

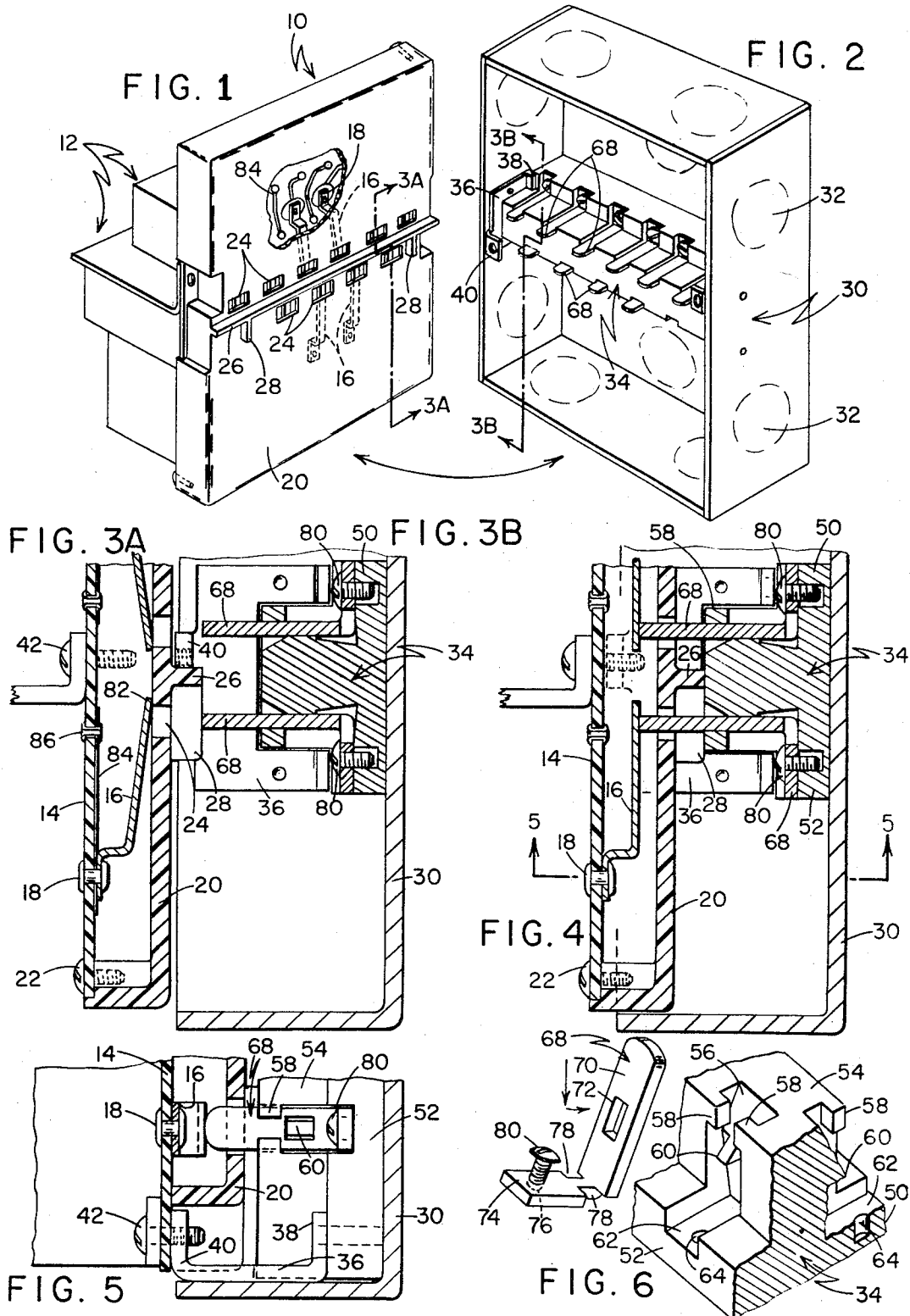
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CONNECTOR STRUCTURE

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CONNECTOR STRUCTURE

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ABSTRACT OF THE DISCLOSURE

An electrical connector assembly includes a base that has a central support insulator on which is disposed two rows of L-shaped contacts. Each contact is secured in a slot by cooperation of a projection in the rear wall of the slot, two tabs that overlie that rear wall and a screw that extends into a hole in the base wall of the slot. A chassis has a support insulator to which are secured corresponding beryllium copper leaf contacts. These contacts are restrained by a cover that has apertures through which the base contacts extend to complete electric circuits.

This invention relates to electrical connector structures and more particularly to connector arrangements which enable a multiplicity of electrical circuits to be completed substantially simultaneously.

Such multiple connector arrangements find frequent use in pluggable units of quick disconnect type in which a plurality of electrical components are mounted on a chassis for connection to an electrical system via a cooperating base element which is fixedly wired into an electrical system. Such a chassis may be replaced quickly, on failure of a component mounted on the chassis for example, or where it is desired to change the type of components in a unit without undue interruption in the operation of the system.

It is an object of this invention to provide a novel and improved multiple electrical connector arrangement of the pluggable unit type in which all the contact elements carried by the chassis are enclosed and protected in a structural arrangement that permits the chassis to be placed on support surfaces without damage to either the chassis or the support surface; that permits the multiplicity of electrical circuits to be easily connected and disconnected in a reliable manner; that assures the proper alignment of the chassis relative to the base element; that facilitates connection of fixed wiring to the base element; and that is relatively inexpensive to manufacture and easy to maintain.

Another object of the invention is to provide novel and improved contact arrangements of simplified design for use in pluggable unit constructions.

In accordance with the invention there is provided an electrical connector assembly that includes a base and a cooperating removable chassis that is adapted to be secured to the base. Mounted in the base housing is an insulator member that has secured to it a plurality of first contact members. Each contact member, in the preferred embodiment, being in the form of an L-shaped sheet member, one leg forming a contact portion at one end and the other leg forming a terminal portion. In that embodiment, each contact member has an aperture in the contact portion leg element and that aperture receives a latch portion protruding from the insulator member. The terminal leg has a threaded hole in which is received a contact securing bolt. When the contact member is properly positioned relative to the insulator member, the threaded aperture is aligned with a cooperating recess in the base of the insulator member so that the tightening of the bolt down through the terminal leg causes the end

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of the bolt to project into the insulator base recess and fastens the contact member securely in the insulator member in a simple, inexpensive and reliable manner.

The component support chassis includes a base plate of insulating material to which a plurality of second contact members, corresponding in number and location to said first contact members are secured. Each second contact member is in the form of a flat resilient contact plate that is secured at one end to the base plate with the other end extending in cantilever fashion. A cover member encloses the second contact members and is secured to the chassis base plate. This cover member has a plurality of relatively small apertures, corresponding to the locations of the first contact members. The upwardly projecting portions of the first contact members enter the apertures and engage the second contact members, flexing them upwardly when the base and chassis are assembled together, thus completing the several electric circuits.

Provision is made to insure the proper positioning of the chassis relative to the base. In the preferred embodiment the contact members are positioned in two rows at the center of the assembly and a ridge formed on the cover member plate extends between the two rows of apertures for increasing electrical isolation between the two rows. Projecting tabs in the cover member are aligned with upwardly projecting contact elements from the base if the chassis is attempted to be inserted in reverse position, and thus insure that the assembly and circuits cannot be completed unless the chassis is properly positioned relative to the base.

Thus apparatus constructed in accordance with the invention provides a simple neat and compact arrangement of electrical connections in a pluggable unit assembly which facilitates connection of fixed circuit arrangements to a base element and which provides a compact enclosed assembly of cooperating contacts of simplified design on a chassis element in a manner whereby a relatively heavy chassis element may be easily handled and will not damage surfaces on which it is placed.

Other objects, features and advantages of the invention will be seen as the following description of a particular embodiment thereof progresses, in conjunction with the drawings, in which:

FIG. 1 is a perspective view of a chassis element constructed in accordance with the invention;

FIG. 2 is a perspective view of a base element constructed in accordance with the invention;

FIGS. 3a and 3b are sectional views taken along the lines 3a-3a and 3b-3b of FIGS. 1 and 2 respectively showing the relation of the chassis and base elements just prior to actual connection;

FIG. 4 is a sectional view similar to that of FIGS. 3a and 3b showing the chassis and base elements in connected relation;

FIG. 5 is a sectional view taken along the line 5-5 of FIG. 4; and

FIG. 6 is a perspective view of the insulator member secured in the base element and contact members illustrating the method of assembly of contact members to that insulator member.

With reference to FIG. 1 there is shown a chassis 10 having a plurality of electrical components 12 mounted thereon. In this embodiment, the chassis unit carries the electronic control components for a combustion control system and include a flame relay, a control relay, an energizing transformer, lock-out switch structure and interconnected control components. As indicated in FIG. 3a, the chassis includes a base element 14 of insulating material to which Phosphor bronze contact members 16 are secured by rivets 18. Fastened to the base plate 14

by bolts 22 is an enclosing cover 20 of electrically insulating plastic material. Two rows of apertures 24 extend across the center of cover 20 and are separated by isolator ridge 26 molded integrally with the cover 20. Lateral tabs 28 project at either end of ridge 26 each in alignment with an aperture 24 on the other side of ridge 26.

The cooperating base structure 30 is shown in FIG. 2. This base structure is a metal enclosure having a plurality of knock-out portions 32 through which fixed electrical circuit connections may be made. An insulator structure 34 is secured in the base 30 and extends across its width. This insulator structure is secured in place by brackets 36 which are riveted to the walls of the base and which have inwardly turned lower ears 38 which secure the insulator bar 34 in position. An upper ear 40 on each bracket 36 has a threaded aperture which receives a securing bolt 42 which is passed through an aperture in chassis base plate 14 to secure the chassis 10 to the base 30.

A perspective view of insulator structure 34 is shown in FIG. 6. That structure has a base portion including legs 50, 52 projecting in opposite directions and an upstanding central portion 54. A series of slots 56 are disposed in portion 54 each of which has at its upper end two inwardly facing tabs 58 which overlie the outer margins of the slots and, in its middle center, a latch projection 60. Slot extensions 62 extend laterally along the base legs 50 and 52 in alignment with the slots 56 in central portion 54. Each base slot 62 has in it a cylindrical recess 64.

A contact structure in the form of a generally L-shaped metal strip member 68 has a relatively long contact leg portion 70 with an aperture 72 located in its intermediate portion, a relatively short terminal leg portion 74 with a threaded aperture 76 in its intermediate portion, and notches 78 on either side at the junction between leg portions 70 and 74 as indicated in FIG. 6. A terminal screw 80 is received in threaded aperture 76.

The manner of assembly of this contact element 68 onto insulator 34 is indicated in FIG. 6. The contact leg 70 is positioned with notches 78 over tabs 58 and then slid down between tabs 58 from above and aperture 72 is placed over latch projection 60. The terminal screw 80 is then tightened so that it extends into and engages the wall of latch recess 64 and secures the contact structure 68 in place as controlled by the tabs 58, projection 60 and the cooperation of terminal screw 80 with recess 64.

It will be seen that this fixed terminal structure provides in a simple manner and with use of only a single threaded locking member, a metal contact element, and a molded insulator member 34, an easy to assemble and inexpensive contact assembly which is sturdy and reliable in operation. Each contact assembly includes an upwardly projecting contact portion 70 which extends substantially above the top of central barrier 54 of the insulator member 34.

These upwardly projecting contact portions 70 are aligned with apertures 24 in cover plate 20 of the chassis. Behind each aperture is the chassis contact leaf 16. In unstressed condition, each leaf contact 16 has its unsupported tip 82 resting against the enclosure cover 20 inwardly of the aperture 24 so that a portion of the leaf contact overlies the aperture. Connections are made from the securing rivet 18 to the electrical components by suitable conductors 84 which are secured to the base 14 and leads may be brought through the base 14 by means of eyelets 86.

When chassis 10 is secured in base 30 by bolts 42, the contact portions 70 of the base contact members project through apertures 24 and engage the chassis contact members 16, forcing their unsupported ends upwardly away from cover 20 to the position shown in FIG. 4 so that those contacts are stressed and a substantial force is exerted between each leaf contact 16 and the surface of contact portion 70 to assure a low resistance electrical

circuit path between the base contact member 68 and the chassis contact member 16.

It will be seen that the invention provides a simple, compact, multiple terminal connector arrangement capable of inexpensive assembly by mass production methods and which provides circuit spacing and isolation as is necessary for reliable operation of the electrical circuits. The chassis contacts are enclosed in an arrangement which permits the chassis assembly to be easily handled.

While a particular embodiment of the invention has been shown and described, various modifications thereof will be obvious to those skilled in the art and therefore it is not intended that the invention be limited to the disclosed embodiment or to details thereof and departures may be made therefrom within the spirit and scope of the invention as defined in the claims.

What is claimed is:

1. An electrical connector assembly for ready connection and disconnection of a plurality of electrical circuits comprising a base, an electrical insulator member in said base, a plurality of first contact members secured to said insulator member, each said first contact member being a metal strip of L-shaped configuration having a terminal leg portion having a threaded aperture therein and an upwardly projecting second leg portion forming a contact portion, with an aperture in said second leg portion, said insulator member having a slot of generally L-shaped configuration to receive said metal contact strip, said slot having in one wall thereof a recess for alignment with the threaded aperture in said terminal leg of said contact member and in a second wall thereof a protruding latch for engagement with the aperture in the second leg portion of said contact strip, and further including a terminal screw for engagement with the threaded aperture in said metal contact strip and protrusion into said recess to secure, in conjunction with said latch, the contact strip to said insulator member,

a component carrying chassis adapted to be moved with straight line motion downwardly toward said base housing and secured there to complete a plurality of electrical circuits, said chassis including an insulating base plate member, a plurality of second contact members corresponding in number and in location to said first contact members, each said second contact member having a terminal portion secured to said base plate and a contact portion, and a cover enclosing said second contact members and secured to said base plate, said cover having a plurality of apertures corresponding in number, configuration and location to said first contact members for receiving said upstanding contact portions of said first contact members, the contact portions of said first contact members, when said chassis is secured to said base, projecting through said apertures in said cover and engaging said contact portions of the corresponding second contact members to complete electrical circuits therebetween.

2. An electrical connector assembly for ready connection and disconnection of a plurality of electrical circuits comprising a base, an electrical insulator member in said base, a plurality of first contact members secured to said insulator member, each said first contact member including a terminal portion and an upwardly projecting contact portion projecting above said insulator member in said base, a component carrying chassis adapted to be moved with straight line motion downwardly toward said base and secured thereto to complete a plurality of electrical circuits, said chassis including an insulating base plate member, a plurality of second contact members corresponding in number and in location to said first contact members, each said second contact member including a terminal portion secured to said base plate and a flat resilient leaf contact portion that extends away from said terminal portion in a direction generally normal to the direction of connecting movement of said chassis to said

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base, and a cover enclosing said second contact members and secured to said base plate, said cover having a plurality of apertures corresponding in number, configuration and location to said first contact members for receiving said upstanding contact portions of said first contact members, the ends of said leaf contact portions being restrained by engagement with said cover when said chassis is disconnected from said base, and the contact portions of said first contact members, when said chassis is secured to said base, projecting through said apertures in said cover and engaging said leaf contact portions of the corresponding second contact members to complete electrical circuits therebetween while forcing the ends of said leaf contact portions out of engagement with said cover.

3. The connector assembly as claimed in claim 2 wherein said apertures in said cover are aligned in two rows and further including an isolating ridge extending between said two rows and at least one guard ridge disposed laterally from said isolating ridge for alignment with a first contact member should said chassis be disposed in improper position relative to said base.

4. An electrical connector assembly for ready connection and disconnection of a plurality of electrical circuits comprising a base, an electrical insulator member in said base, a plurality of first contact members secured to said insulator member, each said first contact member including a terminal portion and an upwardly projecting contact portion projecting vertically above said insulator member,

a component carrying chassis adapted to be moved with straight line motion downwardly toward said base housing and secured there to complete a plurality of electrical circuits, said chassis including an insulating base plate member, a plurality of second contact members corresponding in number and in location to said first contact members, each said second contact member having a terminal portion secured to said base plate and a contact portion, and a cover enclosing said second contact members and secured to said base plate, said cover having a plurality of apertures aligned in two rows corresponding in number, configuration and location to said first contact members for receiving said upstanding contact portions of said first contact members, an isolating ridge extending between said two rows of apertures, and at least one guard ridge disposed laterally from said isolating ridge for alignment with a first contact member should said chassis be disposed in improper position relative to said base, the contact portions of said first contact members, when said chassis is secured to said base, projecting through said apertures in said cover and engaging said contact portions of the corresponding second contact members to complete electrical circuits therebetween.

5. The connector assembly as claimed in claim 4 wherein each said first contact member is a metal strip of L-shaped configuration having a terminal leg portion having a threaded aperture therein and a second leg portion forming said contact portion, with an aperture in said second leg portion, said insulator member has a slot of generally L-shaped configuration to receive said metal contact strip, said slot having in one wall thereof a recess for alignment with the threaded aperture in said terminal leg of said contact member and in a second wall thereof a protruding latch for engagement with the aperture in the second leg portion of said contact strip, and further including a terminal screw for engagement with the threaded aperture in said metal contact strip and protrusion into said recess to secure, in conjunction with said latch, the contact strip to said insulator member.

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6. A connector structure comprising an insulator member having a slot of generally L-shaped configuration, said insulator member having a recess in one wall of the slot and overlying tab means, adjacent the second wall of the slot,

a metal contact member of L-shaped configuration disposed in said slot, said contact member having an apertured terminal leg portion disposed adjacent said one slot wall, a second leg portion of greater length than the length of said second slot wall disposed adjacent said second slot wall and a recess of configuration corresponding to the configuration of said tab means,

and a terminal connector fixedly secured in said terminal leg aperture and extending into said slot recess, said terminal connector being adapted to receive an electrical conductor for connection to said metal contact member.

7. The connector structure as claimed in claim 6 wherein said tab means comprises two opposed tabs overlying the second wall of said slot, said tabs and said second wall defining substantially the same area as the cross-sectional configuration of said second leg of said metal contact member.

8. The connector structure as claimed in claim 7 and further including a cooperating biased contact element adapted to be placed in electrically conducting relation with the tip of the second leg portion of said metal contact member by movement along a path generally parallel to said second leg.

9. A connector structure comprising an insulator member having a slot of generally L-shaped configuration, said insulator member having a recess in one wall of the slot, a projection extending outwardly from the second wall of said slot, and a tab overlying the second wall of the slot,

a metal contact member of L-shaped configuration disposed in said slot, said contact member having an apertured terminal leg portion disposed adjacent said one slot wall and an apertured second leg portion of greater length than the length of said second slot wall disposed adjacent said second slot wall behind said tab and with said projection extending into the aperture in said second leg portion,

and a terminal connector fixedly secured in said terminal leg aperture and extending into said slot recess, said terminal connector being adapted to receive an electrical conductor for connection to said metal contact member and said tab, projection and connector cooperating with said contact member to secure said contact member in said slot.

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