

June 19, 1962

G. I. WICKS

3,040,289

MODULAR ELECTRICAL CONNECTOR

Filed Nov. 24, 1958

3 Sheets-Sheet 1

FIG. 1

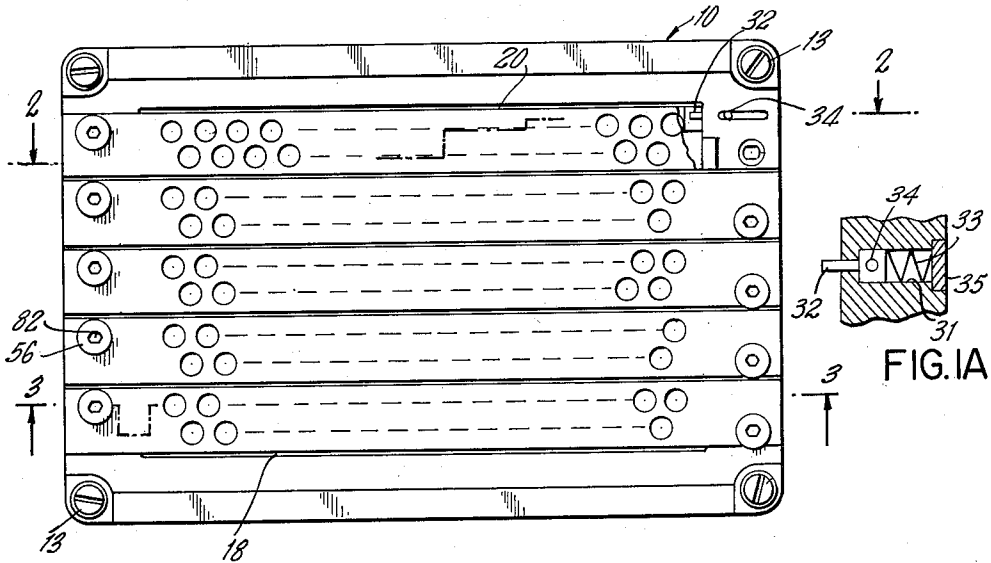


FIG. 2

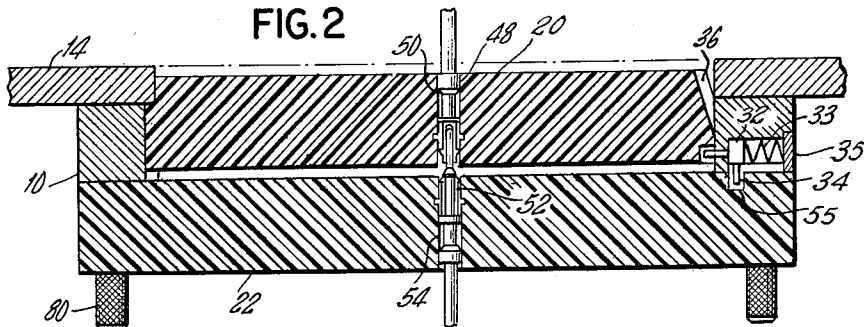
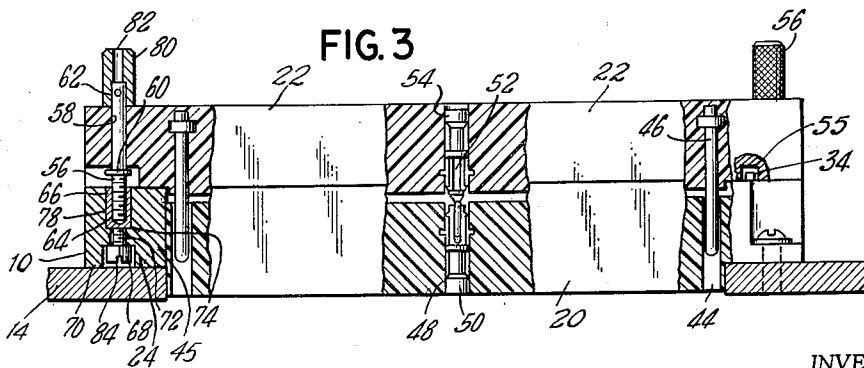


FIG. 3



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FIG. 4

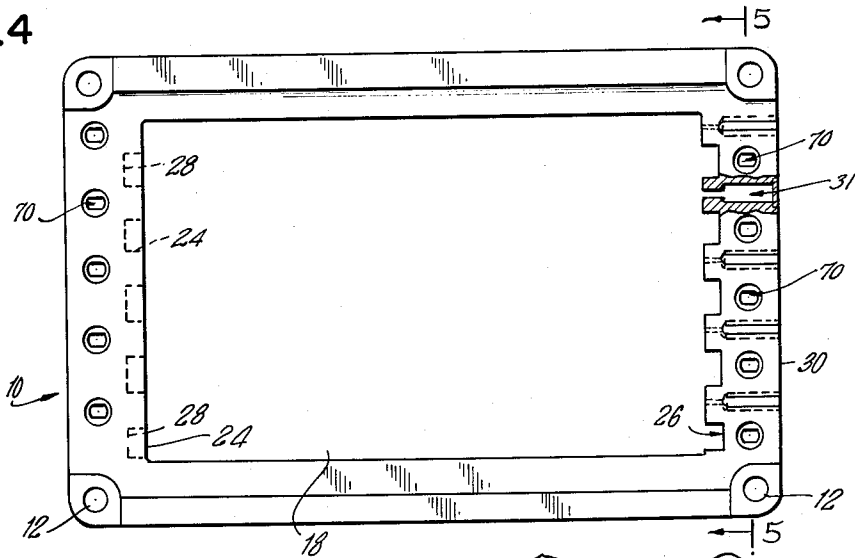


FIG. 5

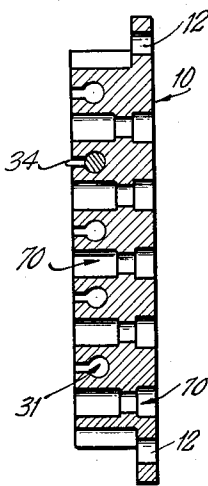
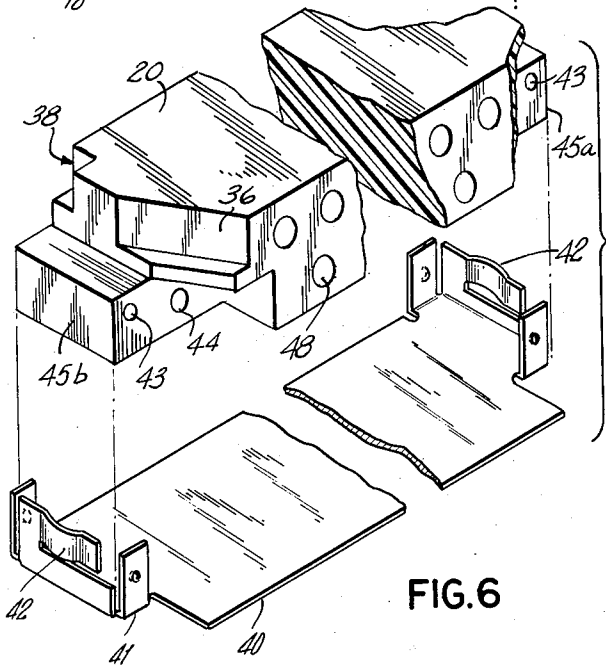


FIG. 6

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FIG. 7

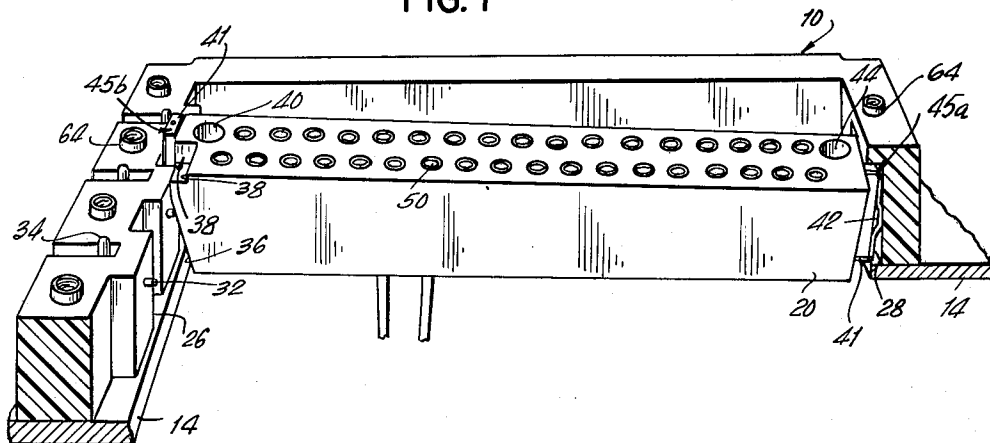
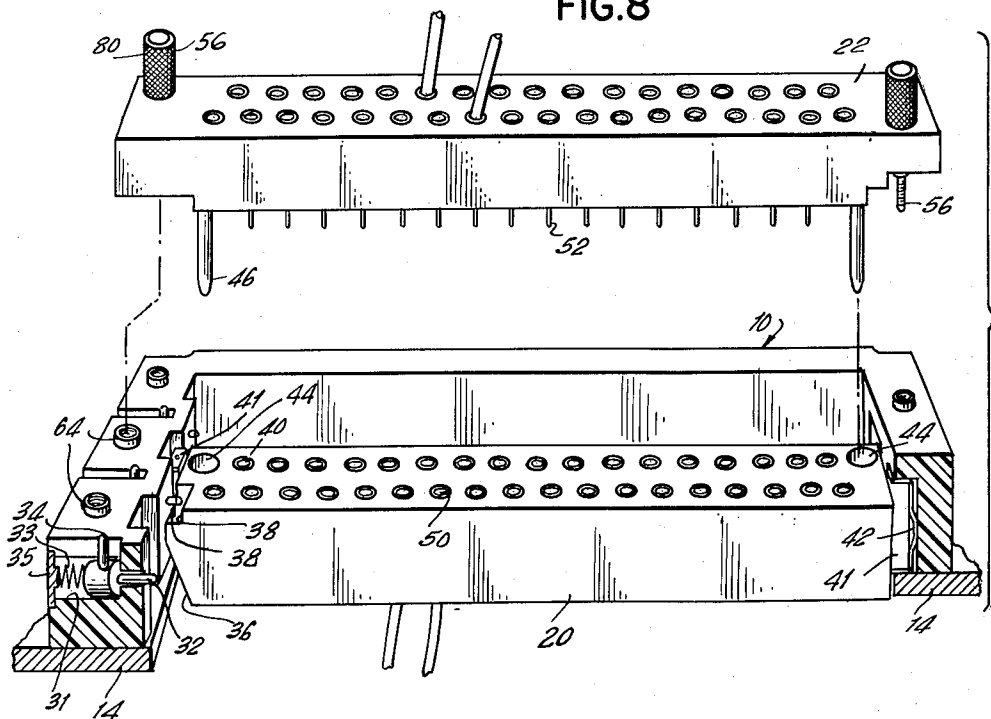


FIG. 8



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MODULAR ELECTRICAL CONNECTOR

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3 Claims. (Cl. 339—126)

My invention relates to a multiple unit panel and, more particularly, to a disconnect panel in which the panel units are individually readily detachable and removable for replacement, interchange or for modification.

Hitherto, a multiple unit panel required removal of the individual connections when it was desired to make any change in the circuitry. Where component connections required multiple circuits, such arrangement was lacking in flexibility and interchangeability. Accordingly, an object of the invention is to provide a disconnect panel wherein the multiple panel units are readily detached, interchanged, replaced or modified as a unit.

Other objects are to provide a panel having the foregoing features, which is compact, which will permit removal of the unit parts easily and quickly, and to provide means wherein the panel units may be disassembled and locked into position resisting vibration and other conditions which may result in accidental disconnection.

The above-mentioned and other features and objects of the invention will become more apparent by reference to the following description taken in conjunction with the accompanying drawings, in which:

FIG. 1 is a top plan view of a panel assembly incorporating my invention, with a corner of a panel unit shown in section;

FIGURE 1A is a detail top view in section of FIGURE 1 showing the spring loaded plunger;

FIGURE 2 is a rear inverse elevation thereof, partly in section, and mounted on a bulkhead;

FIGURE 3 is a front partly sectioned view taken along line 3—3 of FIG. 1;

FIGURE 4 is a bottom plan elevation of the frame;

FIG. 5 is a side sectional view of the frame taken along line 5—5 of FIGURE 1;

FIG. 6 is a perspective exploded view of a combined panel unit and shield spring for a panel unit;

FIG. 7 is a perspective view, partially in section, showing the partial insertion of a female panel unit into the frame; and

FIG. 8 is a perspective view, partially in section, showing the complete insertion of a female panel unit into the frame.

The assembly comprises a frame 10 having apertures 12 for bolting the frame as at 13, to a bulkhead 14, the connections to the assembly extending through opening 16 of the bulkheads. The frame forms an opening 18 into which a plurality of female panel units 20 are seated, and upon which complementary male panel units 22 are mounted.

In the embodiment illustrated, the bottom female panel units 20 are fitted into the frame at grooves 24 and 26, respectively (see FIG. 4). The groove 24 is provided with a seat 28 for positioning the panel unit, and the opposite frame wall 30 is provided with a plunger 32 loaded by a spring 33 having a pin handle 34 for manually releasing the female panel unit from the frame. A plug 35 secures the spring and plunger in the frame. The female panel unit 20 is tapered at 36 and recessed at 38 to permit the panel unit to depress the plunger 32 on engagement with the taper 36 and snap into the recess 38 to support the female panel unit in position within the grooves and upon seat 28.

A combination frequency shield and spring 40 (see FIG. 6) surrounds the bottom of the female panel unit 20 forming spring tongue 42 at both ends thereof, which

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engages the sides of the grooves 24 and 26 in the frame to shield the female panel unit and to support it tightly in the frame. End clips 41 snap into dimples 43 on the extensions 45 to the panel unit to hold the spring 40 firmly in position thereto.

The female panel unit 20 is further provided with bores 44 for receiving aligning and polarizing pins 46, hereafter described and bores 48 for containing the female electrical connector parts 50 shown as socket type contacts for receiving the pin contacts 52 of the mating male panel unit. The connector parts may be reversed, if desired.

The mating male panel units 22 are similarly provided with corresponding bores 54 for containing the pin contacts. In addition, they contain aligning pins 46, which are located at each end, one above and one below the center line of the panel extending into bores 44 of female panel unit 20 for aligning and polarizing the panel units to each other. A recess 55 is provided in each panel 22 to accommodate the end of pin handle 34 when panel 22 is tightened onto frame 10.

The mating male panel unit 22 is also provided with attaching and separating means such as bolts 56 which are freely seated in bores 58 of the mating male panel units, with shoulders 60 and 62 engaging the male panel unit 22 so as to permit rotation without linear movement. These attaching and separating bolts, in the embodiment illustrated, are threadably secured to the frame for locking the mating units thereto. In FIG. 3, I have shown a "floating" or self-adjusting socket member 64 for securing the bolts 56 which member comprises a threaded stem portion 66, and a nut 68 seated in a bore 70 of the frame. The nut is tightened to the threaded stem capturing the frame seat 72 between the nut and shoulder 74 of the stem. The socket member is flattened on the sides thereof to engage the flat side 78 of the bore to prevent rotation of the socket when the bolt is inserted therein. Both bolt 56 and socket member 64 are loosely fitted in their respective bores to provide a "floating" effect to accommodate variations in fit within accepted tolerances. The bolt may be provided with a knurled knob 80 for hand turning, and/or with a polygonal recess 82 for inserting a wrench therein. Similarly, the nut 68 may be slotted as at 84 for inserting a suitable tool therein for rotation.

In order to permit the attaching and separating bolt to be supported to the frame, the mating male panel units may be made longer than the bottom female panel units to overhang the frame. (An alternative construction, but less sturdy, would be to mount the mating male panel units directly to the bottom female panel units, in place of the frame mounting as just described.)

The units are seated in close proximity in the frame, to make the panel as compact as possible, separated only by the shielding spring 40 which extends transversely across the opening 18 between the panel units.

The frame 10 is mounted to the bulkhead by means of bolts 13. Each female panel unit 20 is snapped into the frame by first tilting the unit so that one end 45a thereof is fitted into the groove 24 until it engages seat 28. The other end 45b of the female panel is then leveled until the taper 36 slides over the spring-loaded plunger 32 which snaps into recess 38 of the unit. This brings the remaining end of the female panel unit into groove 26. In this position the female panel unit may be manually released by withdrawing the pin handle 34 of the plunger. The female panel unit is supported in this position by the bulkhead 14, the opening of which corresponds to the dimensions of the portion 20 of the female panel unit which extends therethrough.

The male panel unit 22 is then fitted to the corresponding female panel unit 20, the aligning pins 46 guid-

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ing and polarizing the two units. Finally, the attaching and separating bolts 56 are rotated until the sockets 64 are threadably engaged and secured thereto. Reversing the rotation of the bolts 56 will cause an automatic separation of the panel units, disconnecting the electrical parts.

The frame may be made of die cast aluminum alloy to give the assembly strength and reduce weight. The panel units are preferably made of insulating material such as thermosetting plastic, i.e. an alkyd resin or a ceramic which will withstand heat. Suitable connectors are employed with appropriate means for anchoring them in their respective panel units. The shielding spring may be made of beryllium copper.

In the foregoing I have provided a multiple panel unit having any desired number of panel units. The panel units may be individually removed for replacement or interchange providing maximum flexibility.

By the use of attaching and separating bolts in "free" floating sockets positioned in the frame, I am able to secure the panel units quickly and safely and, if desired, mechanically separate the electrical connections as a group.

I have thus described my invention, but I desire it understood that it is not confined to the particular forms or uses shown and described, the same being merely illustrative, and that the invention may be carried out in other ways without departing from the spirit of my invention and, therefore, I claim broadly the right to employ all equivalent instrumentalities coming within the scope of the appended claims, and by means of which, objects of my invention are attained and new results accomplished, as it is obvious that the particular embodiments herein shown and described are only some of the many that can be employed to attain these objects and accomplish these results.

I claim:

1. An electrical connector assembly, comprising: a frame having a top and a bottom face and a central opening therethrough bounded by a pair of side walls; a given plurality of elongated contact carrying panels disposed in said frame central opening in side by side relationship between said side walls; a given plurality of spaced apart bores disposed along the length of one of said frame side walls, each said bore opening into said frame central opening; a given plurality of spaced apart slots disposed along the length of the other of said frame side walls, each said slot opening into said frame central opening and frame top face and closed from said frame bottom face; a given plurality of spaced apart spring biased projections disposed along the length of said frame other side wall, each said projection extending into said frame central opening, one said projection disposed adjacent each said slot; a first lug projecting from one end of each of said panels; a second lug projecting from the other end of each of said panels; each said first lug disposed in one of said frame bores, whereby said one panel end is captured against movement in the frame top-bottom direction; each said second lug disposed in a corresponding one of said frame slots; a shoulder on said other end of each of said elongate panels, adjacent said second lug, each said shoulder disposed below the adjacent spring biased projection, where-

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by said other panel end is captured between said spring biased projection and the closed bottom of said slot against movement in the frame top-bottom direction; a camming surface on said other end of each of said elongate panels, below said shoulder, adapted to abut said spring biased projection and retract said projection when said other panel end is inserted into said frame slot from said top frame face; manually operable means to retract said spring biased projection to permit said other panel end to be removed from said frame slot towards said top frame face; and resilient means disposed on the end of each of said first and second lugs on each of said panels to resiliently take up any clearance between the maximum spacing between said lugs on one of said panels and the maximum spacing between the corresponding bore and slot in the frame side-side direction.

2. An electrical connector assembly according to claim 1 wherein said frame is made of metal and said resilient means on the end of each of said first and second lugs is provided by a plurality of metal shield strips, each disposed between adjacent panels and each having a resilient finger disposed between each of the lugs of the adjacent connector and the side frame walls.

3. An electrical connector assembly, comprising: a frame having a top and a bottom face and a central opening therethrough bounded by a pair of side walls; an elongated contact carrying panel disposed in said frame central opening between said side walls; a bore disposed in one of said frame side walls, said bore opening into said frame central opening; a slot disposed in the other of said frame side walls, said slot opening into said frame central opening and frame top face and closed from said frame bottom face; a spring biased projection extending from said other frame side wall into said frame central opening, disposed adjacent said slot; a first lug projecting from one end of said panel; a second lug projecting from the other end of said panel; said first lug disposed in said frame bore, whereby said one panel end is captured against movement in the frame top-bottom direction; said second lug disposed in said frame slot; a shoulder on said other end of said panel, adjacent said second lug, said shoulder disposed below said adjacent spring biased projection, whereby said other panel end is captured between said spring biased projection and the closed bottom of said slot against movement in the frame top-bottom direction; a camming surface on said other end of said panel, below said shoulder, adapted to abut said spring biased projection and retract said projection when said other panel end is inserted into said frame slot from said top frame face; and additional means to retract said spring biased projection to permit said other panel end to be removed from said frame slot towards said top frame face.

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