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ELECTRICAL PANEL ASSEMBLY

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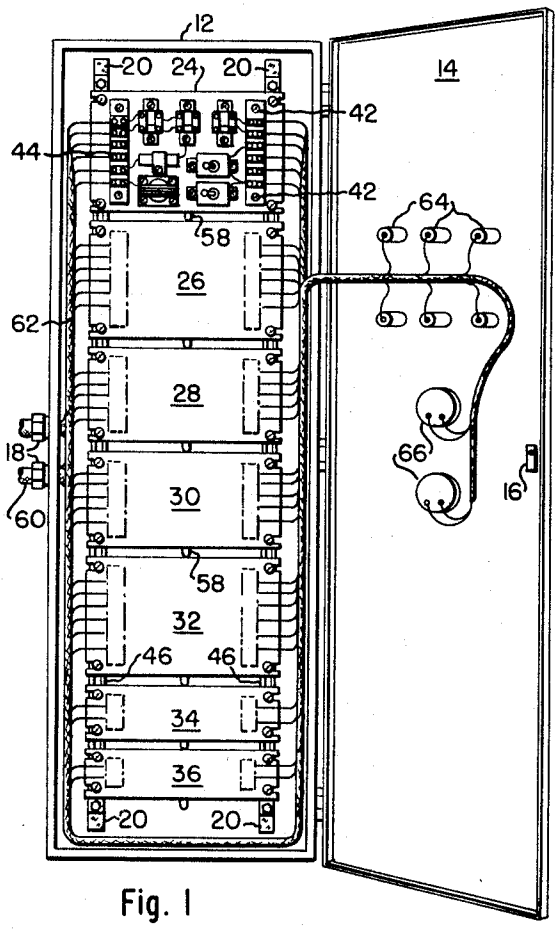


Fig. 1

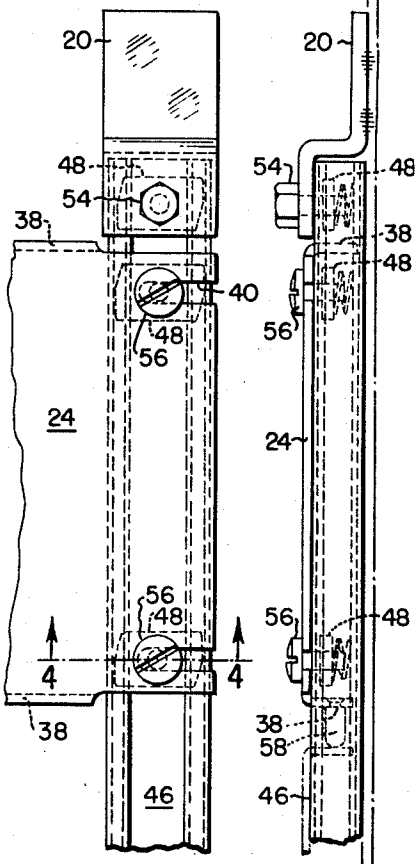


Fig. 2

Fig. 3

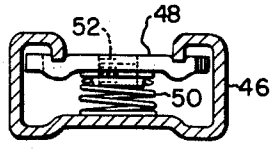


Fig. 4

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ELECTRICAL PANEL ASSEMBLY

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The present invention relates generally to electrical panel assemblies, and more particularly to an assembly adapted to support electrical components such as relays, resistors, capacitors, switches and the like, the components being interconnected to form a control system. Such a system may be used to control a non-municipal fire alarm system such, as is used in an office, school or factory, is either independently or in connection with a municipal alarm system.

Formerly, internal fire alarm control panel installations, that is, non-municipal installations, involved the use of sheets of suitable mineral materials having good strength and dielectric properties, such as ebony asbestos, or laminated plastics, these sheets being ordinarily supported vertically upon studs extending from a supporting wall. The sheets are relatively thick, for example ⅜ to one inch in thickness, and the electrical components were mounted on the sheets by means of bolts received in holes drilled through the sheets. In the majority of cases the electrical wiring was performed upon the reverse side of the panel from that on which the components were mounted, with the wires either passing from one side to the other through other holes, or being connected to through bolts with soldered connections to the bolt head on the back of the panel. This made it difficult to replace components, as such replacement entailed removing the entire panel from the supporting studs so as to provide access to the wiring.

It is a principal object of the present invention to provide an assembly for internal panel installation adapted to facilitate the wiring and replacement of individual electrical components or groups of components, and especially to permit such replacement without the step of dismounting the panel from its supports.

The former use of panels having insulating properties led to difficulties arising from the necessity for drilling numerous holes into the panels to secure the electrical components in place and to provide passage for the electrical wiring. The number, location and sizes of such holes were limited by the strength and brittleness of the sheet material to be used. It is another object of this invention to provide an assembly adapted to the use of metallic sheets for supporting panels, such sheets being not only relatively strong and free from the danger of cracking from shock or vibration, but also adapted for threading to receive mounting screws for the electrical components, whereby the mechanical and electrical assembly and replacement of the individual components takes place entirely on one side, that is, the accessible side of the panel.

A further object is to provide an assembly for control panels adapted to accommodate a large number of available combinations of assorted panels selected from stock, each panel having a predetermined function, group of components and associated wiring, the panels being selected in varying numbers and sizes to make up a wide choice of control systems designed for a variety of requirements of use. For example, a particular internal

fire alarm control system has particular requirements as to the available source of power, the numbers and types of signal boxes and warning devices to be accommodated, and specific requirements as to supervisory controls and annunciating or other indicating devices, the combination of these requirements being substantially unique. Accordingly, it is desirable to provide a plurality of stock panels making up a complete control system, each panel being designed for a specific purpose and being useable in various combinations with other panels. Thus the control system may be custom-designed to the given requirements with a minimum of engineering skill in connection with the particular installation.

With the foregoing and other objects in view, the features of the invention include an improved panel construction utilizing mounting struts upon which the control panels are installed in a column, with provision for columnwise adjustment whereby any desired combination and arrangement of panels of variable sizes depending upon function, may be arranged in logical and compact alignment.

According to another feature, the electrical components mounted upon the panels are secured to and completely wired from the front. Therefore, replacement of individual components does not require the removal of any panel.

According to another feature, the method of assembly is adapted to provide rapid installation, in that the cabinet may be installed independently of the panels to be housed therein, and the panels may be assembled and interconnected at the factory and shipped for installation in the cabinet at a later time. Similarly, an installation that has been in operation may be modified or its capacity extended with ease, due to the possibilities of rearrangement of the panels and of providing additional panels with a minimum of disturbance to the portions of the system already in operation.

Other features of the invention reside in certain features of construction and assembly and in certain combinations of the elements which will be more clearly understood from the following description of a preferred embodiment thereof, having reference to the appended drawing in which

Fig. 1 is a front elevation illustrating an opened, assembled control cabinet according to the invention;

Fig. 2 is an enlarged front elevation partly broken away illustrating the attaching means associated with the struts;

Fig. 3 is a side elevation corresponding to Fig. 2, and

Fig. 4 is a plan view in section of a strut taken on line 4—4 in Fig. 2.

Referring to the drawings, there is illustrated a control cabinet for an internal fire alarm system. This system is intended to provide controls to be powered from a prescribed source of energy, and to accommodate a prescribed number and type of fire alarm boxes and detectors, alarm bells, buzzers, horns, chimes and the like distributed throughout a building or group of buildings, as well as prescribed alarm recording and annunciating devices, together with drill switches, trouble indicating devices and the like. While this invention is not concerned with the specific circuits themselves, it is important to recognize that the possible combinations of system requirements with reference to such features are very numerous.

The assembly is housed within a five-sided metal cabinet **12** having a hinged door **14** with a suitable latch **16**, the door having adequate clearance from the components to be mounted upon the panels within the cabinet. The cabinet may be housed within a wall or flush-mounted, as desired. Suitable cable access fittings **18** are provided in one or more openings in the sides of the cabinet.

A set of Z-brackets 20 are permanently secured to the rear inner wall 22 of the cabinet (Fig. 3) by any suitable means such as welding. The cabinet, with these brackets 20 secured to its wall, comprises the only portion of the control unit that is required for initial installation. The illustrated cabinet is adapted for a single column of stock control panels 24 to 36, inclusive, these panels having a common width but variable height depending in each case on the number of components to be mounted thereon. If the panels required for a particular system would provide a column of excessive height for convenient access, a wider stock cabinet adapted for two or more columns of panels may be provided. The initial cabinet dimensions are determined by the requirements of the system plus any future additions thereto, from which the desired number and types of panels are selected from stock and their sizes determined.

Each panel consists of a generally flat metal sheet, preferably of aluminum, having opposed marginal portions 38 at the top and bottom bent at substantially right angles to the body of the panel. Each panel is also provided with a pair of mounting slots 40 on each side adjacent the top and bottom. The electrical components associated with the particular panel are supported directly against its surface and secured to it by self threading screws 42 received in the panel. Each panel is preferably provided with terminal blocks such as 44 for making external connections.

To support each column of panels, there is provided a pair of channel-shaped metal struts 46, each strut being supported between a pair of the Z-brackets 20. The struts are generally channel-shaped as shown in Fig. 4, with the open sides facing toward the front of the cabinet. Slidably supported within each channel are a number of generally flat nuts 48, each nut being frictionally held against return edges of the channel by a compression spring 50. Each nut has a threaded hole 52 and is shaped to permit it to be rotated to insert or withdraw it from the channel without sliding it off the end thereof. It will be appreciated that each nut may be slid vertically along the channel to any desired position and is held independently in position by friction.

The struts 46 are secured to the Z-brackets 20 by means of cap screws 54 threaded into nuts 48 at each end of the channel. Other screws 56 are received in identical nuts 48 through the mounting slots 40 in the respective panels.

If desired, spacer studs 58 may be attached to the marginal return portions 38 of the panels to define accurately the spacing between the panels and to eliminate the possibility of short circuits between the electrical components mounted on adjacent panels. In addition to providing supports and abutments for the spacer studs 58, the portions 38 increase the rigidity of the panels and insure the proper alignment of the panels in relation to the struts. Proper alignment arises from the fact that the portions 38 span substantially the entire distance between associated pairs of struts 46, as shown in Fig. 2.

In a typical new building installation, after the cabinet 12 has been installed during the structural framing, electrical cables such as 60 are installed from the cabinet to remote devices such as fire alarm boxes, bells, horns and the like. The cables are led in through the fittings 18 in the side of the cabinet. Meanwhile, the particular number and combination of control panels for which the system is designed are arranged and mounted upon one or more pairs of struts 46 at the factory, and interconnected according to the particular circuit requirements. The assembled struts and panels are crated and shipped to the site for rapid installation. This requires only the removing of the screws 54 which are secured to the crate, and sliding the entire assembly in place with the struts behind their associated Z-brackets 20 in the cabinet, as illustrated. The screws 54 are then tightened to the end nuts 48. Finally, the electrical connection of

the cables such as 60 to the terminal blocks 44 is accomplished in a standard manner, spaces adjacent each side of the column of panels being provided for the resulting harness 62. The harness may be flexibly extended to the door of the panel for indicating lamps 64, meters 66 or the like, as illustrated.

As previously indicated, the entire assembly operation including the wiring is accomplished from the front of the cabinet. Any panel may be completely replaced independently from the front, and the same is true of any electrical component thereon such as a switch, relay, terminal block, transformer, or the like. Also, the panels may be rearranged with proper adjustments of the harness, and new panels may be inserted in any desired location, within the limits of the length of struts provided. Thus later enlargement of the system or other changes can be provided for in a cabinet having sufficient strut footage for the ultimate installation, with only part of the capacity being used in the initial installation.

From the foregoing description, it will be appreciated that the assembly is very simple and involves the use of panels, struts and mounting screws of an inexpensive type, providing substantial rigidity and freedom from the possibility of physical fatigue from vibration or the like. With a suitable inventory of panels each adapted for a particular function in the system, it is possible to provide a great many combinations depending upon the particular requirements of each system. Furthermore, no special skill is required in installation of the panel and strut assembly as it is shipped from the factory to the site.

Having thus described the invention, I claim:

1. An enclosed assembly adapted for arranging, supporting, and making electrical connection to a number of component panels including the combination of a cabinet provided with a door, a number of channel-like struts supported within the cabinet in parallel arrangement with clearance from the door in closed position, a number of generally flat metallic panels each adapted to overlie a pair of struts, the channels of the struts facing the panels, each panel being provided with openings aligned with the channels of said struts and marginal portions extending between the struts for alignment therewith, and means to secure the panels to the struts through said openings and channels, said cabinet having a cable access opening and providing interior space adjacent the panels for front connection thereof to a cable.

2. An enclosed assembly adapted for arranging, supporting, and making electrical connection to a number of component panels including the combination of a cabinet provided with a door, a number of channel-like struts supported within the cabinet in parallel arrangement with clearance from the door in closed position, a number of generally flat metallic panels arranged in a column, the channels of the struts facing the panels each panel being adapted to overlie a pair of struts and being provided with openings aligned with the channels of said struts and a pair of marginal portions spanning substantially the full distance between the adjacent portions of said pair of struts and extending therebetween for alignment of the panel, and means to secure the panels to the struts through said openings and channels, said cabinet having a cable access opening and providing interior space adjacent to and parallel with a column of panels for front connection thereof to a cable.

3. An enclosed assembly adapted for arranging, supporting, and making electrical connection to a number of component panels including the combination of a cabinet provided with a door, a number of channel-like struts supported within the cabinet in parallel arrangement with clearance from the door in closed position, a number of generally flat metallic panels each adapted to overlie a pair of struts, the channels of the struts facing the panels, each panel being provided with a number of electrical elements front wired and front mounted with screws threaded into the panel and also having openings aligned

with the channels of said struts and a pair of marginal portions spanning substantially the full distance between the adjacent portions of said pair of struts and extending therebetween for alignment of the panel, and means to secure the panels to the struts through said openings, said cabinet having a cable access opening and providing interior space adjacent the panels for front connection of said elements to a cable.

4. An enclosed assembly adapted for arranging, supporting, and making electrical connection to a number of component panels including the combination of a cabinet provided with a door, a number of channel-like struts supported within the cabinet in parallel arrangement with clearance from the door in closed position, a number of generally flat metallic panels each adapted to overlie a pair of struts, the channels of the struts facing the panels, each strut having a number of threaded nuts slidably retained in its channel, each panel being provided with a number of electrical elements front wired and front mounted with screws threaded into the panel and also having openings aligned with the channels of said struts and a pair of marginal portions spanning substantially

the full distance between the adjacent portions of said pair of struts and extending therebetween for alignment of the panel, and screws to secure the panels to the nuts through said openings, said cabinet having a cable access opening and providing interior space adjacent the panels for front connection thereof to a cable.

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