

March 18, 1969

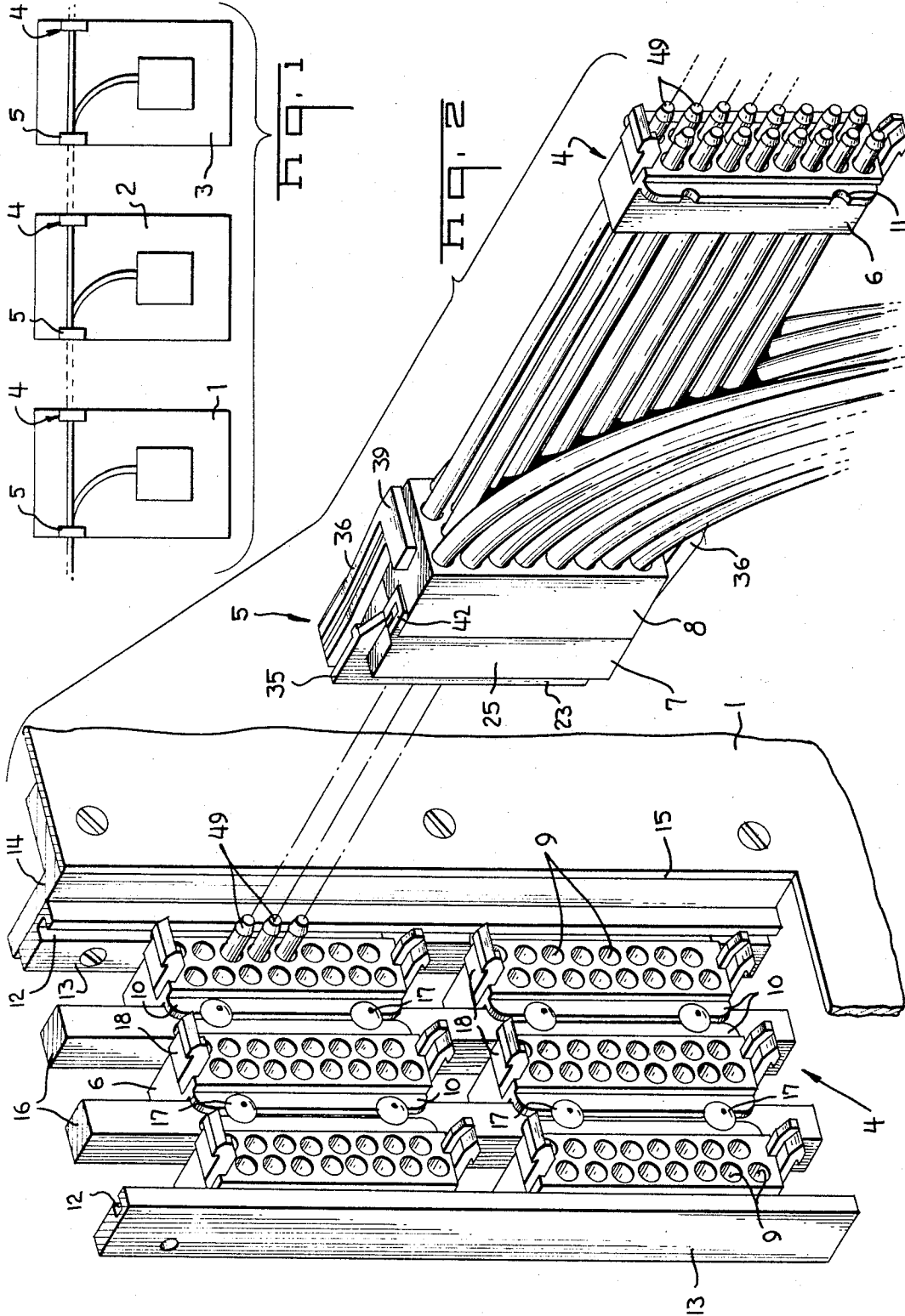
W. L. SCHUMACHER

3,434,098

SEPARABLE ELECTRICAL CONNECTOR HOUSING ASSEMBLIES

Filed April 21, 1966

Sheet 1 of 3

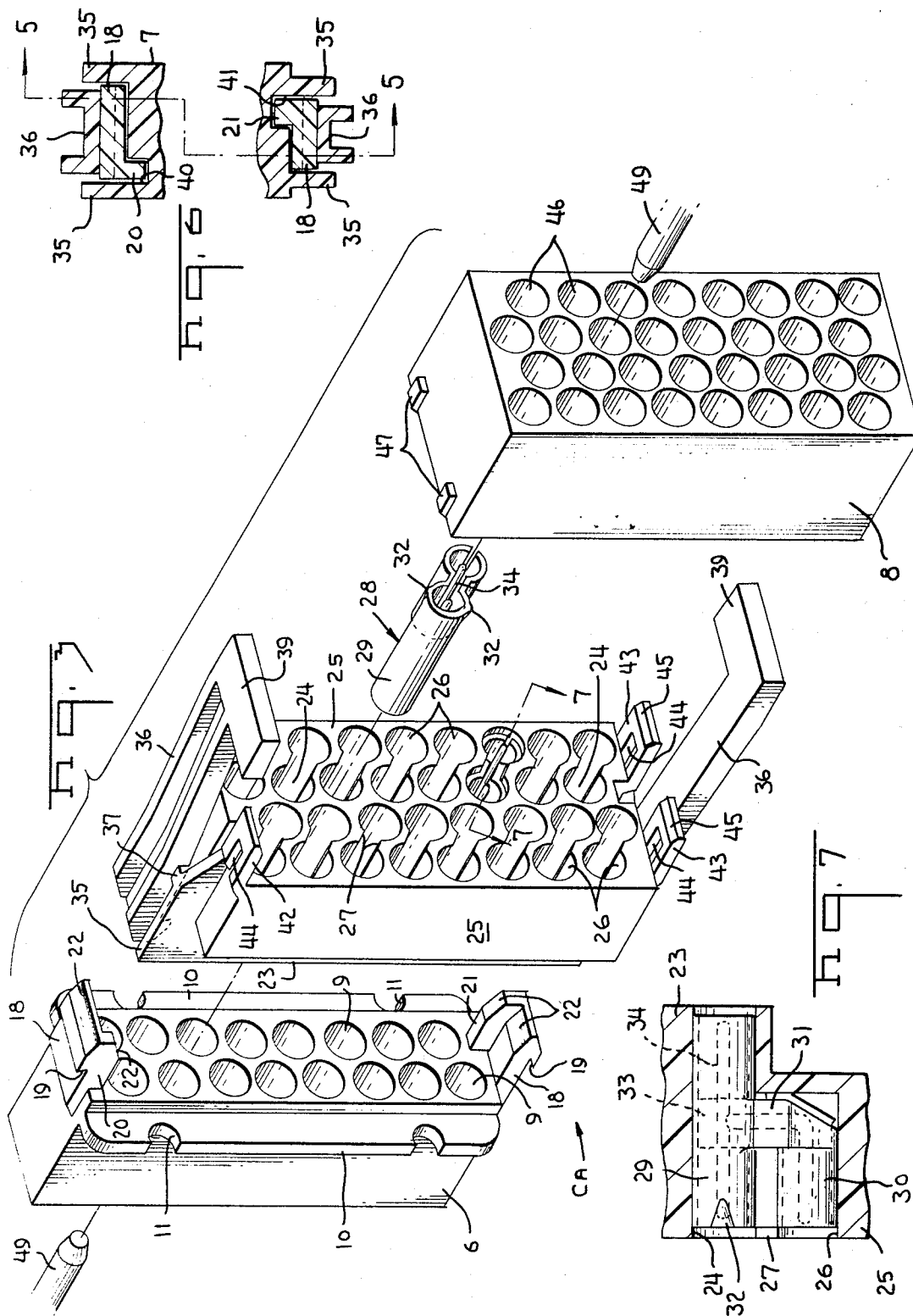


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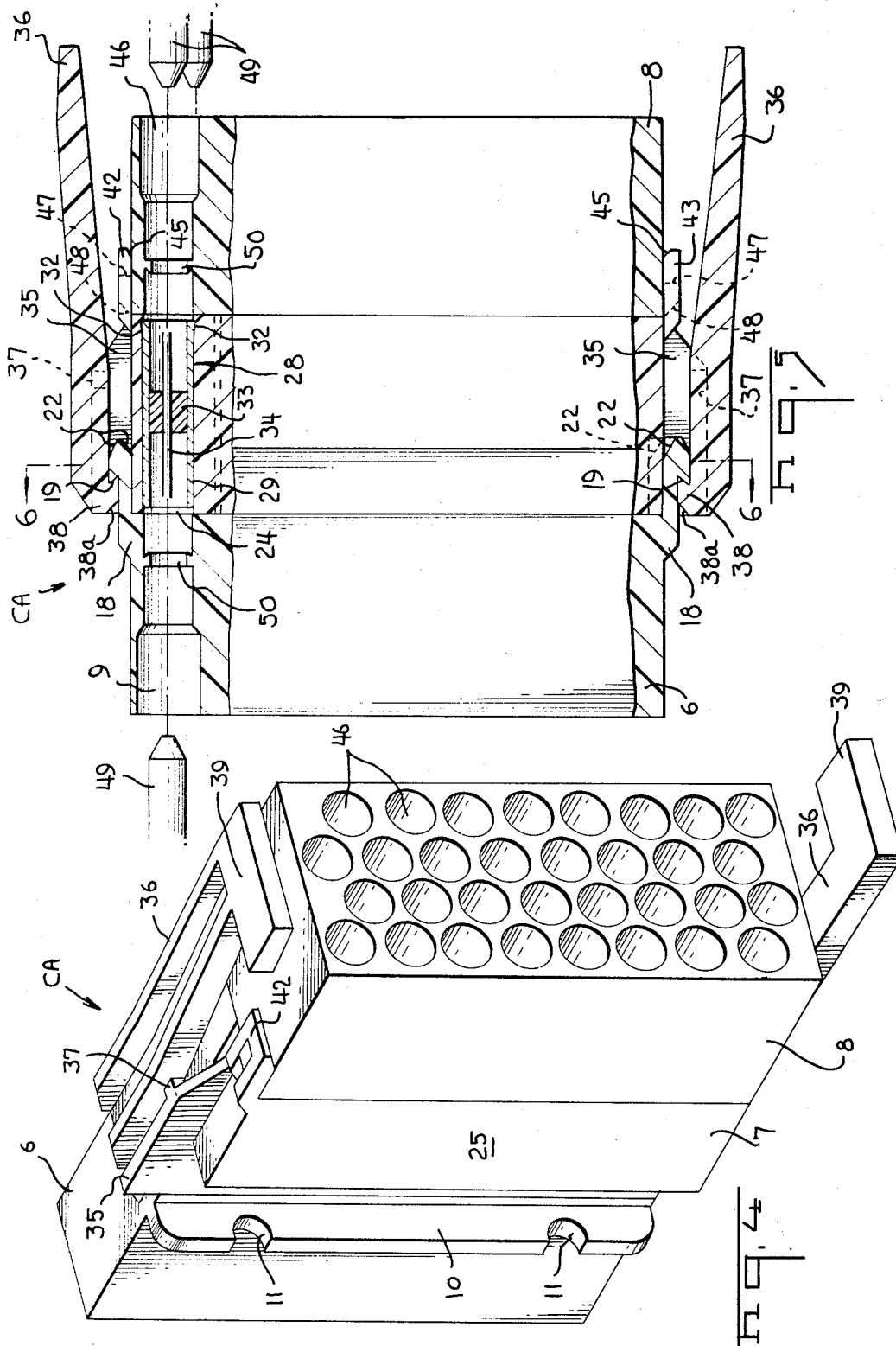
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SEPARABLE ELECTRICAL CONNECTOR HOUSING ASSEMBLIES

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6 Claims

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ABSTRACT OF THE DISCLOSURE

An electrical housing assembly comprises a first housing member securable on a mounting panel, a second housing member matable with the first housing member in a polarizing manner with latching means provided by the first and second housing members to latchably secure the housing members together, and a third housing member latchably secured to the second housing member in a polarizing manner.

This invention relates to electrical housing members and more particularly to separable electrical connector assemblies for disengageably connecting a plurality of conductors.

Electrical equipment to form a system, such as for example, a computer or the like, has to be assembled, tested, disassembled, shipped and reassembled at its place of use. It is desirable that the electrical connections between various electrical equipment to form the system be readily connectable, provide space savings, provide fool-proof connections and be economical. It is also desirable that the connectors provide an input to the equipment in which they are disposed as well as to adjacent electrical equipment.

An object of the invention is to provide a separable connector housing having molded parts of unitary construction.

Another object of the invention is the provision of a separable connector housing for doubling the number of outputs.

A further object of the invention is to provide a separable connector housing having latching means to latch the parts of the housing together.

An additional object of the invention is the provision of a separable connector housing having polarized latching means to assure the correct positioning of the parts of the housing relative to one another so as to provide a foolproof connector assembly thereby preventing any mismatching of connector members.

A still further object of the invention is to provide a separable connector housing to permit modular equipment to be readily interconnected, to provide space savings at low cost and to prevent mismatching of electrical connectors carried by the parts of the housing.

Other objects and attainments of the present invention will become apparent to those skilled in the art upon a reading of the following detailed description when taken in conjunction with the drawings in which there is shown and described an illustrative embodiment of the invention; it is to be understood, however, that this embodiment is not intended to be exhaustive nor limiting of the invention but is given for purposes of illustration in order that others skilled in the art may fully understand the invention and the principles thereof and the manner of applying it in practical use so that they may modify it in various forms, each as may be best suited to the conditions of a particular use.

The foregoing and other objects are achieved by a preferred embodiment of the invention comprising a first dielectric member having cavities extending therethrough

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for securably receiving electrical connectors therein, means on the first member for securing same to a mounting member, a second dielectric member having openings therethrough in alignment with corresponding cavities of the first member, each of the openings having an extension in communication with and extending outwardly therefrom, the openings and their corresponding extensions securably receiving other electrical connectors therein, latching means on the first and second members to releasably latch these members together, polarizing means on the first and second members to assure proper engagement between the electrical connectors of these members, a third dielectric member having holes extending therethrough in alignment with respective openings and extensions of the second member for carrying further electrical connectors therein, securing means on the second and third members to releasably secure these members together, and additional polarizing means on the second and third members to assure proper engagement between the electrical connectors of these members.

In the drawings:

FIGURE 1 is a schematic diagram showing the use of the invention in conjunction with electrical and/or electronic components;

FIGURE 2 is a partially sectioned view of first members of the separable connector assemblies mounted in position and second and third members of the connector assembly exploded from one of the first members;

FIGURE 3 is an exploded perspective view of a separable electrical connector assembly;

FIGURE 4 is a perspective view of the assembly of FIGURE 3 in engagement;

FIGURE 5 is a partial cross-sectional view taken along lines 5-5 of FIGURE 6;

FIGURE 6 is a partial cross-sectional view taken along lines 6-6 of FIGURE 5; and

FIGURE 7 is a partial cross-sectional view of a Y-shaped connector securably mounted in the second member of the connector assembly.

Referring first to FIGURE 1, there is illustrated cabinets 1, 2 and 3 in which electrical or electronic circuitry is disposed for use such as, for example, computer modules. Banks 4 of one part of an electrical connector assembly are located in one side of cabinets 1 through 3 and banks 5 of the matable part of the electrical connector assembly are disposable through sides of cabinets 1 through 3 opposite banks 4 and matable with the parts of the electrical connector assembly therein. When the matable parts of the connector assemblies in banks 5 are matable with the parts of the connector assemblies located in banks 4, cabinets 1, 2 and 3 are in abutting relationship to reduce space.

Turning now to FIGURE 2, there is illustrated first members 6 of connector assemblies CA secured in stacked relationship in cabinet 1. Each connector assembly CA includes second member 7 and third member 8 securable together as a unit with second member 7 latchably secured to first member 6. Connector assembly CA is preferably molded in accordance with conventional molding techniques from a suitable stiffly-flexible dielectric material such as for example, nylon, polypropylene, polycarbonate, or the like.

First member 6 is a rectangular block having rows of cavities 9 extending therethrough, the cavities in one row being offset with respect to the cavities in the other row. Mounting projections 10 extend outwardly from each side of the dielectric block and have recesses 11 disposed therein. As can be discerned from FIGURE 2, the outer mounting projections of stacked members 6 are disposed in channels 12 of mounting members 13 which are secured on mounting brackets 14 (only one being shown) on cabinet 1 in alignment with an opening 15 in this

cabinet. The inner projections of the outer rows of members 6 are disposed against mounting members 16 spaced from one another to permit other members 6 to be disposed therebetween with their mounting projections disposed adjacent respective inner projections of outer members 6. Screws 17 are disposed in respective recesses 11 of mounting projections 10 of members 6 in engagement with mounting members 16 in order to maintain first members 6 in properly aligned rows.

Lugs 18 extend outwardly from each end of the dielectric block of first member 6 and forwardly from the front surface thereof. Latching surfaces 19 extend outwardly from the top surfaces of lugs 18 and are directed in a rearwardly direction. Inwardly-directed polarizing extensions 20 and 21 are located on the inner surfaces of respective lugs 18. The thickness of polarizing projection 21 is greater than that of polarizing projection 20. Beveled surfaces 22 are located on the front of lugs 18 and also polarizing projections 20 and 21. Also, lug 18 carrying polarizing projection 20 is wider than lug 18 on which polarizing projection 21 is located (FIGURE 6).

The second member 7 is a dielectric block having a middle section 23 provided with rows of openings 24 extending therethrough. Middle section 23 has a rectangular configuration equal to that of first member 6. Each opening 24 is alignable with a corresponding cavity 9 of first member 6. Stepped sections 25 are located on each side of middle section 23 and each of openings 24 has an extension 26 diagonally disposed in a corresponding stepped section 25, openings 24 and their respective extensions 26 being in communication and having a necked-down section 27 therebetween. Openings 24 and their respective extensions 26 have a Y-shaped configuration as illustrated in FIGURE 7 in order to receive a female Y-shaped electrical connector 28.

Y-shaped connector 28 comprises a first tubular member 29 disposable in an opening 24, a second tubular member 30 disposable in extension 26 of this opening and a necked-down section 31 interconnecting tubular members 29 and 30 and disposable in necked-down section 27 between opening 24 and extension 26. Outwardly-directed projections 32 are located on tubular member 29 in order to engage opening 24 to frictionally secure connector 28 in position within opening 24 and respective extension 26. Similar projections may be located on tubular member 30. Insulation 33 is centrally located in tubular member 29, in necked down section 31 and at the inner end of tubular member 30 (FIGURE 7). A Y-shaped pin 34 is secured in insulation 33 and exposed parts of pin 34 are located centrally within each end of tubular member 29 and within tubular member 30.

Spaced projections 35 extend outwardly from each end of second member 7. Latching arms 36 are disposed between opposed projections 35 and are integral with a torsionally deformable pin 37 which is also integral with opposed projections 35. Latching arms 36 have inwardly-directed hooked portions 38 at the forward ends thereof engageable with latching surfaces 19 of lugs 18. Latching surfaces 19 and similar surfaces of hook portions 38 have substantially the same angular disposition to provide optimum, latching interengagement. Any separating force tends to engage them tighter due to the angle. Engaging sections 39 are located at the rear ends of latching arms 36 to enable the latching arms to be easily operated. As can be discerned, each latching arm 36 from respective pins 37 extend outwardly from its respective end of second member 7 to provide sufficient clearance so that the latching arms can be readily operated. The latching arms are U-shaped in cross section from hook portions 38 to engaging sections 39 to make them rigid and strong. Beveled surfaces 38a are located on the inner surfaces of hook portions 38 to facilitate the engagement of lugs 18 with latching arms 36.

A channel 40 is located in one end of second member 7 adjacent a projection 35 and channel 41 is located in

the other end of second member 7 adjacent a projection 35 as illustrated in FIGURE 6. As can be discerned, channel 40 is narrower than channel 41 so that channel 40 can accommodate polarizing projection 20 while channel 41 accommodates polarizing projection 21 when lugs 18 are brought into latching engagement with latching arms 36 and this keying assures proper positioning of first member 6 with second member 7. It should also be noted that the spacing between projections 35 between which channel 40 is located is wider than the spacing of projections 35 between which channel 41 is located in order to accommodate respective lugs 18.

Latching members 42 and 43 extend outwardly from respective ends of second member 7 at the rear surface thereof. Latching members 42 are located at outermost positions adjacent the sides of member 7 while latching members 43 are spaced inwardly from the sides. Each of the latching members has a slot 44 therein and an inner beveled surface 45.

Third member 8 is a rectangular block having a cross-sectional configuration equal to the rear surface of second member 7. Holes 46 extend therethrough and are alignable with respective openings 24 and extensions 26 in member 7. Latching projections 47 extend outwardly from each end of third member 8 in alignment with respective slots 44 in latching members 42 and 43. Latching projections 47 mate with slots 44 in latching members 42 and 43 in order to securely latch members 7 and 8 together. Beveled surfaces 48 are located on the front of latching projections 47 and these beveled surfaces as well as beveled surfaces 45 on latching members 42 and 43 facilitate the engagement of latching projections 47 with slots 44.

Coaxial connector members 49 of the type disclosed in U.S. patent application Ser. No. 336,909, filed Jan. 10, 1964, and assigned to the present assignee, are securable within cavities 9 of first member 6 and holes 46 in third member 8. An annular shoulder 50 is located in each of cavities 9 and holes 46 in order to secure coaxial connector members 49 in position therein in accordance with the teaching set forth in the above-mentioned patent application.

Connector members 49 in cavities 9 are matable with first tubular members 29 of Y-shaped electrical connectors 28 and connector members 49 in holes 46 of third member 8 are matable with first tubular members 29 and second tubular members 30. The terminations between connector members 49 in cavities 9 of first member 6 and first tubular members 29 of Y-shaped electrical connectors 28 are doubled between second member 7 and third member 8 so that the inputs in first member 6 are connectable to electronic equipment in one cabinet and the same input is connectable to another cabinet to provide the arrangement as illustrated in FIGURES 1 and 2. Since the present invention has been described in conjunction with coaxial connector members, a dummy load will have to be connected to the bank 4 of electrical connector at the end of the series of cabinets to maintain correct impedance loads in the circuit paths. It is to be understood, however, that other types of electrical connectors may be used other than those described.

As can be discerned, first member 6 is securable within brackets 14 and mounting members 16 in alignment with an opening 15 in stacked relationship and second members 7 are secured to third members 8 to form units that are latchably secured to first members 6. Second and third members 7 and 8 also double the output. The separable electrical connector assemblies of the invention permit modular equipment to be readily interconnected, they save space, they are foolproof assemblies when being interconnected to prevent any mismatch between the electrical connectors, they are economical to manufacture and they provide ready transportability in that the connector assemblies permit testing to take place of the entire equipment, the equipment can then be readily broken down, shipped and easily reassembled at its designated location.

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It will, therefore, be appreciated that the aforementioned and other desirable objects have been achieved; however, it should be emphasized that the particular embodiment of the invention, which is shown and described herein, is intended as merely illustrative and not as restrictive of the invention.

The invention is claimed in accordance with the following:

1. A separable connector housing assembly comprising a first dielectric member having cavities extending therethrough for securably receiving electrical connectors therein, a second unitary dielectric member having openings therethrough in corresponding alignment with said cavities of said first member, each of said openings having an extension in communication with and extending outwardly therefrom, said openings and corresponding extensions securably receiving other electrical connectors therein, integral latching means on said first and second members to releasably latch these members together, integral polarizing means on the first and second members to assure proper engagement between the electrical connectors of these members, a third unitary dielectric member having holes extending therethrough in alignment with respective openings and extensions of said second member for carrying further electrical connectors therein, securing means on the second and third members to releasably secure these members together as a unit, and additional polarizing means on said second and third members to assure proper engagement between the electrical connectors of these members.

2. A separable connector housing assembly according to claim 1 wherein mounting means is provided on said first dielectric member to mount said first member on a mounting member.

3. A separable connector housing assembly according to claim 1 wherein said latching means include lug means on one of said first and second members and integral latching arms including torsional pin means on one of said first and second members, said lug means and latching arms including beveled latching surfaces.

4. A separable connector housing assembly according to claim 1 wherein said securing means include members extending outwardly from one of said second and third members and having slots therein, projections extending outwardly from one of said second and third members and being in alignment with respective members.

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5. A separable connector housing assembly according to claim 1 wherein said securing means includes said additional polarizing means.

6. A separable electrical connector housing assembly comprising first dielectric housing means having cavities extending therethrough for securably receiving electrical connectors therein, second unitary dielectric housing means having openings therethrough in corresponding alignment with said cavities of said first housing means, each of said openings having an extension in communication therewith and extending outwardly therefrom and adapted to securably receive other electrical connectors therein, integral latching means on said first and second housing means to releasably latch these housing means together, integral polarizing means on said first and second housing means adjacent said latching means to assure proper engagement between the electrical connectors of these housing means, third unitary dielectric housing means having holes extending therethrough in alignment with respective openings and extensions of said second housing means for carrying further electrical connectors therein, securing means on said second and third housing means to releasably secure these housing means together as a unit, and additional polarizing means provided by said second and third housing means to assure proper engagement between the electrical connectors of these housing means.

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