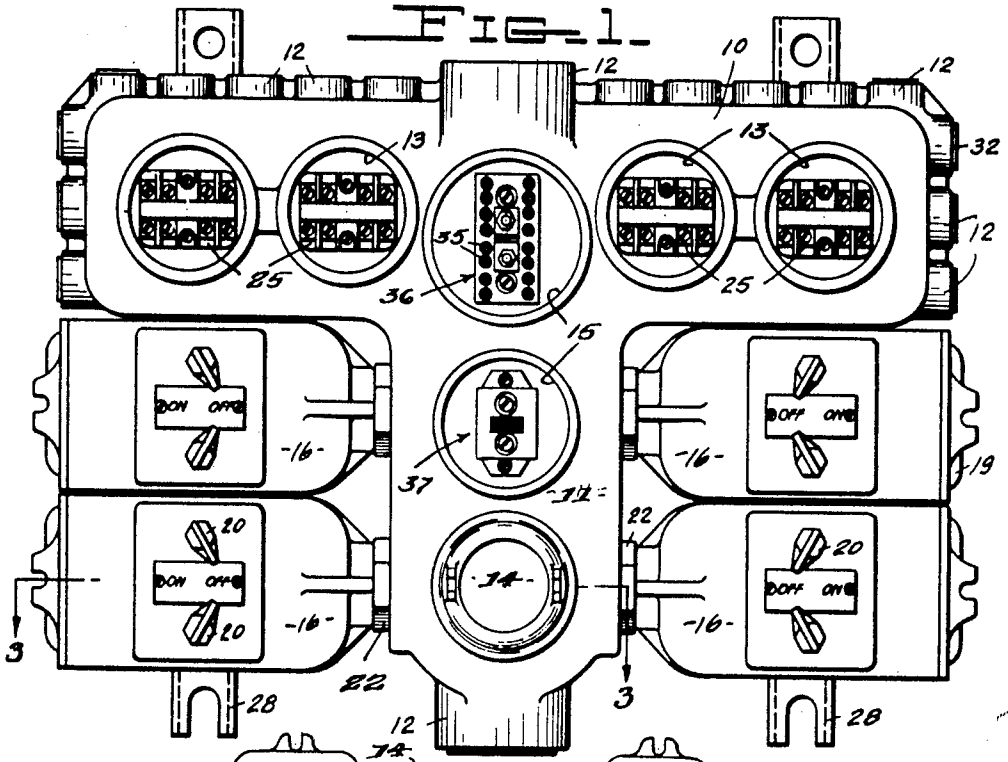
Nov. 30, 1943. H. L. BUSH 2,335,233

EXPLOSION PROOF PANEL BOARD

Filed Jan. 9, 1941 3 Sheets-Sheet 1

FIG. 1.



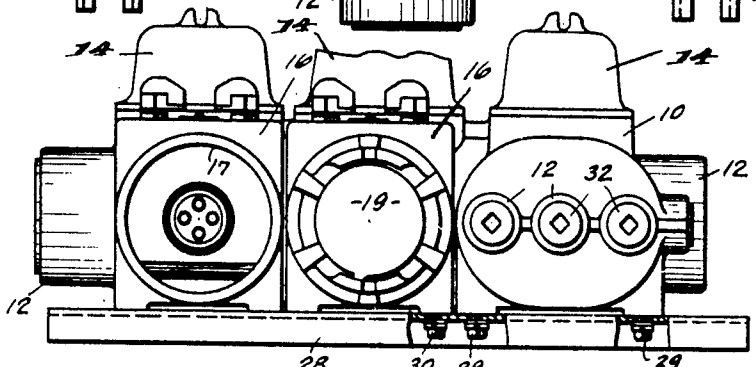


FIG. 2.

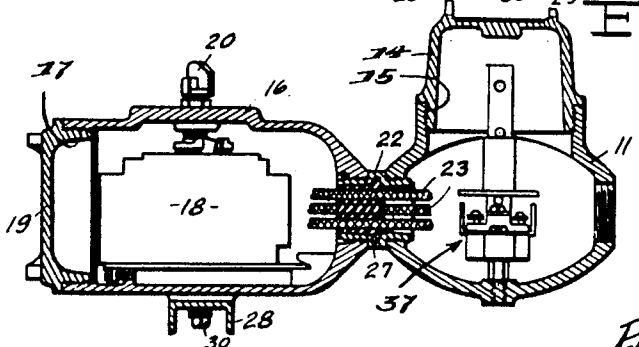


FIG. 3.

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EXPLOSION PROOF PANEL BOARD

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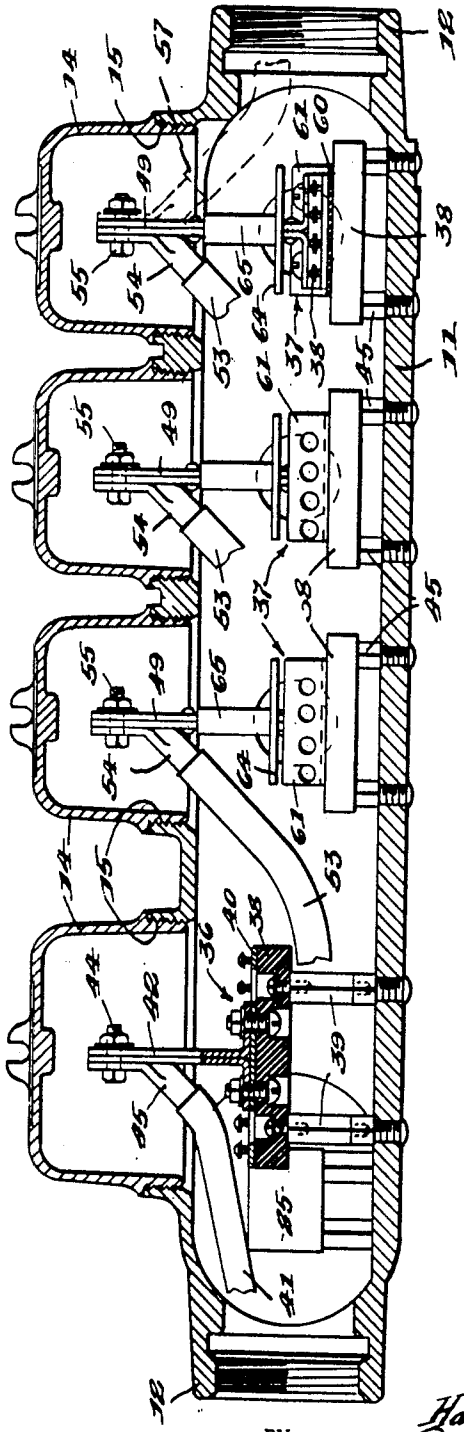

Fig. 4.

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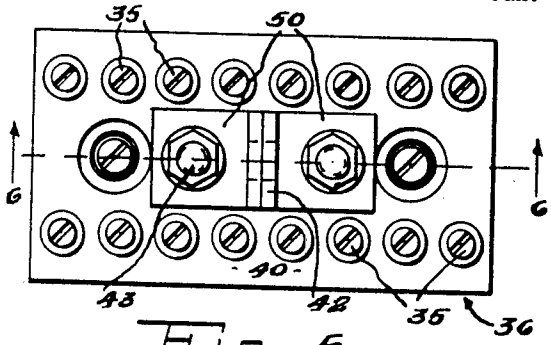

Fig-5-

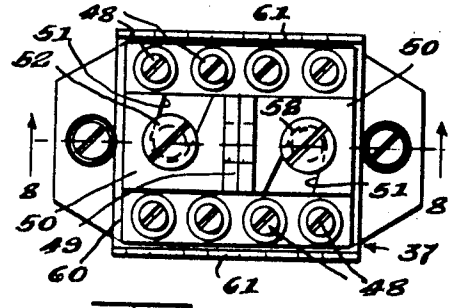

Fig-7-

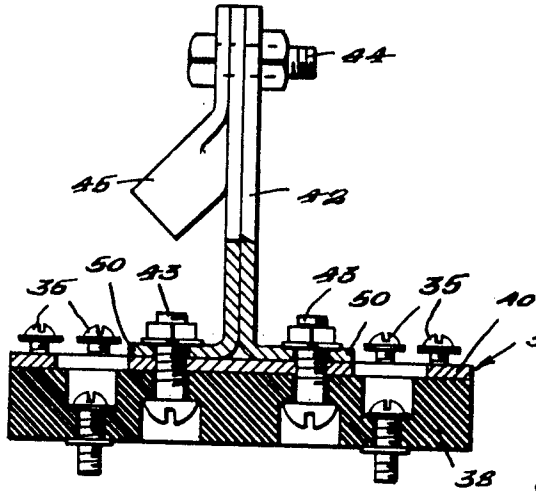

Fig-6-

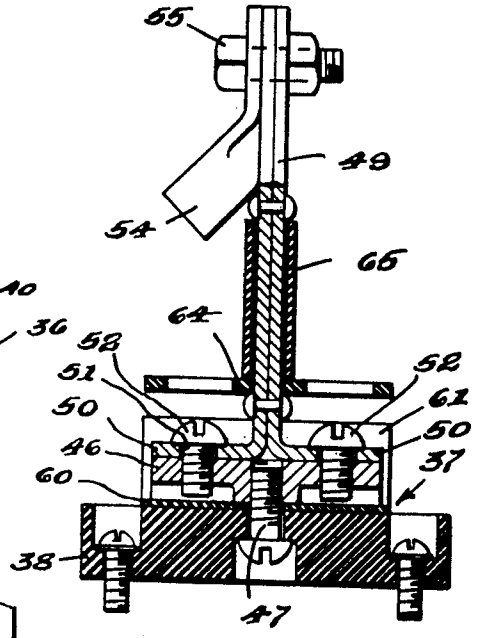

Fig-8-

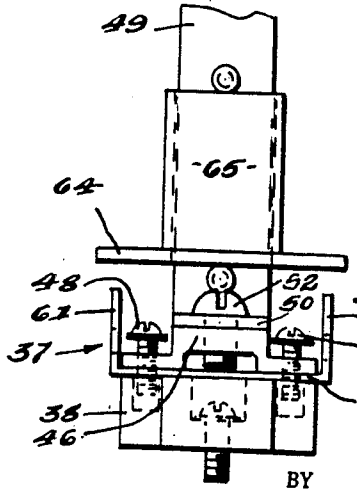

Fig-9-

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2,335,233

UNITED STATES PATENT OFFICE

2,335,233

EXPLOSION-PROOF PANEL BOARD

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Application January 9, 1941, Serial No. 373,827

8 Claims. (Cl. 175—308)

This invention relates in general to electrical explosion-proof panel boards and in its more limited aspects has to do with an improved structure of that type of panel board disclosed in Patent No. 2,158,477, issued May 16, 1939, to Raymond H. Olley.

The invention has as an object an enclosed explosion-proof panel board embodying a construction economical to manufacture and by which the individual switch housings may be conveniently assembled to the main body structure after the panel board has been installed. This construction permits the individual switch housings to be cast separately thereby materially reducing casting losses involved in panel boards of the integral type.

The invention has as a further object a particularly novel terminal block construction and arrangement permitting the panel board to be quickly and conveniently wired. This feature of the invention is of great importance inasmuch as the main feeders for these panel boards consist of heavy stiff cables which are extremely difficult to manipulate in the relatively confined spaces in the enclosed type of panel board.

The general construction and arrangement of my invention permits the individual switch housings to be conveniently secured to the main body of the panel and conveniently wired to the branch circuits therein with the switch housings sealed in flame-tight relation from the main structure of the panel board. The individual switch housings are usually assembled to the main panel and the branch circuit connections are usually made at the factory. However, the construction and arrangement is such that the switch housings may be assembled to the panel and the connections made conveniently in the field.

After the completed panel board is mounted, the only connections necessary to be made to complete the installation are the connections to the main feeders of the system. As previously stated, these feeders consist of large heavy cables which can not be conveniently bent at sharp angles, or otherwise manipulated, in confined spaces. This disadvantage, inherent in panel boards of the type referred to, often results in the insulation on the feeder cables being damaged, or the connecting terminals being bent or broken resulting in a short circuit, or other electrical trouble.

The second feature of my invention above alluded to consists generally of a main feeder terminal detachably mounted on each of the terminal blocks, with the exception of the terminal block provided for the neutral conductor. Upon removal of these main terminals, the interior of the panel board is free and available for the pulling and manipulation of the heavy conductors. The main terminals, when mounted upon their respective terminal blocks, extend externally of the panel board through suitable work openings which permit the convenient attachment of the feeder conductors to the respective main terminals, and also permit the main feeders to be conveniently fed through the panel board if such is desired.

The invention consists in the novel features and in the combinations and constructions hereinafter set forth and claimed.

In describing this invention, reference is had to the accompanying drawings in which like characters designate corresponding parts in all the views.

Figure 1 is a front elevational view of a panel board embodying my invention with parts removed.

Figure 2 is a side elevation of the structure shown in Figure 1 with parts removed.

Figure 3 is a sectional view taken on line 3—3, Figure 1.

Figure 4 is a lengthwise sectional view of the panel board with parts shown in elevation.

Figure 5 is a plan view of the neutral terminal block.

Figure 6 is a sectional view, partly in elevation, taken on line 6—6, Figure 5.

Figure 7 is a view, similar to Figure 5, of one of the hot conductor terminal blocks.

Figure 8 is a sectional view, partly in elevation, taken on line 8—8, Figure 7.

Figure 9 is an end elevational view of the terminal block shown in Figures 7 and 8.

The invention consists of a main hollow body member substantially T shaped in general form, and a plurality of individual switch housings detachably secured to the body member in flame tight relation thereto.

The body consists of a transverse or horizontal portion 10 and a leg portion 11 depending centrally from the upper portion 10. The body member consists of a metallic casting provided with one or more hubs 12 threaded internally in the conventional manner to receive the conduits of the electrical system. The top wall of the portion 10 is formed with a plurality of work openings 13, each provided with a closure 14 threaded into the openings and forming a flame tight closure therefor. The leg portion 11 is

provided with similar openings 15 into which are also threaded cup-shaped closure members 14.

Heretofore panel boards of this type have been constructed with a similar body member and with switch housings cast integral with the leg portion 11. Such construction was satisfactory. However, it involves certain disadvantages in that the casting is extremely complicated resulting in a relatively high foundry loss and the inability to add additional switch housings to the original structure, or to replace the switch housing in the event the same should become damaged. In another structure of this general type, individual switch housings were employed and connected to the body member by means of individual conduits. This second structure overcame some of the difficulties of the first. However, the switch housings could not be changed or added to the structure without considerable difficulty and the expenditure of a considerable amount of time.

An important feature of this invention resides in the arrangement by which the individual switch housings may be quickly and conveniently installed or removed without in any way interrupting the use of the panel board.

The individual switch housings 16 are in general of rectangular cross section, each being formed at one end with a circular opening 17 of appreciable dimension to permit the insertion and removal of the switch or breaker 18. The openings 17 are provided with plugs 19 threaded into the openings and forming a flame tight closure therefor. The top wall of the housing is provided with suitable switch actuating mechanism operable externally of the housing as by handle 20. Each side wall of the leg portion 11 is formed with spaced apart internally threaded apertures and the like ends of the housing are provided with internally threaded apertures.

The housings are individually attached to the leg portion 11 in flame tight relationship thereto by means of a nipple 22 threading into one of the apertures formed in the side wall of the leg portion 11 and the aperture formed in the inner end wall of the housing. The threads in the aperture of the housing extend in the opposite direction to the threads in the aperture in the side wall of the leg portion 11. That is, the aperture in one member is provided with a right hand thread and the corresponding aperture in the other member is formed with a left hand thread. The nipple 22 is likewise provided with complemental threads at each end thereof. Accordingly, upon rotation of the nipple 22 it is simultaneously threaded into the apertures of both the housing and the main body members during which process the switch housing is moved axially toward the leg portion 11. The nipple 22 forms a passage between the interior of the body member and the interior of the switch housing and through which the lead wires 23 extend.

The nipples 22 are formed with an annular recess 27 which functions to retain a sealing medium which is poured or run into the nipple about the lead wires 23 to effectively seal off the main body compartment from the switch housing. The leads extend outwardly from each end of the nipple, like ends of the leads being arranged in the leg portion 11, and the opposite ends of the leads in the respective switch housings. The leads are, of course, rotated during rotation of the nipples in the securement of the switch housings to the main portion of the panel. The ends of the leads, extending into the switch housing, are connected to the terminals of the switch 18. Certain of the leads, extending into the portion 11, are conneced to the branch circuit terminals 35 mouned on the neutral terminal block 36 and the hot conductor terminal blocks 37. The ends of the other lead conductors 23 are connected to the terminals of terminal blocks 25 arranged in the top section 10 of the housing.

The individual housings 16 are secured to the leg portion 11 and the lead conductors are connected to the switches and respective terminal blocks at the factory, it being only necessary for the electrician to connect the main feeders to the main terminals of blocks 36, 37. The housings 16 are rigidly secured to the main body member by supporting members 28 secured to the upper horizontal portion 10 as by screws 29, and the housings are detachably secured to the supporting members 28, as by screws 30 threading into the bottom wall of the housings.

It will be apparent that any of the switch housings may be readily disassembled from the panel by disconnecting the ends of the leads 23 attached to the switch and the opposite ends of the leads attached to the terminal blocks in the housing. Thereupon, the nipple 22 is rotated in the opposite direction and is threaded out of both the housing and the body member. During this operation, the switch housings only move in an axial direction. This arrangement permits the most economical construction of the switch housings and permits the housings to be detached from the body member without in any way disturbing the arrangement of the remaining switch housings, and permits additional switch housings to be added after the panel board has been installed and put into use.

The neutral terminal block 36 consists of a block 38 of insulating material mounted in spaced apart relation from the bottom wall of the housing as by studs 39. A metallic plate 40 is arranged on the upper surface of the block 38 and is provided along each edge with a plurality of branch circuit terminals 35. The main circuit terminal, to which the neutral feeder 41 is connected, consists of an upwardly extending metallic stem 42 secured to the plate 40 as by bolts 43. The upper end of the stem 42 is apertured to receive a bolt 44 by means of which the conductor lug 45 is secured to the stem.

The hot feed conductor terminal blocks 37 consist of an insulating block 38 also mounted upon studs 45 similar to the studs 39. A metallic block 46 is mounted upon the block 38 as by screws 47, and the metallic block 46 is likewise provided along each side edge with a row of branch circuit terminals 48. The main terminals for the hot feeder conductors are similar to the main neutral terminal consisting of an upwardly extending stem 49. The stems of both types of terminals are formed from flat metallic stock bent to form laterally extending feet 50. In the case of the main terminals for the hot feed conductors, the feet 50 are provided with slots 51 to receive screws 52. The hot feed conductors 53 are secured to the respective main terminals as by suitable lugs 54 and bolts 55. The main terminals 49 of the hot feed conductor terminals are readily removable by loosening the screws 52 and rotating the terminal in a counter-clockwise direction, Figure 7. With these terminals removed, the heavy conductors 53 may be pulled through the leg portion 11 and outwardly through the respective work openings where the lugs and other suitable connectors 54 may be conveniently at-

tached to the ends of the conductors. The main terminals 49 are then mounted upon the terminal blocks and secured thereto by screws 52, and the lugs attached to the main terminals by the screws 55. Inasmuch as the main terminals 42, 49 extend outwardly through the work openings 15, the above connections can be most conveniently made even with the heaviest of cables. If it is desired to establish a through feed service, this is readily effected by connecting the through feed conductors, indicated in dotted outline at 57, Figure 4, to the respective main terminals. After the main connections have been made, the work openings are closed by the covers 14.

In order to effect the maximum protection for the exposed hot terminals, a protective shield 60, channel shaped in cross section, is interposed between the insulating block 38 and the metallic block 46 with the sides or legs 61 of the channel formation extending along opposite sides of the metallic block in juxtaposition to the branch circuit terminals 48, the legs 61 being provided with suitable apertures to permit connection of the ends of the leads 23 to the terminals. The top surface of the terminals is protected by a shield 64 carried by each of the hot main terminals 49, and the adjacent portion of the stem of these terminals is protected by an insulated sleeve 65.

What I claim is:

1. An explosion-proof electrical panel board comprising an enclosed housing formed with a work opening in the top wall, a terminal block mounted in the housing in register with said work opening, a terminal secured to said block and extending outwardly therefrom through said work opening, and a cup shaped closure member for said opening detachably secured to the body in flame tight relation thereto.

2. An explosion-proof panel board comprising an enclosed housing formed with a work opening in one wall thereof, a terminal block mounted in the housing in register with said opening, a plurality of branch circuit terminals mounted on said block, and a main circuit terminal detachably secured to said block and extending outwardly therefrom through said opening, and being accessible for the attachment of a conductor exteriorly of the housing, and a closure member for said opening detachably secured to the housing in flame tight relation thereto.

3. An explosion-proof electrical panel board comprising an enclosed housing formed with a work opening in the top wall thereof, a terminal block mounted in the housing in spaced relation to the bottom wall and in register with said opening, a plurality of branch circuit terminals mounted on said terminal block and a main terminal detachably mounted on the block and extending outwardly therefrom through said opening, and a cup shaped closure member for said opening detachably secured to the housing in flame tight relation thereto.

4. An explosion-proof electrical panel board comprising an enclosed housing formed with a work opening in one wall thereof, a terminal block mounted in the housing in register with said opening, a plurality of branch circuit terminals mounted on said block and a main terminal detachably secured to the block and extending outwardly therefrom through said opening, an insulating shield carried by said main terminal and overlying said branch circuit terminals, and a closure member for said opening detachably secured to the housing in flame tight relation thereto.

5. An explosion-proof electrical panel board comprising an enclosed housing formed with a work opening in one wall thereof, a terminal block mounted in the housing in register with said opening, a plurality of branch terminals mounted on said terminal block, a shield of insulating material extending along each side of said block in juxtaposition to said branch circuit terminals, a main terminal detachably secured to the block and extending upwardly therefrom through said work opening, a shield of insulating material carried by said main terminal and overlying said branch circuit terminals, and a closure for said opening detachably secured to the housing in flame tight relation thereto.

6. An explosion-proof electrical panel board comprising an enclosed housing formed with a work opening in one side thereof, a block of insulating material mounted in the housing in register with said opening, a metallic block secured to said insulating block and being provided along opposite sides with branch circuit terminals, a main terminal having a base porton detachably secured to said metallic block and a stem portion extending upwardly therefrom through said work opening, an insulating member channel shaped in cross section arranged intermediate said insulating block and said metallic block and operable to shield the sides of said metallic block, and an insulating shield carried by said main terminal and overhanging the top surface of said metallic block, and a closure member for said opening detachably secured to the housing in flame tight relation thereto.

7. An explosion-proof electrical panel board comprising a hollow body housing, the side walls of which are formed with spaced apart threaded apertures and the top wall with work openings, a plurality of bus conductors arranged in the body housing, a plurality of switch housings arranged along each side wall of the body, each switch housing being formed with a threaded aperture in one end arranged in register with one of the apertures in the side wall of the body housing, each of said switch housings being also provided with an opening to permit insertion and removal of a switch in the switch housing, said apertures in one of said housings being provided with a right hand thread, and the aperture in the other housing being formed with a left hand thread, means for detachably securing said switch housings to the body housing comprising a nipple provided with right hand threads at one end complemental to the threads in the aperture of one of said housings, and at the opposite ends with a left hand thread complemental to the thread in the aperture of the other housing, a plurality of lead conductors arranged in said nipple and sealed in flame tight relation therein and extending outwardly from each end of the nipple, said nipple being operable upon rotation to simultaneously thread into both of said housings and serving to mechanically connect the switch housing to the body housing, and said lead conductors serving to connect the switch mounted in the switch housing to the bus conductors in the body housing, and a closure for each work opening in the body housing and switch housings and being detachably secured in flame tight relation thereto.

8. An explosion-proof electrical panel board comprising a hollow body housing, the side walls of which are formed with spaced apart threaded apertures and the top wall with work openings, a plurality of bus conductors arranged in the body

housing, a plurality of switch housings arranged along each side wall of the body, each switch housing being formed with a threaded aperture in one end arranged in register with one of the apertures in the side wall of the body housing, each of said switch housings being also provided with an opening to permit insertion and removal of a switch in the switch housing, said apertures in one of said housings being provided with a right hand thread, and the aperture in the other housing being formed with a left hand thread, means for detachably securing said switch housings to the body housing comprising a nipple provided with right hand threads at one end complemental to the threads in the aperture of one of said housings, and at the opposite ends with a left hand thread complemental to the thread in the aperture of the other housing, a plurality of lead conductors extending through the nipple and being sealed therein in flame tight relation and being rotatable as a unit with the nipple, said nipple being operable upon rotation to simultaneously thread into both of said housings and serving to connect the switch housing to the body housing, and said lead conductors serving to connect the switch mounted in the switch housing to the bus conductors in the body housing, and a closure for each work opening in said housings detachably secured thereto in flame tight relation.

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