

May 16, 1939.

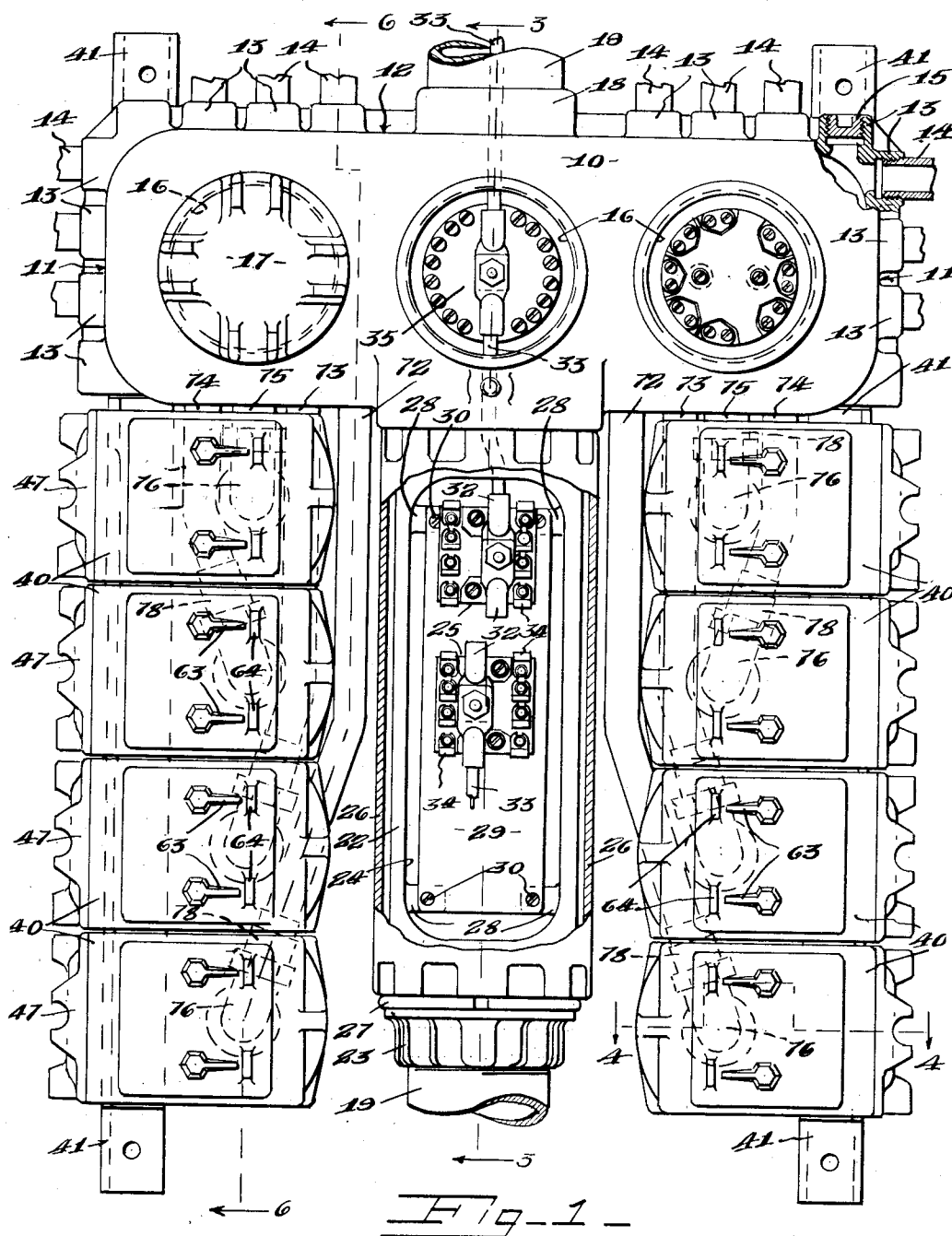
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2,158,477

EXPLOSIONPROOF SWITCH PANEL

Filed April 8, 1937

4 Sheets-Sheet 1



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4 Sheets-Sheet 2

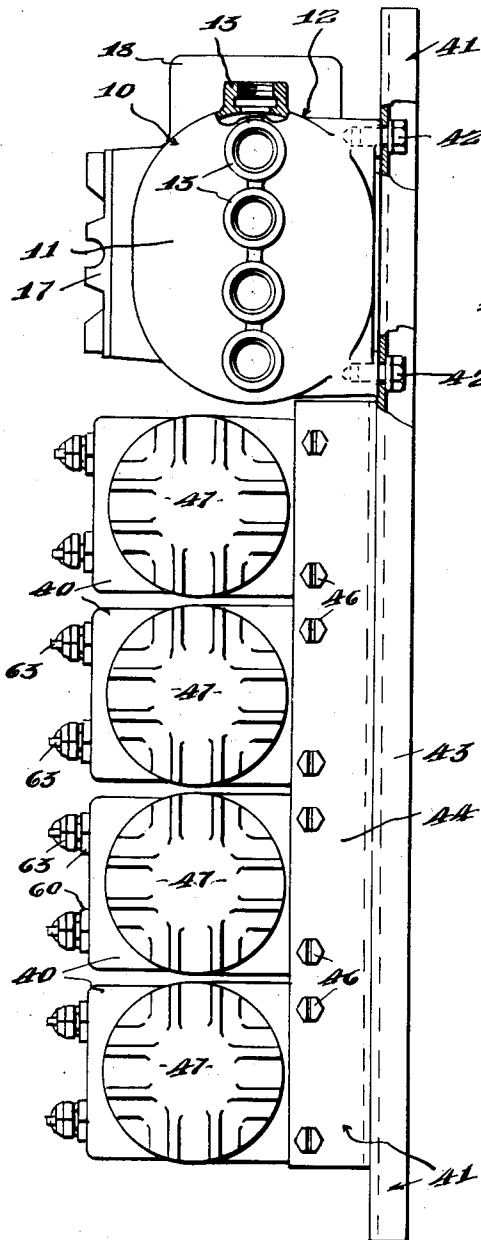


Fig. 2-

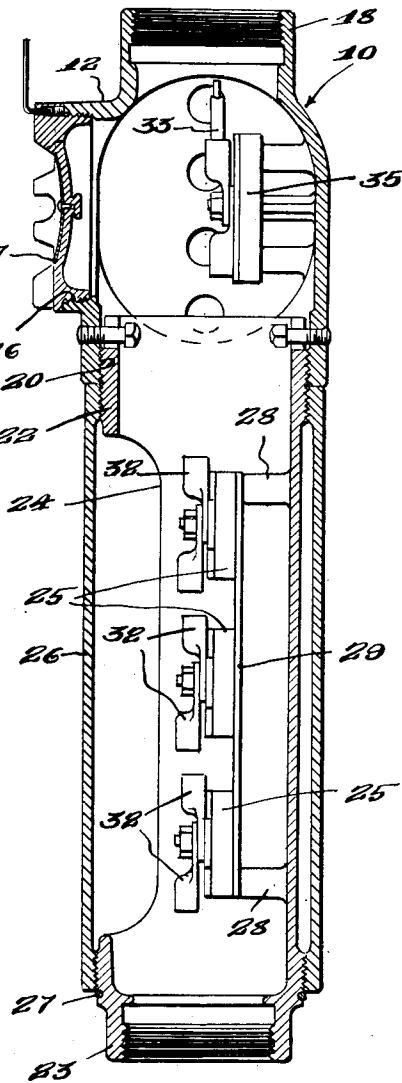


Fig. 3-

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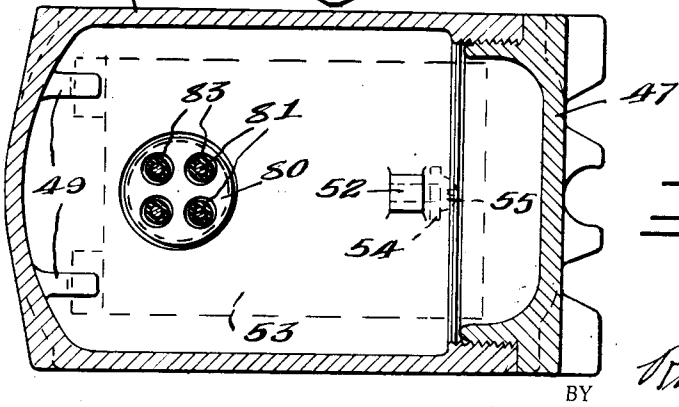
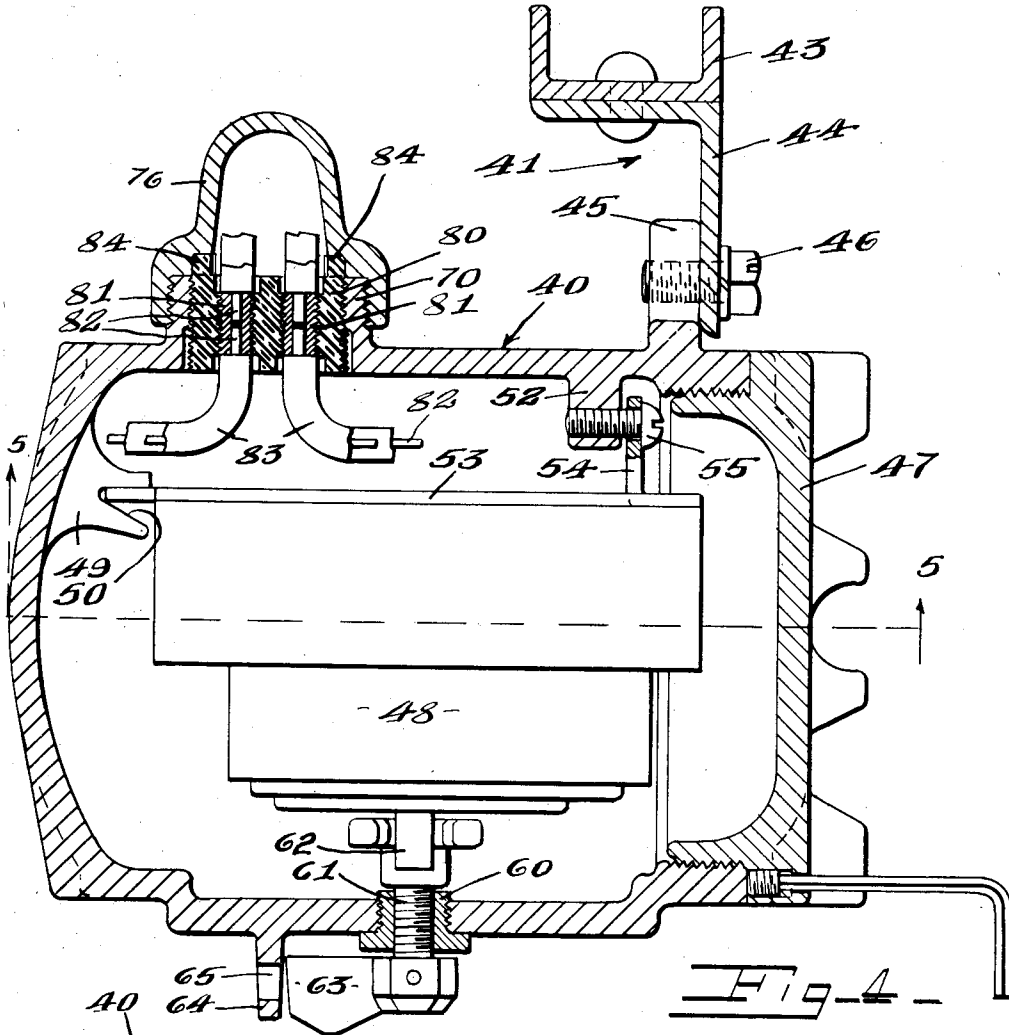
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Filed April 8, 1937

4 Sheets-Sheet 3



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EXPLOSIONPROOF SWITCH PANEL

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4 Sheets-Sheet 4

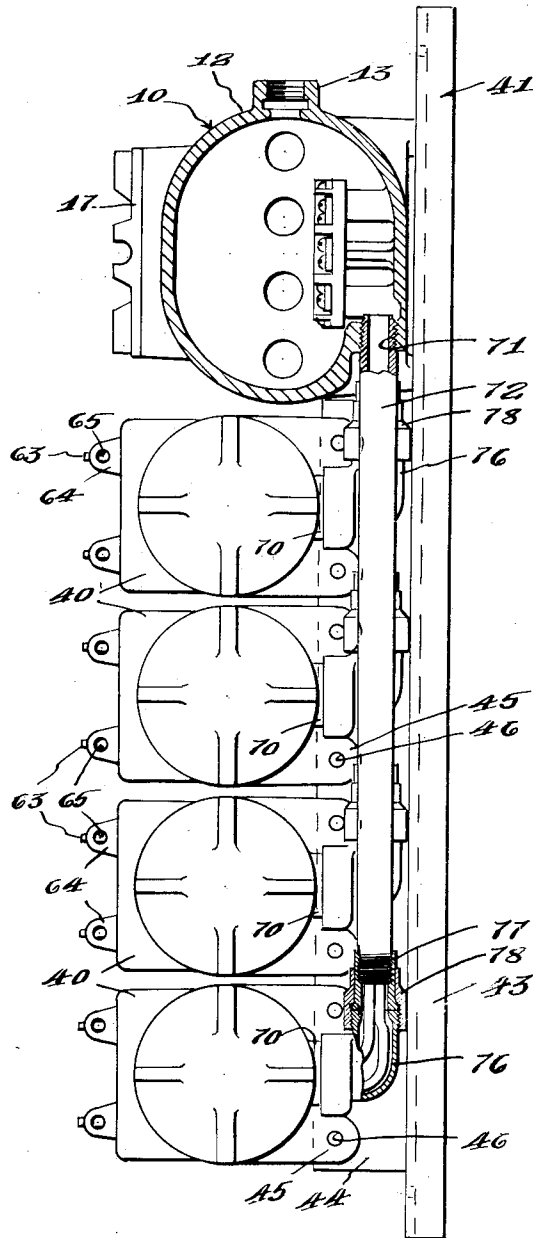


Fig. 6 -

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UNITED STATES PATENT OFFICE

2,158,477

EXPLOSIONPROOF SWITCH PANEL

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Application April 8, 1937, Serial No. 135,823

3 Claims. (Cl. 174—65)

This invention relates to an enclosed explosion-proof switch panel, and has for an object a construction and arrangement which is particularly economical to manufacture and assemble.

5. A further object of the invention is a switch panel of the type referred to which, because of its novel construction and arrangement of parts, is particularly easy to install, including the connection of the main and branch electrical circuits.

10. A further object of the invention includes a construction by which the switch panel may be readily assembled with any number of switches to accommodate any particular situation, and the invention includes the provision of means whereby the individual switch housings are respectively connected to the main wiring compartment of the panel by individual conduits, and means is provided for detachably securing the free ends
15 of these conduits to the individual switch housings and separating the interior of the switch housings from the conduits by a flame tight partition not involving the use of molten sealing compounds.

20. 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
30 characters designate corresponding parts in all the views.

Figure 1 is a front elevational view, partly in section, of the switch panel.

35. Figure 2 is a side elevational view of the switch panel with parts shown in section.

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

Figure 4 is a sectional view through one of the switch housings taken on lines 4—4, Figure 1.

40. Figure 5 is a sectional view of the switch housing taken on lines 5—5, Figure 4.

Figure 6 is a sectional view taken on lines 6—6, Figure 1, in which the switch housings are shown in end elevation.

45. The invention consists generally of a body section comprising a main wiring compartment and a supporting member secured to and extending transversely of the ends of the body section and extending outwardly from one side of the body section, a plurality of enclosed switch housings detachably secured to each of said supporting members and extending transversely thereof, a plurality of conduits extending from said body section and terminating respectively adjacent
50 said switch housings, means for detachably se-

curing the ends of said conduits to said switch housings, each of said switch housings and said body sections being provided with an opening in one wall thereof, and a flame tight closure for each of said openings.

5. The invention, in its preferred embodiment, further comprehends a tubular wiring compartment extending from the side wall of said body section and arranged intermediate said supporting members and switch housings mounted
10 thereon.

The switch panel is usually mounted in vertical position, as shown in Figure 1, upon the wall or a post, or other suitable support. The body section 10 is formed of cast metal, and is here shown as elliptical in general cross sectional form with the end walls 11 and a side wall 12 provided with a plurality of hubs 13 to receive the branch conduits 14. The hubs 13 may be provided with the conventional threaded aperture
15 to receive the threaded end of the conduit 14, and when any of the hubs 13 are not in use this aperture is closed by means of a screw plug 15. The outer or top wall of the body section 10 is provided with a plurality of comparatively large
20 work openings 16, these openings being threaded internally to receive closures 17 in the nature of a screw plug. The rear or top wall 12 is provided with an enlarged threaded hub 18 to receive the main conduit run 19. That is, the main
25 or feed wires carried in the conduit 19 are brought into the body section 10 and connected to suitable terminal blocks and the individual switches of the panel are in turn wired to the respective terminal blocks, and the branch circuits controlled by the switches are carried out
30 through the branch conduits 14.

The bottom wall of the body section 10 is formed with a comparatively large, centrally arranged aperture 20 threaded internally. The aperture 20 is arranged in alinement with the aperture in the hub 18, and may be of the same dimension as the aperture in hub 18 to permit the panel to be inserted in the run of the main conduit line. When the switch panel is connected
35 to the end of the main conduit run, the aperture 20 is closed with a screw plug. Preferably, the aperture 20 is enlarged to receive one end of a tubular housing or section 22, the opposite end of which is provided with an internally threaded hub 23 to receive the conduit. One side
40 of the central portion of the tubular section 22 is cut away, as at 24, to permit access to the interior of the section 22 and to the terminal blocks 25 mounted therein. That is, the central cross

section of the section 22 is substantially trough-shaped, and the tubular section is enclosed by an elongated sleeve 26 threaded internally at each end with the threaded portions being complementary to external threads provided on the ends of the sections 22, whereby the sleeve 26 may be threaded axially of the section 22 and act as a closure for the section, as indicated in Figure 3.

The sleeve 26 is held from displacement by a snap ring 27 located in a peripheral groove at the outer end of the section 22. This arrangement permits for a through feed on the main conduit line, and permits one or more terminal blocks 25 to be located outside of the main wiring compartment in body 10 to effect greater ease of installation and wiring. The tubular section 22 is formed with inwardly extending bosses 28 arranged adjacent the bottom of the section, and on which is detachably mounted a terminal block supporting plate 29 by means of screws 30.

The terminal blocks 25 are provided with large main terminals 32 to which are connected the main feed conductors 33 carried in main conduit 19, and the terminal blocks 25 are provided with a plurality of smaller branch terminals 34 to which conductors are connected, and which run to the individual switches or circuit breakers hereinafter referred to.

As here shown, one of the terminal blocks connected to the main feeds 33 is located in the central portion of the wiring compartment. This terminal block is designated as 35 and preferably the neutral wire of the system is connected to the terminals of this block, the outside wires of the system being connected to the terminal blocks 25 located in the tubular housing 22.

As shown in Figure 1, two terminal blocks 25 are installed in the tubular section 22 to accommodate a three wire system, and in Figure 3, three terminal blocks 25 are installed in the tubular section to accommodate a four wire system. The addition of the tubular section 22 is preferred, inasmuch as it does not add to the over-all dimension of the panel and affords a conveniently accessible compartment for the main terminal blocks resulting in less congestion in the main wiring compartment of the body section 10, particularly when the feed conductors 33 are large, rigid cables and accordingly, permitting the panel to be wired up with greater ease and a minimum consumption of time.

The switches or circuit breakers are mounted in flame tight explosionproof housings 40 which are detachably secured to supporting members 41 which are secured to the body 10, as by cap screws 42, and extending transversely of the ends of the body. The supporting members are here shown in the nature of a channel iron 43, to which is secured an angle plate 44. The bottoms of the switch housings 40 are formed with a pair of spaced apart downwardly extending bosses 45 which are provided with threaded apertures to receive the screws 46 which extend through apertures on the outer end of the angle plate 44. The switch housings 40 are accordingly arranged side by side and extend transversely of the supporting members 41, the outer ends of the housings being formed with a large threaded aperture to receive the threaded closures 47. The purpose of the end aperture is to permit convenient installation of the switch or circuit breaker 48, and to effect the proper electrical connections thereto.

Attention is particularly called to the novel

construction employed in mounting the switches 48 in the housings 40. The inner surface of the inner end wall of the housing 40 is provided with a pair of spaced apart, inwardly extending bosses 49. The bosses 49 are bifurcated as at 50. The bottom wall of the housing 40, adjacent the open end thereof, is provided with a radially inwardly extending boss 52 provided with a threaded aperture. The switch or breaker 48 is mounted on a flat sheet iron plate 53 formed with a downwardly extending tongue 54 which is so arranged as to come in alinement with the outer boss 52 of the housing when the inner end of the plate 53 is located in the bifurcations 50 of bosses 49. A screw 55 extends through the tongue 54 and is threaded into the boss 52, this construction acting as an outer support for the plate 53 and switch 48, and also holding the inner end of the plate securely in the bifurcated bosses 49. It is only necessary to manipulate the single screw 55 to remove or install the switch or breaker 48 in the housing 40.

The housing 40 may be provided with a suitable switch actuating manual. As here shown, the top wall of the housing is provided with a bushing 60 threaded into the top wall of the housing, and being provided with internal threads to receive the threaded stem 61, to the inner end of which is secured suitable means connecting the stem 61 with the handle or actuating member 62 of the switch or breaker, and the outer end of the stem 61 provided with a suitable mandrel 63. If it is desired to lock the switches in their on or off position, the top wall of the housing may be formed with an outwardly extending boss 64 provided with an aperture 65 to receive a padlock, or the like, to prevent oscillation of the mandrel 63.

Inasmuch as the switch panel is of the explosionproof type, it is necessary that all the wires and conductors of the system be enclosed in a metallic closure, and to comply with this prerequisite I employ a separate conduit extending from the main body section 10 to each of the individual switch housings 40. The purpose of these conduits is to enclose the wires or conductors leading to and from the circuit breakers arranged in the housings. While switch panels of this type heretofore used have functioned with perfect satisfaction, there have been two outstanding disadvantages. First, the manufacturing cost was exceptionally high due to the fact that the entire panel comprised an integral casting and second, difficulty was incurred in connecting the switches or breakers to the main and branch circuits and maintaining the switch and wire compartments in flame tight relationship.

From the description thus far, it will be apparent that the wiring compartment consists of an individual casting or body section 10, and the switches or breakers are mounted in comparatively small individual explosionproof switch housings which are of uniform construction and which, because of their construction and size, are comparatively easy to construct and machine. The tubular housing 22 and sleeve 26, if used, are also separate units which can be manufactured at a comparatively small cost. It will be appreciated by those familiar with the art that switch panels are constructed to meet the requirements of individual situations, and employ two or more switches or breakers. Usually all panel boards are constructed in multiple arrangement. That is, there are two, four, six, eight etc., switches employed.

An object of my invention is the structural arrangements and combinations by which any number of switch housings and switches, within practical limits, may be employed. That is, the panel may be constructed with two, four, six or eight switch housings.

The bottom wall of each switch housing is formed with an outwardly extending boss 70. This boss 70 is provided with complemental threads externally and internally, and the lower wall of the body section 10, when the panel is arranged in vertical position, is provided with a series of threaded apertures 71 arranged adjacent the rear or back wall of the body section, see Figure 6. The threaded apertures 71 are arranged on each side of the aperture 20. Conduits 72, 73, 74 and 75 are screwed into the apertures 71 and extend outwardly from the wall of the body section 10 in substantially parallel relationship to the supporting members 41. The conduit 72 extends to the outer or lowermost switch housing, the conduit 73 to the adjacent switch housing, the conduit 75 to the switch housing mounted adjacent the body section 10, and the conduit 74 to the switch housing arranged second from the body section 10. That is, there is a conduit extending from the body section 10 for each of the switch housings 40. In order to provide ease of assembly, the housings 40 are detachably secured to the outer ends of the conduits 72 to 75.

As here shown, an elbow fitting 76 is threaded on the exterior of the boss 70 of the switch housing, and the end of the conduit is provided with a union fitting comprising a sleeve 77 and a nut 78. The end of the elbow 76 is machined to a flat surface to receive the complemental end face of the sleeve 77, and the periphery of the elbow is threaded to receive the nut 78 which coacts with the sleeve 77 to draw the same tightly against the end of the elbow. This construction assures a flame tight joint between the conduits and the elbows 76. It is necessary to seal the interior of the switch housings from the interior of the body section 10. Heretofore, it has been conventional practice to pour molten compound in some portion of the fitting about the wires. However, due to the fact that the recess in which the molten compound is poured is generally inaccessible, it is difficult to get the compound in the recess, and particularly difficult to effect a proper seal.

As here shown, a plug 80, formed of high heat resisting insulating material, is threaded into the bore 70 of the switch housing, and the plug 80 is provided with a plurality of threaded apertures into which metallic sleeves 81 are threaded. The metallic sleeves 81 are drilled from each end, and the metallic portion 82 of the conductors 83 are secured in the ends of the sleeves 81 by means of solder, or the like.

The device is assembled by securing the wires 82 into each end of the sleeves 81, passing the wires extending from one end of the plug through the threaded apertures thereof, and threading the sleeves 81 into said apertures. The wires, extending from one end of the plug, are of such length as to extend from the plug to the terminals of the switch in the housing. The wires, extending from the opposite end of the plug, are of such length as to extend from the plug through the conduits and into the main body section 10 for connection to the terminal plugs mounted therein. It will be observed that there is no difficulty in threading the respective sleeves 81, with the wires attached thereto, into the plug 80, and

likewise there is no difficulty in threading the plug 80 into the boss 70 inasmuch as the extending wires from each end of the plug are permitted to freely rotate within and without the housing respectively. The plug 80 is only initially partially threaded into the boss 70 and is formed at its outer end with a pair of opposed projections 84, and the bore of the elbow member 76 is provided with opposed recesses complemental to the projections 84.

The elbow member 76 is sleeved over the extending wires from the plug and is threaded onto the boss 70 with the projections 84 engaging the recesses in the elbow member, whereby the elbow member is threaded on the boss 70 and the plug member is simultaneously threaded in the boss. The operations thus far described are completed prior to the time the switch housing 40 is secured to the support 41, or angle iron 44 thereof.

The respective conduits 72, 73, 74 and 75 are now threaded into the main body section, and the sleeves 77 with nuts 78 are secured to the outer ends of the conduits. The conduits 72, 73, 74 and 75 are cut to such lengths, and formed in such manner that the sleeves 77 are arranged in alinement with the outer ends of the respective elbow members 76. After the wires 83 have been secured in the switch housing 40 in flame tight relationship thereto in the manner above described, the wires extending outwardly from the switch housing are passed through the respective conduits 72, 73, 74 and 75, the switch housing secured to the support member 41, and the nuts 78 tightened. The wires extending from the switch terminals into the main body section 10 are thus totally enclosed, and the switch housings are sealed off from the connecting conduits in a flame tight manner so that an explosion occurring in the switch housing will not carry back into the main body section, and at the same time the individual switch housings are conveniently attached to the panel, or removed therefrom. It will be understood that if the panel is initially equipped with two switch housings, the apertures 71, not used, will be closed by a suitable plug. If desired, additional switch housings may be conveniently added subsequently as above described.

It is believed the advantages resulting from the structures employed in my switch panel will be obvious to those skilled in the art without further detail reference to the same.

What I claim is:

1. An enclosed switch housing provided with a threaded aperture in one wall thereof, a conduit enclosing a plurality of conductors, a plug threaded into said aperture and being formed with a plurality of threaded apertures extending there-through, each of said conductors being provided with an externally threaded sleeve, said sleeves being threaded into the respective threaded apertures of said plug, and means for detachably connecting one end of said conduit to the switch housing in register with the aperture formed therein.

2. An enclosed switch housing formed with an externally threaded hub on one wall thereof, and said hub being provided with an internally threaded aperture, a conduit enclosing a plurality of conductors, a plug member threaded into the aperture of said hub, each of said conductors extending through said plug member in flame tight relationship therewith, a coupling member secured to one end of said conduit and threading on said hub, and being cooperable

therewith to arrange said conduit in register with said plug.

3. An enclosed switch housing formed with a hub on one wall thereof, and said hub being provided with an internally threaded aperture, a plug member threading into said aperture, a plurality of conductors arranged in said conduit and

extending through said plug in flame tight relationship thereto, a coupling member carried by one end of said conduit and threading on said hub and being cooperable with said plug member to prevent relative rotation between said plug member and said coupling.

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