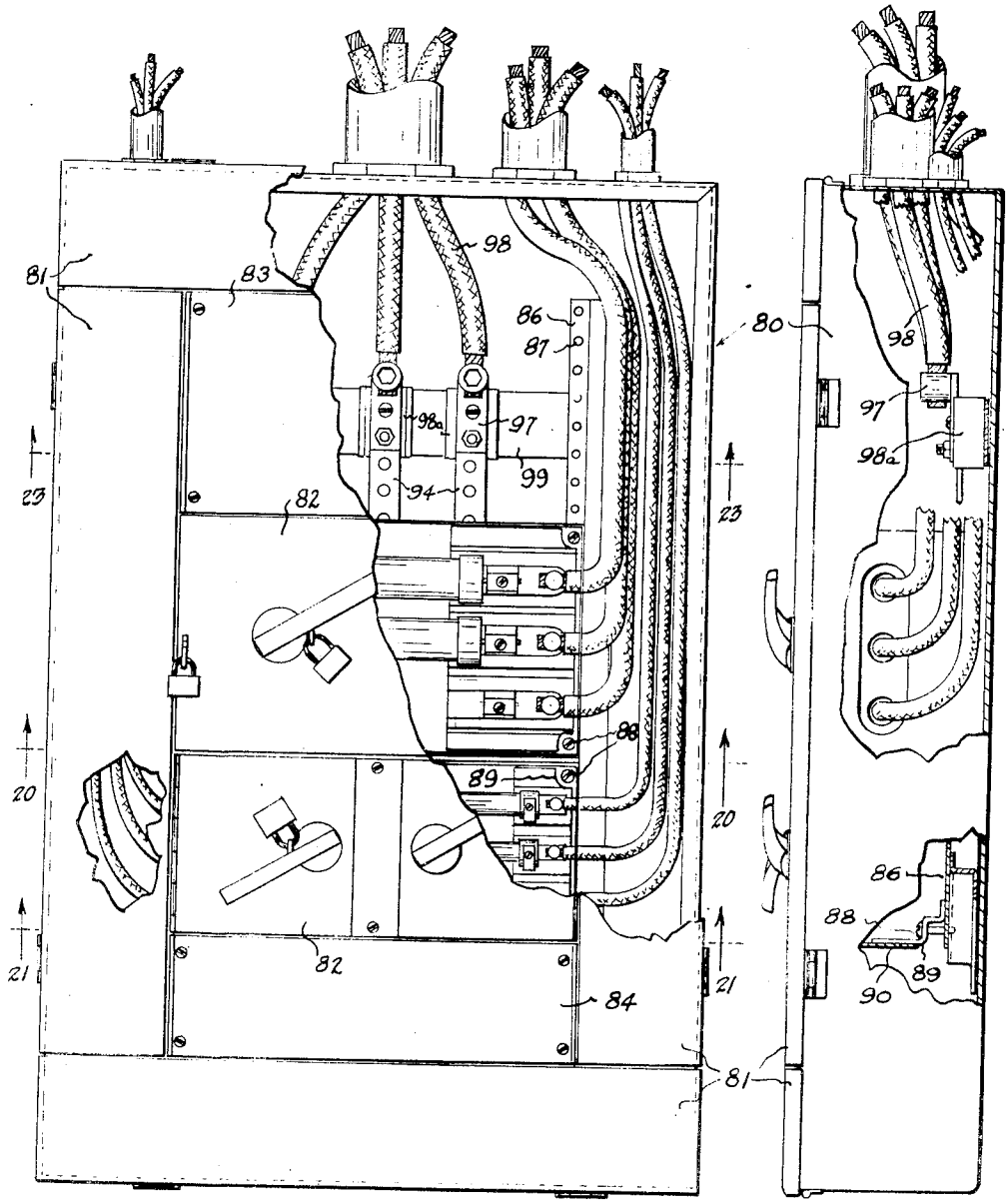


Fig. 18. Fig. 19.

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SWITCHING APPARATUS

Original Filed Sept. 14, 1936 9 Sheets-Sheet 8

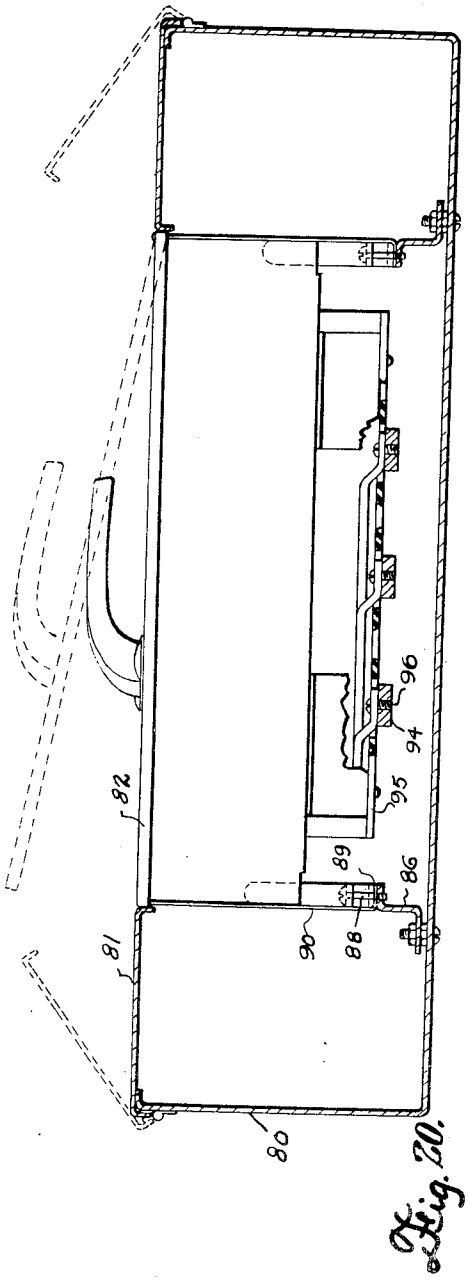


Fig. 20.

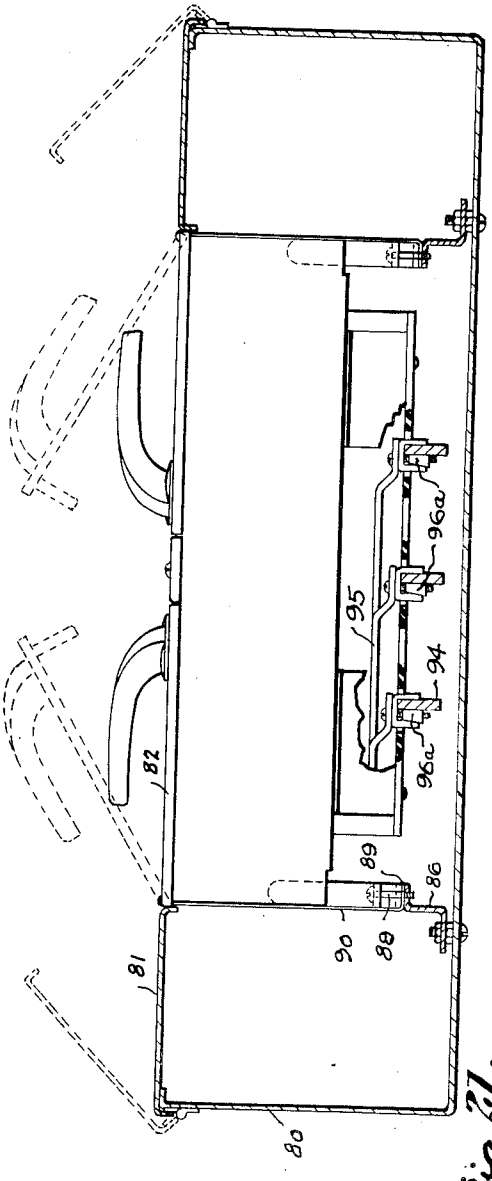


Fig. 21.

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SWITCHING APPARATUS

Original Filed Sept. 14, 1936 9 Sheets-Sheet 9

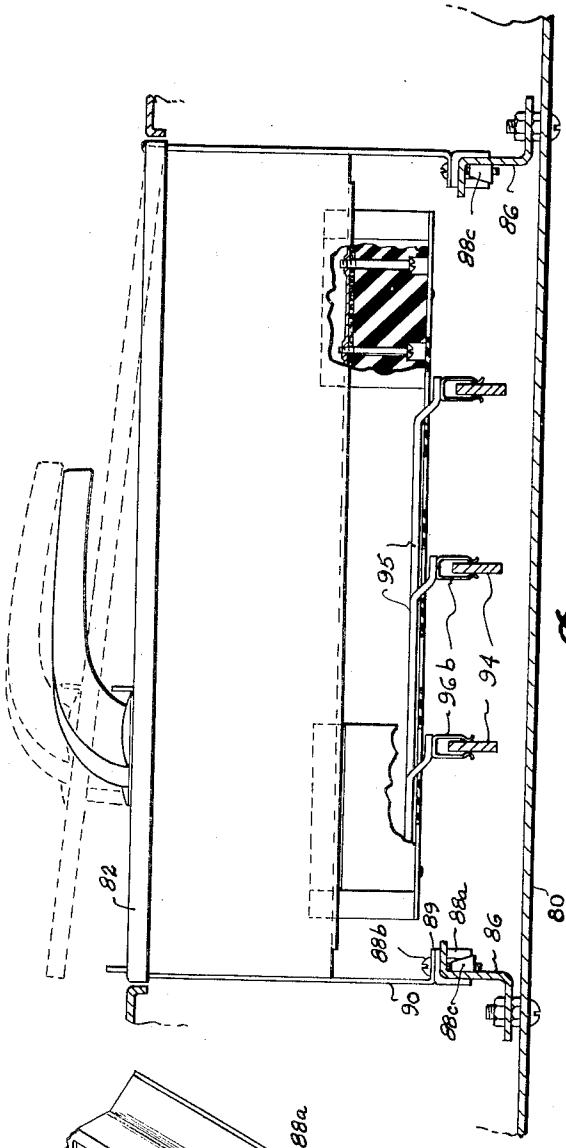


Fig. 22.

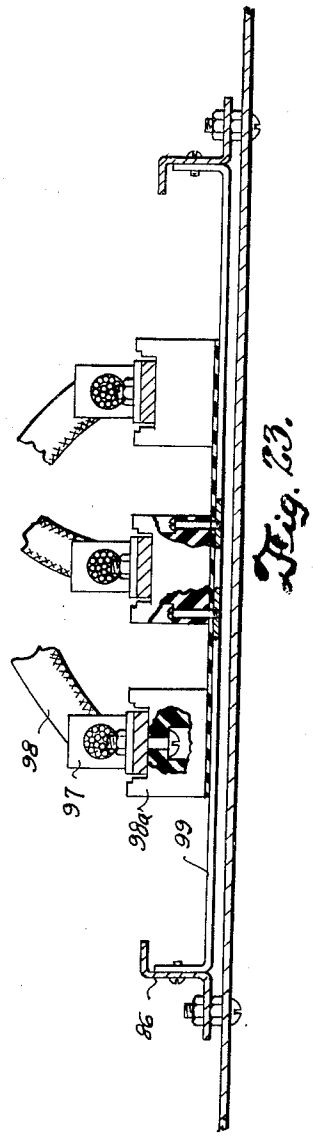


Fig. 23.

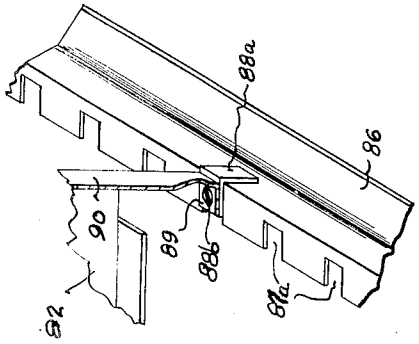


Fig. 22a.

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Patented Feb. 27, 1940

2,191,615

UNITED STATES PATENT OFFICE

2,191,615

SWITCHING APPARATUS

William H. Frank, Lawrence E. Fisher, and Joseph A. Messing, Detroit, Mich.

Original application September 14, 1936, Serial No. 100,771. Divided and this application May 17, 1937, Serial No. 143,234

1 Claim. (Cl. 175—309)

This application discloses a panelboard, and is a division of our prior application Serial No. 100,771, filed September 14, 1936.

For an understanding of the design and construction of the panelboard hereof, reference should be had to the appended drawings. In these drawings,

Figs. 1–8 and 9–17 show details of a single branch unit and a double branch unit which may be used to form the panelboard of Figs. 18–23.

Single Branch Unit

(Figures 1–8)

Fig. 1 is a front view of the unit.

Fig. 2 shows the same with the cover removed.

Fig. 3 is a bottom view of the unit on the arrow 3 of Fig. 1.

Fig. 4 is a section on line 4—4 of Fig. 2 with the movable head shown in On position.

Fig. 5 is a fragmentary view, like Fig. 4, but showing the head in Off position.

Fig. 6 is a side view of the unit on arrow 6 of Fig. 1.

Fig. 7 shows the connection between the handle of the unit and the operating bar thereof which enables the unit to be actuated by a handle on the front of the same.

Fig. 8 is a perspective view of the parts shown in Fig. 7.

Double Branch Unit

(Figures 9–17)

Fig. 9 is a front view of the unit.

Fig. 10 is a view like Fig. 9 but with the cover removed.

Fig. 11 is a right end view of Fig. 10.

Fig. 12 is a bottom view of Fig. 9.

Fig. 13 is a section on line 13—13 of Fig. 10 with one head shown in On position and the other shown in Off position.

Fig. 14 shows a back shielding plate of the unit as secured to and carried by the stationary contact bases thereof in turn secured to and carried by the top and bottom walls of the unit box.

Fig. 15 illustrates the connections between the handles and the operating parts of the units which enables the units to be actuated by handles on the front of the same.

Fig. 16 is a cutaway view of Fig. 15.

Fig. 17 is a section on line 17—17 of Fig. 16.

The Panelboard

(Figures 18–23)

Fig. 18 is a front view of the panelboard.

Fig. 19 is a side view of Fig. 18.

Figs. 20 and 21 are sections on lines 20—20 and 21—21 of Fig. 18.

Figs. 22—22*a* show a modified arrangement for connecting straps to bus bars and for mounting the units on a mounting plate or cabinet wall.

Fig. 23 is a section on line 23—23 of Fig. 18 showing how main feed conductors may be associated with bus bars.

Single Branch Unit

(Figures 1–8)

This comprises a sheet metal box 40 having an open back and having its top and bottom walls 40*a* bridged by bases 41 secured to the walls 40*a* and partially closing the open back, these bases supporting a back shielding plate 42 which substantially completely closes the open back of the box and through which pass conductor straps 43 adapted to be connected by front manipulable screws 44 to bus bars 45 disposed in back of the shield 42. The conductor straps are connected to stationary piston contacts 46 supported on one of the bases and which cooperate with other similar contacts 46 also supported on that base to form the stationary contact sets. The last mentioned contacts 46 are connected to terminals of branch circuit conductors 47 which enter the box 40 through the sides 40*b* thereof. Associated with the stationary contacts are the movable contact heads 48 which may be reciprocated for switching purposes, by an operating mechanism disposed within the box and actuated by a handle 49 disposed on the openable cover 50 of the box which is hinged at 51 to the side 40*b* of the box.

It will be observed that the unit may be associated with the bus bars merely by disposing it in front thereof and by manipulating the screws 44 and that it may be associated with branch circuit conductors merely by entering the terminals of these through the sides of the box at the opening 52 and disposing them in the binding posts 53 whose binding screws may be actuated from the front of the unit through the opening provided by the swinging cover 50.

It will also be observed that the operative connection between the actuating handle 49 on the cover 50 and the operating mechanism of the switch disposed within the box, may be established merely by swinging the cover closed in which case a part 54 permanently connected to the handle will interlock or clutch itself in a releasable manner with a part 55 permanently associated with the operating mechanism within the box. It will be observed that the weight of the handle 49 tends to establish the part car-

ried by the cover 50 and connected to the handle, namely part 54, in proper position to associate itself automatically with the part 55 in the box on cover closing.

It will also be observed that the unit hereof resembles the switch shown in a prior application Serial No. 67,740, filed March 7, 1936.

Double Branch Unit

(Figures 9–17)

This unit comprises a sheet metal box 60 having an open back and having its top and bottom walls 60*a* bridged by insulation bases 61 secured to these walls and partially closing the open back, these bases supporting a back shielding plate 62 which substantially completely closes the open back of the box and through which pass conductor straps 63 adapted to be connected by front manipulable screws 64 to bus bars 65 disposed in back of the shield 62. The conductor straps are connected to stationary piston contacts 66 supported on the bases and which cooperate with other similar contacts 66 also supported on the bases to form the stationary contact sets; because this is a double branch unit there are two contacts 66 connected to each bus bar by a strap, one contact for each set of two; the other contacts of the sets of contacts 66 are connected to terminals of branch circuit conductors 67 which enter the box 60 through the opposed sides 60*b* thereof. Associated with the sets of stationary contacts are the movable contact heads 68 which may be reciprocated for switching purposes, by operating mechanisms disposed within the box and in turn actuated by handles 69 disposed on the openable covers 70 of the box which are hinged at 71 to the opposed sides 60*b* of the box.

It will be observed that the unit may be associated with the bus bars merely by disposing it in front thereof and by manipulating the screws 64 and that it may be associated with branch circuit conductors merely by entering the terminals of these through the sides 60*b* of the box at the openings 72 and disposing them in the binding posts 73 whose binding screws may be actuated from the front of the unit through the openings provided by the swinging covers 70.

It will also be observed that the operative connections between the actuating handles 69 on the covers 70 and the operating mechanisms of the unit disposed within the box may be established merely by swinging the covers closed in which case parts 74 permanently connected to the handles will interlock or clutch themselves in a releasable manner with parts 75 permanently associated with the operating mechanisms within the box.

The Panelboard

(Figures 18–23)

The panelboard herein shown comprises a sheet metal cabinet 80 having an open front partially closed by masking plates or gutter covers 81 cooperating to define an open area occupied by the fronts of units 82 like those disclosed in Figs. 1–17, and by a connection lug cover 83 and by blank filler plates 84. It is hereby observed that while one of each of these units is shown, it can readily be understood that any desired number of these units may be used in a panelboard whose cabinet and front cover parts are suitably proportioned to accommodate the desired number of units of it.

The units may be mounted on mounting angles 86 secured to the back of the cabinet and provided with uniformly and closely spaced tapped holes 87 (Figs. 18–21) into which are threaded mounting screws 88 disposed in flanged lugs 89 formed from extensions 90 of the sides of the boxes of the units. The screws may be manipulable from the front through the open fronts of the units when these fronts have their swing covers swung open.

Another arrangement for mounting the units is shown in Figs. 22–22*a*. In this arrangement the mounting angles 86 have a plurality of slots 87*a* through which pass clamping lugs 88*a* secured to the flanged extension lugs 89 formed from the sides of the units and also through which pass clamping screws 88*b* seated in such lugs, upon which screws are threaded wedge blocks 88*c* which may be manipulated to approach the front of the cabinet by the tightening up of the screws 88*b* to securely mount and clamp the units in place with their extension lugs 89 securely clamped to the angles 86.

For mounting a unit, all that is necessary is to move the unit bodily close to the cabinet back and cause the parts on the lugs 89, namely parts 88 to register with the openings of the angles, namely parts 87, after which the front manipulable screws may be manipulated, with access to these screws being obtained through the open front of the units, when the swinging cover of these are swung open for these purposes.

For connecting the units to the bus bars 94 disposed near the cabinet back, between it and the back of the units, there are provided, as extensions of the back straps 95 of the units, which correspond to the straps 43 of the single branch units of Figs. 1–8 and to the straps of the double branch units of Figs. 9–17, screws 96 or wedge blocks 96*a* or prongs 96*b* which fit in tapped holes of or embrace the bus bars and form electrical connections between the straps and the bus bars.

For supporting the connections referenced generally 97 between the terminals of the main feed cables 98 and the bus bars 94, there may be provided insulating blocks 98*a* disposed on straps 99 which are supported by the rails 46 as shown in Fig. 23.

It will be observed that the arrangement shown at 96*a*, Fig. 15, generally resembles that shown in Fig. 2 of Frank Patent No. 1,846,714 of February 23, 1932.

Inasmuch as the units used in the panelboards are shielded and enclosed on the back by the panelboard cabinets, it is not necessary to provide in these units back shielding plates such as those shown at 42, Fig. 9, and 62, Fig. 13. The units used in cabinets or enclosures might well have their backs left open with the contact bases and connection bases bridging the sides of the sheet metal boxes of the units and forming a partial closure for the backs.

However, if desired, as shown particularly in Figs. 20 and 21, the shielding plates may be employed and their use in units for panelboards is recommended.

Now having described the panelboard hereof, reference will be had to the claim which follows for a determination of the protection sought to be obtained by this application.

We claim:

A panelboard comprising vertical bus bars and vertical mounting rails and a plurality of sheet metal boxes in front of said bars and rails, each box having a back, an open front provided with

a hinged cover, ends, and sides, the boxes being disposed side to side and with their covers flush to form a panel front, openings in the ends through which load conductors enter the boxes, pairs of forwardly projecting free ended stationary prongs on the backs of the boxes, one prong of each pair being connected to a load conductor terminal and the other being connected to a bus bar, there being a plurality of pairs of prongs in each box, a cup shaped housing of insulation telescoped over each pair of forwardly projecting prongs, with its open side open to the back of the box and receiving the free ends of the prongs, a contact in each housing for bridging the free ends of the prongs, within the housing, a quick make and break operating mechanism within each box and connected to the housings therein, a handle on each front cover arranged to move in a path parallel to the front cover, and detachably operatively connected, through the front cover, by means on the back of the front cover, to the operating mechanism within the box, whereby the housings may be moved towards and away from the back of the box for switching action by the handles, and means accessible and manipulable through the open fronts of the boxes, when the covers are swung open, for securing the boxes on the mounting rails and for electrically connecting the prongs to the bus bars and load conductor terminals.

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