

March 13, 1934.

H. J. L. FRANK

1,950,486

PANEL BOARD EQUIPPED FOR TESTING

Filed April 27, 1932

2 Sheets-Sheet 1

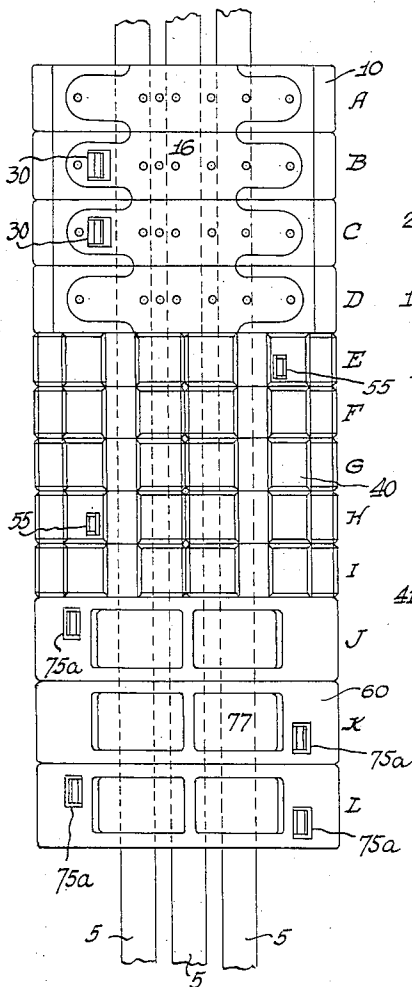


Fig. 1.

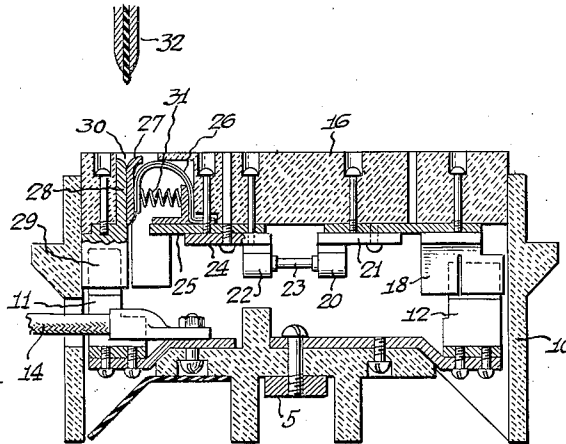


Fig. 2.

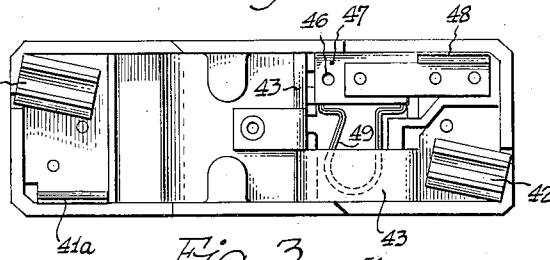


Fig. 3.

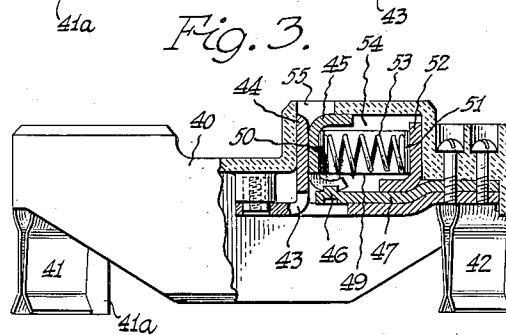


Fig. 4.

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2 Sheets-Sheet 2

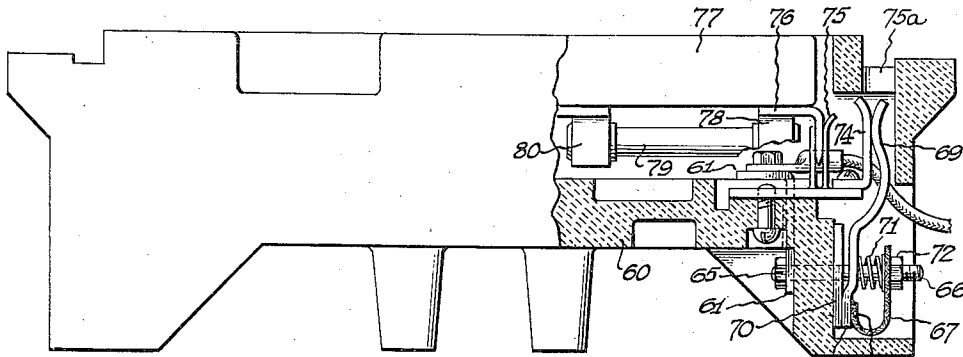


Fig. 5.

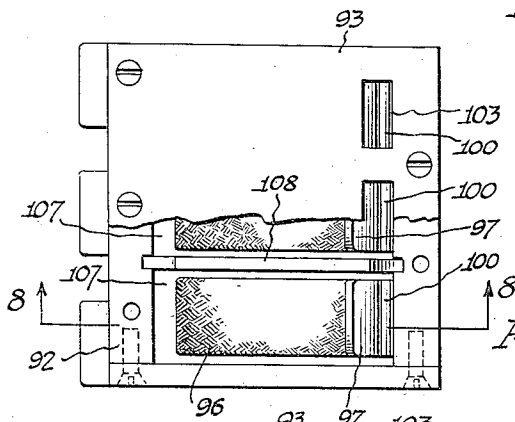


Fig. 7.

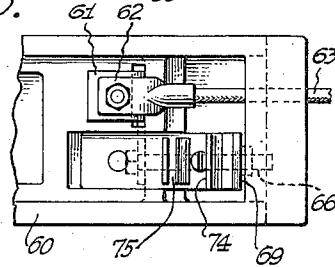


Fig. 6.

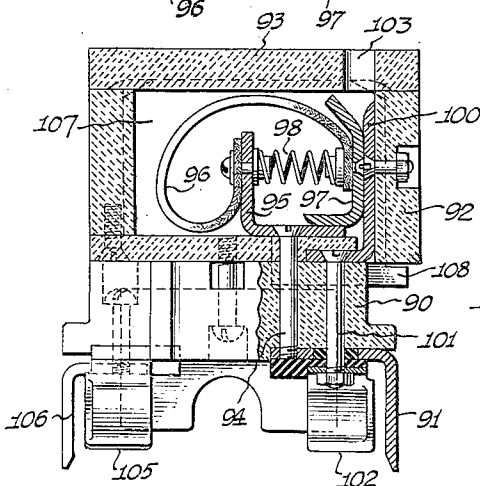


Fig. 8.

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1,950,486

PANEL BOARD EQUIPPED FOR TESTING

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Application April 27, 1932, Serial No. 607,802

19 Claims. (Cl. 175—183)

The present invention relates to panels built up of fused switching devices, and more particularly to dead front convertible panel boards equipped to permit testing of various circuits.

5 This invention is in part a continuation of my application Serial No. 353,343, filed April 8, 1929.

The principal object of this invention is to provide a panel board having a plurality of fused switching units which are relatively interchangeable, in whole or in part, without disturbing the ordered appearance of the panel board, certain of the units having means to permit the insertion of a test jack for testing the unit circuit without interrupting the same.

15 Still further objects of the invention of the present application need not be mentioned specifically here, for they have been mentioned in detail in the above mentioned application. Such objects, together with many other, will become readily apparent to those skilled in the art upon reference to the appended drawings disclosing preferred embodiments of the invention and to the detailed description of the same which follows;

25 Referring to the drawings, it will be seen that Figure 1 shows a panel board having various types of fused switching units thereon, certain of these being equipped for testing;

Fig. 2 is a transverse longitudinal section of a single branch unit having a test head, and adapted to be grouped with other units to form a panel board;

Figs. 3 and 4 are fragmentary bottom plan and longitudinal section views of the head part of a double branch unit, which may be grouped with other units to form a panel board;

Figs. 5 and 6 are fragmentary longitudinal section and plan views of double branch units which may be grouped with others to form a panel board;

Figs. 7 and 8 are top plan and longitudinal section views of a testing head, Fig. 8 being a section as if on line 8—8, Fig. 7;

As indicated in the drawings, and as is more particularly described in the application above mentioned, a panel board may be built up of a number of units disposed in front of a plurality of vertically disposed parallel bus bars 5. The units may be of different characteristic, single branch, double branch, single pole, multi-pole etc., and are so proportioned as to be relatively interchangeable, without disturbing the ordered appearance of the panel board, and without disturbing any units but those interchanged.

55 Still further, none, some, or all of the units may

be provided with means whereby the circuit passing through the units may be tested without interrupting the circuits or otherwise disturbing the units whose circuits are being tested. These test units are also designed to be interchangeable with the other units without disturbing the ordered appearance of the board and without disturbing any units but those being interchanged.

Still further, the heads of certain units may be interchanged with the heads of others, without deleterious effect, and if some of the heads are test heads, such interchange can be used to create test units, without difficulty.

In Fig. 1, wherein a representative panel board is disclosed, there are indicated twelve units, A-L, of which units A to D are of the single branch type, and units E to L are of the double branch type. Further of units A to D, units B and C are disclosed as testing units, although of course, it will be understood that this may be varied as desired. Further, of the double branch units E to I, the right hand head of unit E and the left hand head of unit H are of the testing type, whereas the others are shown as not of that type, although it will be understood, of course, that interchange of these heads with any of the others of the units E-I as desired, may be effected. Of units J to L inclusive, unit J is shown as having test jack receiving means at the left hand end, unit K is shown as having test jack receiving means at the right hand end, and unit L is shown as having such means at both ends.

Any of the units A to D may be replaced by any of the others, for they are all shown as single pole units of the same dimensions. The same is true of units J-L. Further these units A-D may be interchanged with two units J-L, the units A-D being two-thirds as long as the units J-L, along the bus runs. It will be understood, of course, that multi-pole units may be used and within certain limitations, are interchangeable with single pole units.

The single branch unit of Fig. 2, (A-D) which is the same as the unit of Figs. 9 to 13 inclusive of the application above referred to, includes a receptacle 10 having upstanding contact fingers 11 and 12, connected to a circuit cable 14 and to one of the bus bars, respectively. For connecting the bus bar to the cable, that is to say, for bridging the gaps between the fingers 11 and 12 there may be provided heads which may be of the non-test variety, or which may be of the test variety, as desired.

Fig. 2 shows a test head and the same includes a plug 16 of insulation having at one end a con-

tact 18 adapted to mate with the contact 12, the contact 18 being connected to a fuse clip 20 by a conducting strap 21. A second fuse clip 22 between which and the other clip is a fuse 23, is connected by a conducting strap 24 to a second strap 25 to which may be welded or otherwise secured the end of a flexible copper strap 26. To the free end of the latter is secured a plate 27 adapted to engage a second plate 28 connected to a contact 29 adapted to mate with the contact 11. The bent over flexible strap 26 and its plate 27 are disposed in a cavity 30 of the plug and a coiled spring 31 in the cavity tends to force plate 27 against plate 28. A slot 30 disposed above the plane of meeting of plates 27 and 28 permits a double pole test jack 32 to be inserted into the head and to have its test parts and the meter connected thereto to be plugged into the unit, into series with the circuit from bus bar 5 to cable 14, the jack tending to separate plate 27 from plate 28 against the influence of spring 31.

The head 16 as stated above may be interchanged with a non-testing head of similar form and conversion of a unit from a test unit to a non-test unit and vice versa is therefore a simple matter for it can be effected without disturbing the receptacle part of the unit, if desired.

Figs. 3 and 4 show a head adapted to be used with a double branch unit (E-I) and adapted to be interchanged with the non-test heads of these and similar units whenever desired. The double branch testing heads of these figures includes a body 40 of insulating material having clips 41 and 42 at diagonally opposed corners. To the clip 41 is connected a male contact 41a. To the clip 42 is connected a conducting strap 43 having an upstanding portion 44 against which, on the side of the body remote from clip 42 may be pressed a conducting plate 45, the latter having an indentation meshing with a struck-up portion 46 of a conducting strap 47 connected to a male contact 48. Means for pressing the plate 45 against the plate 44 includes a doubled over flexible conducting strap 49 whose end 50 is welded to strap 45 and whose end 51 is welded to a strap 52 resting on strap 47, there being a coiled spring 53 between the ends of the flexible strap for pressing the plate 45 against plate 44, these parts being disposed in a cavity 54 of the body, the same having a slot 55 opening to the top of the body and permitting the entrance of a test jack between the plates 44, 45, whereby the meter connected to the jack may be inserted in series between metal contacts 41a and 48.

Figs. 5 and 6 show a unit (J-L) wherein the jack receiving slot and parts are formed in the receptacle rather than in the head and it is intended that this form of unit may be interchanged with any other form of unit as a whole, when desired, for conversion. In this form of unit there is provided a receptacle 60 having a conducting plate 61 to which may be secured a terminal 62 of a load cable 63, the latter entering the receptacle through an opening in the end thereof. The plate 61 is provided with a transverse portion and a downwardly projecting portion, indicated in dotted lines, in engagement with the head 65 of a bolt 66, the latter being provided with a flexible conducting strap 67 welded at 68 to the end of a conducting strap 69, the latter being engaged with a second conducting strap 70 insulated from the bolt 66. A coiled spring 71 surrounds the bolt 66 and reacts against the nut 72 and the plate 69 to press the upper end of the latter against the L-shaped conducting

strap 74. The space between these two last mentioned parts is immediately beneath a jack receiving entrance slot 75a open through the top of the unit, as indicated. Plate 74 is connected to the female contacts 75 which receive the male contact 76 of a head 77, there being a fuse clip 78 connected to and secured to the contact 76 for receiving one end of a fuse 79. The other end of the fuse is disposed in a clip 80 connected to other circuit parts not shown. It will be observed that in this form of test unit the circuit from cable 63 to the fuse 79 includes parts 62, 61, 65, 66, 67, 69, 74, 75, 76, 78.

If desired, the means of Fig. 5 may be provided in one or both ends of a receptacle.

In Figs. 7 and 8 there is disclosed a test head particularly adapted for use with the receptacle shown in Patent No. 1,733,370 of October 29, 1929. As indicated the test head includes a body 90 having a male contact 91 and also having a box-like part 92 provided with a cover 93. The contact 91 is connected by a screw 94 to a strap 95 in the box-like portion and a bent over flexible strap 96 having one end secured to the strap 95, and the other to a plate 97, electrically connects these two parts. A coiled spring 98 disposed between them serves to press the strap 97 against a stationary strap 100 which is electrically connected by a screw 101 to a fuse clip 102. An entrance slot 103 opening into the cavity in which the testing parts are received and also opening through the cover 93 provides means for admitting a test jack to the space between the plates 97 and 100. The circuit from contact 91 to the fuse clip 102 includes parts 94, 95, 96, 97, 100, 101; from clip 102 current is conducted through the fuse, not shown, to a fuse clip 105 connected to a contact 106.

Since the unit of Figs. 7 and 8 as shown, has a three-pole head, three sets of parts heretofore described are provided and are disposed in three cells 107 of the head, the various cells being separated by partitions 108 as indicated. There are, of course, three slots 103.

It will be observed that the test head of Fig. 2 may replace and be interchanged with any other similarly dimensioned single branch test head on the board. Further the unit of Fig. 2 as a whole may be interchanged with any other similarly dimensioned single branch unit, as a whole. Further the double branch head of Fig. 5 may be interchanged with any other double branch head as desired, or a double branch unit, having one or more testing heads, may be interchanged with a double branch unit having none, or one or more testing heads, as desired. Further carrying forward the idea of application Serial No. 353,343, single pole units may be interchanged with multi-pole units as desired within limits such as are disclosed in that application.

It will also be observed that the tested circuit and the testing instrument is protected by a fuse even while the circuit is being tested. This is in contrast to devices where the fuse is removed when the circuit is to be tested, or when the testing instrument is connected to the circuit.

Now having described the invention and preferred embodiments thereof, reference will be had to the following claims which define the invention, it being understood that the same is not to be limited to the specific details herein disclosed.

What I claim is:

1. In a panel board, a plurality of switching

devices, each comprising a female member enclosing "live" contacts and a male member carrying mating contacts, fuse holding means connected therewith, and means in the male members of certain of the devices permitting the insertion in series into the circuits through the last mentioned devices of bipolar instrument terminals without discontinuing said circuits.

2. In a panelboard, a plurality of switching devices, each comprising a female member enclosing "live" contacts, a male member carrying mating contacts, fuse holding means connected therewith, and means in certain of said male members permitting the insertion in series into the circuit through said members of a bipolar instrument terminal without discontinuing said circuits, the latter means comprising a pair of plates through which the current passes from one to the other, and at least one of which is movable away from the other and means for holding one end of said plate in contact with the other plate when the other end is moved out of contact until the terminal is in contact with both plates.

3. In a panelboard, a plurality of switching devices, each comprising a female member enclosing "live" contacts, a male member carrying mating contacts, fuse holding means connected therewith, and means in certain of said male members permitting the insertion in series into the circuits through said members of a bipolar instrument terminal without discontinuing said circuits, the latter means comprising a pair of plates through which the current passes from one to the other, one of said plates being freely movable to permit insertion of said terminal between them, a spring adapted to press the plates together, said spring abutting the rear of the movable plate near its middle, whereby when one end of said plate is moved a small distance the other end maintains contact.

4. In a panelboard, a plurality of switching devices, each comprising a female member enclosing "live" contacts, a male member carrying mating contacts, fuse holding means connected therewith, one end of the fuse of certain of said devices being directly connected to the corresponding contacts thereof through separable spring pressed contacting plates carried in recesses in the male member of said devices and accessible from the outside thereof.

5. In a panel board, a plurality of circuit switching units comprising bases mounted over bus bars, and heads adapted to be placed into cooperative relation with said bases for completing circuits therethrough, certain of said heads having means for receiving testing jacks and for causing the same to divert the circuit through the heads into testing devices, placed by said jacks, in series with said circuits.

6. In a panel board, a plurality of circuit switching units comprising bases mounted over bus bars, and heads adapted to be placed into cooperative relation with said bases for completing circuits therethrough, certain of said heads having means for receiving testing jacks and for causing the same to divert the circuit through the heads into testing devices, placed by said jacks, in series with said circuits, said means being accessible from the front of the panel board for jack receiving, even while the heads are in cooperative relation with said bases.

7. In a panel board, a plurality of circuit switching units comprising bases mounted over bus bars, and heads adapted to be placed into cooperative relation with said bases for completing circuits

therethrough, certain of said heads having means for receiving testing jacks and for causing the same to divert the circuit through the heads into testing devices, placed by said jacks, in series with said circuits, said test jack receiving heads being dimensioned and constructed to be interchangeable with one another.

8. In a panel board, a plurality of circuit switching units comprising bases mounted over bus bars, and heads adapted to be placed into cooperative relation with said bases for completing circuits therethrough, certain of said heads having means for receiving testing jacks and for causing the same to divert the circuit through the heads into testing devices, placed by said jacks, in series with said circuits, said test jack receiving heads being dimensioned and constructed to be interchangeable with other heads, not provided with jack receiving means.

9. In a panel board, a plurality of circuit switching units comprising bases mounted over bus bars, and heads adapted to be placed into cooperative relation with said bases for completing circuits therethrough, certain of said heads having means for receiving testing jacks and for causing the same to divert the circuit through the heads into testing devices, placed by said jacks, in series with said circuits, said test jack receiving heads being dimensioned and constructed to be interchangeable with one another, and with other heads, not provided with jack receiving means.

10. In a panel board, a plurality of circuit switching units comprising bases mounted over bus bars, and heads adapted to be placed into cooperative relation with said bases for completing circuits therethrough, certain of said heads having means for receiving testing jacks and for causing the same to divert the circuit through the heads into testing devices, placed by said jacks, in series with said circuits, said test jack receiving heads being dimensioned and constructed to be interchangeable with one another, said means being accessible from the front of the panel board for jack receiving, even while the heads are in cooperative relation with said bases.

11. In a panel board, a plurality of circuit switching units comprising bases mounted over bus bars, and heads adapted to be placed into cooperative relation with said bases for completing circuits therethrough, certain of said heads having means for receiving testing jacks and for causing the same to divert the circuit through the heads into testing devices, placed by said jack, in series with said circuits, said test jack receiving heads being dimensioned and constructed to be interchangeable with other heads, not provided with jack receiving means, said means being accessible from the front of the panel board for jack receiving, even while the heads are in cooperative relation with said bases.

12. In a panel board, a plurality of circuit switching units comprising bases mounted over bus bars, and heads adapted to be placed into cooperative relation with said bases for completing circuits therethrough, certain of said heads having means for receiving testing jacks and for causing the same to divert the circuit through the heads into testing devices, placed by said jacks, in series with said circuits, said test jack receiving heads being dimensioned and constructed to be interchangeable with one another, and with other heads, not provided with jack receiving means, said means being accessible from

the front of the panel board for jack receiving, even while the heads are in cooperative relation with said bases.

13. A panelboard built up of a plurality of selectively interchangeable circuit control units, all of said units being of the base and head, fuse enclosing type, with the fuse interlocked to a circuit opening means thereof so that fuse removal can be effected only on open circuit, one or more but less than all of said units having a readily accessible series jack which controls the circuit thru the respective unit, independently of the fuse or the main circuit opening means thereof.

14. A panelboard built up of a plurality of selectively interchangeable fused circuit control switching units, whose fuses are interlocked to the switching means, one or more but less than all of said units having a readily accessible switching means in series with the fuse and which controls the circuit thru the respective unit, independently of the fuse or the first mentioned switching means.

15. A panelboard built up of a plurality of selectively interchangeable fused circuit control switching units, whose fuses are interlocked to the switching means, one or more but less than all of said units having a readily accessible switching means of the jack type in series with the fuse and which controls the circuit thru the respective unit, independently of the fuse or the first mentioned switching means.

16. A panelboard built up of a plurality of selectively interchangeable fused circuit control switching units of the base and head type, whose heads are selectively interchangeable, and whose fuses are interlocked to the co-operation of the heads and the bases, one or more but less than all of said heads having a readily accessible switch-

ing means in series with the fuse and which controls the circuit thru the respective unit, independently of the fuse, and even while the head and base are in circuit closing relation.

17. A panelboard built up of a plurality of selectively interchangeable fused circuit control switching units of the base and head type, whose heads are selectively interchangeable, and whose fuses are interlocked to the co-operation of the heads and the bases, one or more but less than all of said heads having a readily accessible switching jack in series with the fuse and which controls the circuit thru the respective unit, independently of the fuse, and even while the head and base are in circuit closing relation.

18. A panelboard built up of a plurality of selectively interchangeable, base and covering head type, fuse-enclosing, circuit control units with the fuses interlocked with respect to the heads so that fuse removal can be effected only when the heads are moved to open circuit position, certain of said units having switching means in series with their fuses operable to control the circuits through the fuses, even though the heads are in circuit closing position.

19. A panelboard built up of a plurality of selectively interchangeable, base and covering head type, fuse-enclosing, circuit control units with the fuses interlocked with respect to the heads so that fuse removal can be effected only when the heads are moved to open circuit position, certain of said units having readily accessible switching means in series with their fuses operable to control the circuits through the fuses, even though the heads are in circuit closing position.

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