Oct. 20, 1970 B. BAUMANIS 3,535,675

SIDE MOUNT CONNECTOR

Filed July 31, 1968

Fig. 1.

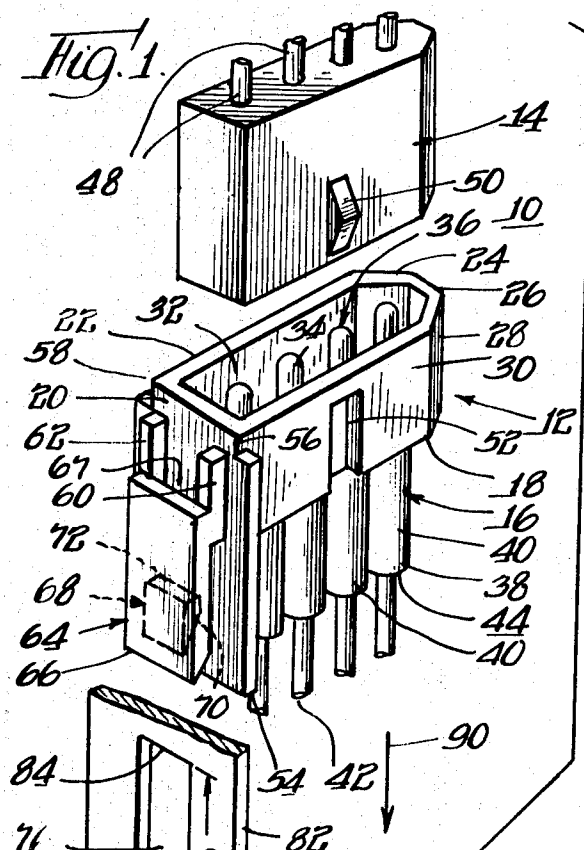


Fig. 2.

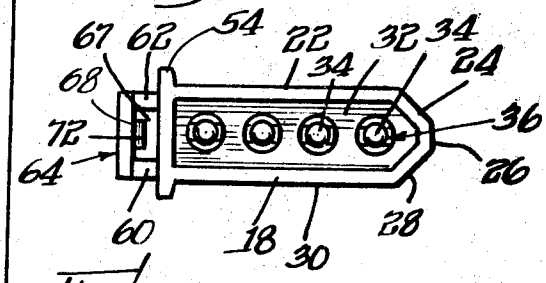


Fig. 3.

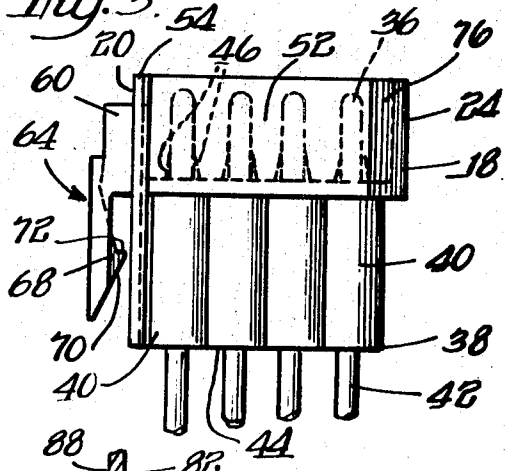


Fig. 4.

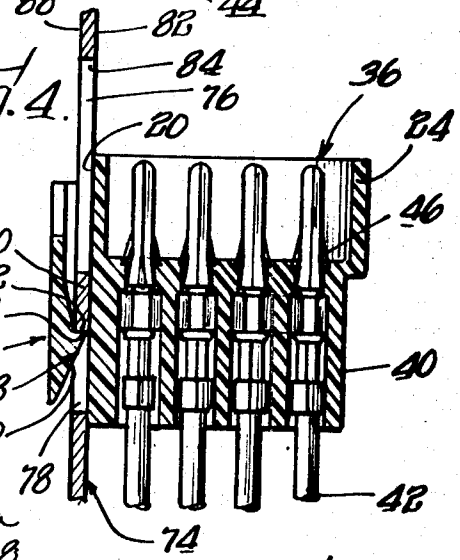


Fig. 5.

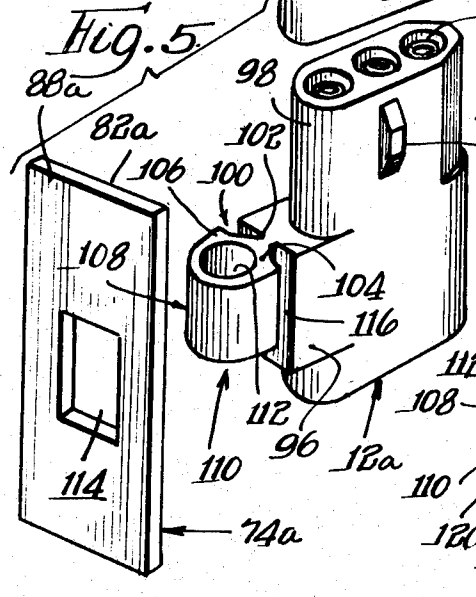
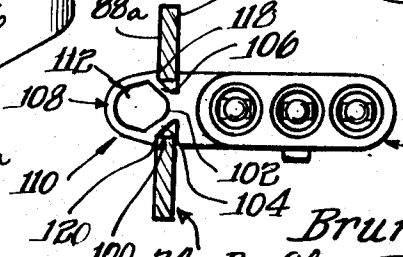


Fig. 6.



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SIDE MOUNT CONNECTOR

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U.S. Cl. 339—125 8 Claims

ABSTRACT OF THE DISCLOSURE

A side mounted electrical connector element of plastic insulating material including a resilient member formed integrally with a side wall thereof, which can be inserted into an aperture in a mounting panel to secure the connector element to a first surface of the panel. A first embodiment of the connector element includes a resilient arm attached at one end to a side wall of the connector element and extends in spaced-apart relation therealong. The arm is inserted from a first surface of the panel into a first aperture therein; a nib on the free end of the arm extends into a second aperture from the second surface of the panel, and the arm bridges the gap between apertures, thereby to secure the connector element to the first panel surface. A second embodiment includes a collapsible, hollow plastic member extending outwardly from the side wall of the connector element. The plastic member is forced into an aperture in the panel and the member collapses until it is forced through the aperture and returns to normal thereafter to hold the connector element on the panel.

BACKGROUND OF THE INVENTION

This invention relates generally to electrical connectors and more particularly to the mounting of such connectors on a support surface.

Conventionally, electrical connector elements are mounted on a panel, etc., by inserting a portion of the body of the connector element through an aperture in the panel with the terminal end thereof extending outwardly from the panel substantially perpendicularly to the plane thereof. A connector element provided to mate with the connector element mounted in the panel aperture extends outwardly away from the panel when the two elements are joined.

While this arrangement is suitable in most instances, often the components of a unit of electrical equipment must be mounted in extremely close relation to each other with very little space thereabout. In this case, connector elements extending from both surfaces of a mounting panel require space on both sides of the panel and are difficult to disconnect once they are in place.

SUMMARY OF THE INVENTION

Accordingly, it is a primary object of the present invention to provide a separable connector element which is easily and efficiently mounted and which may be easily interconnected with and disconnected from a complementary connector element on a mounting panel.

It is another object of the present invention to provide a connector element which is easily and quickly mountable on one surface of a mounting panel.

It is still another object of this invention to provide a connector element having a mounting member on one side thereof for mounting the element on its side to a mounting panel, with the terminals of the element extending substantially parallel to the plane of the panel.

It is yet another object of this invention to provide a snap-in type mounting member formed on one side of a connector element, integrally therewith, for mounting the element on its side on an apertured mounting panel.

It is yet another object of this invention to provide an electrical connector arrangement comprising a pair of mating connector elements wherein at least one of the connector elements includes a side mount member for mounting the joined connector elements on their sides on one surface of a mounting panel.

The foregoing and other objects and advantages are attained by an electrical connector comprising a molded resilient housing having a plurality of metallic terminals secured therein. The housing is provided along one side with a flat base for resting against an apertured panel. Means extends from the flat base for projecting into an aperture in the panel to lock the connector in place with the base flat against the panel.

In a first, preferred, form of the invention a resilient arm on the base projects through the aperture in the panel and extends along the opposite side of the panel, being provided at its free end with a nib or projection locking behind an edge, such as of a second aperture. In the second embodiment of the invention a hollow collapsible resilient cylinder integral with the housing projects through the aperture, engaging the panel on the side opposite the housing.

DESCRIPTION OF THE DRAWINGS

A better understanding of the present invention and its organization and construction may be had by referring to the description below in conjunction with the accompanying drawings wherein:

FIG. 1 is an exploded perspective view of a connector element including side mounting means according to the invention, ready to be mounted to a surface of a mounting panel and to be interconnected with a complementary connector element;

FIG. 2 is an end plan view of the connector element of FIG. 1;

FIG. 3 is a side plan view of the electrical connector element of FIG. 2;

FIG. 4 is a side sectional view of the electrical connector of FIGS. 2 and 3, taken along the line 4—4 in FIG. 2 and shown mounted on its side on the surface of a mounting panel;

FIG. 5 is an exploded perspective view of an alternative embodiment of a connector element including side mounting means according to the invention, ready to be mounted to one surface of a mounting panel and to be interconnected with a mating connector element; and

FIG. 6 is an end view of the connector element of FIG. 5 shown mounted on its side on one surface of a mounting panel.

DETAILED DESCRIPTION

Referring now to the drawings more in detail, there is shown a separable electrical connector arrangement, designated generally by the numeral **10**, in FIG. 1 thereof. The connector arrangement comprises a pair of complementary connector elements, **12** and **14**, respectively. As shown in the figure, connector element **12** is the male or plug element and connector element **14** is the female or receptacle element.

Each of the connector elements, **12** and **14** is of a one-piece molded plastic construction. The plug element **12** includes a body **16**, the leading end **18** of which has a polygonal cross-sectional shape (FIG. 2) comprising six interconnected side walls **20**, **22**, **24**, **26**, **28** and **30**, opposing walls **22** and **30** thereof being longer than the others and parallel to one another. A cavity **32** is defined by the aforesaid walls within the leading end **18** of the body **16** to house the leading ends **34** of a plurality of male terminals **36** extending through the plug body **16**. (The terminals preferably of the type

shown in John H. Krehbiel U.S. Pat. 3,178,673, for Wire Connector.) The trailing end 38 of the plug body comprises a plurality of interconnected, integrally formed, cylindrical or tubular members 40, each one of the members communicating with cavity 32 in the leading end 18 of the plug body 16. The terminals are each connected to an external wire 42 and terminals are inserted into respective tubular members 40 from the ends 44 thereof, until the leading ends 34 of the terminals extend outwardly into cavity 32 as shown in FIG. 1. Each of the terminals includes a pair of tabs 46 (FIG. 3) which serve to retain the wired terminal in the plug body 16.

The female or receptacle element 14, like the plug element 12, includes six side walls which are interconnected to form a similarly shaped element. The female element however is small enough to be received in cavity 32 in telescopic relation with the plug body 16 so that the wired female terminals 48, imbedded therein, may be joined with the male terminal ends in cavity 32.

A lock arrangement comprising a wedge-shaped nib 50 formed on and extending from one side wall of the female receptacle and an aperture 52 in the corresponding side wall of the male plug body, is provided to secure the elements to each other. The wedge-shaped nib 50 fits into aperture 52 upon the joining of the two connector elements.

Along side wall 20 of the male plug element 12, there is formed, integrally therewith, a platform 54. The platform 54 extends substantially the length of the connector element along wall 20 as well as along the end tubular members 40, and is slightly wider than the wall 20, extending outwardly from or overhanging the sides 56 and 58 thereof. Integrally formed with the platform 54 is a pair of guide members 60 and 62 extending outwardly a predetermined distance from the plane of the platform 54. Formed with and extending from the guide members in a direction away from the leading ends of the terminals 36, is a resilient arm 64. The arm 64 extends substantially parallel to the platform 54, and is spaced therefrom. A hole 67 is formed between guide members 60, 62 and arm 64. Near the free end 66 of the arm 64 there is an inwardly facing locking nib 68, having an inclined surface 70 along one end thereof and a right angle shoulder 72 on the opposite end. The free end 66 of the arm 64 is likewise inclined at an angle equal to that of the inclined surface 70 of the nib 68 and extends in a like direction to form a continual surface therewith (FIG. 3). As will be described hereinafter, the inclined surfaces are provided for easy mounting of the connector element.

A mounting panel 74 is provided for mounting the male connector element thereon by means of resilient arm 64. The mounting panel, as can be seen in FIG. 1, includes a pair of apertures 76 and 78, extending therethrough. Aperture 76 is elongated and rectangularly shaped, having a length *a* and width *b*. The second aperture 78 is located adjacent the first aperture 76, spaced therefrom by a section 80 of a predetermined length *c* of mounting panel 74. The aperture 78 is substantially square-shaped, the sides thereof being of a length *d* slightly less than the width *b* of aperture 76. The apertures facilitate the mounting of connector element 12 to the mounting panel. As is shown in FIG. 4, the arm 64 extends through elongated aperture 76, and nib 68 extends back into aperture 78 to lock the arm 64 and connector element 12 to the mounting panel. Guide members 60 and 62 which are spaced apart a distance substantially equal to the width *b* of aperture 76 serve to align arm 64 in aperture 76 and thereby to align nib 68 in aperture 78.

For purposes of affording a more complete understanding of the invention, it is advantageous now to provide a functional description of the mode in which the components parts thus far described cooperate.

To mount the connector element 12 on the mounting panel 74 as shown in FIG. 4, the free end 66 of resilient arm 64 is inserted into aperture 76 from surface 82 of the panel, near end 84 of the aperture (FIGS. 1 and 4). The width of the arm 64 is approximately equal to the width *b* of aperture 76, thus arm 64 is received easily in the aperture. The arm 64 is pushed entirely through aperture 76 with the members 60 and 62 guiding the arm therein until surface 82 of the panel 74 rests against platform 54 of the connector element 12.

As the element 12 is moved in the direction of the arrow 90 (FIG. 1), the inclined surface 70 of nib 68 on the arm 64 comes into contact with edge 86 of aperture 76. An additional application of force causes the inclined surface 70 to cam over the edge 86 and to spring resilient arm 64 outwardly from the opposite surface 88 of panel 74. Continued movement draws surface 70 over section 80 of the panel until nib 68 reaches the second aperture 78. At this time nib 68 is, by the spring action of the resilient arm 64, received in aperture 78. As can be seen in FIG. 4, shoulder 72 of nib 68 grips edge 92 of the panel along aperture 78 to lock the connector element to surface 82 of the mounting panel.

After connector element 12 has been mounted on panel 74 as described, the complementary connector element 14 may be inserted into cavity 32 of element 12, so as to join the two.

To remove the connector element 12 from the mounting panel 24, the end 66 of resilient arm 64 is lifted away from surface 88 of the panel (FIG. 4). This movement releases shoulder 72 from the edge 92 of the periphery of aperture 78 and allows the connector element 12 to be moved toward aperture 76.

Arm 64 is then drawn through aperture 76 and the connector element 12 is thereby separated from the panel.

An alternative embodiment of a side-mounted connector element is shown in FIGS. 5 and 6 of the drawings, wherein like numerals have been employed with the addition of the suffix *a* to designate similar parts.

The alternative connector arrangement 10*a* of FIG. 5 comprises a pair of complementary connector elements 12*a* and 14*a*. In this case, however, the element 14*a* includes the male terminals (not shown) and element 12*a* includes the female terminals 94. Furthermore, a locking arrangement including a nib 50*a* and aperture 52*a* in respective connector elements is provided to secure the elements together; nib 50*a* being on a side wall of the receptical connector element and aperture 52*a* being in a corresponding side wall of the plug element.

The connector element 12*a* like element 12 of FIGS. 1–4, includes a mounting arrangement for mounting the element on its side on one surface 82*a* of a mounting panel 74*a* (FIG. 5). The mounting arrangement comprises a block 96 formed integrally with and extending outwardly from one side 98 of the connector element 12*a*. Formed integrally therewith is a resilient plastic base member 100 which is Y-shaped in cross section. The support leg 102 of the Y is connected to the block 96 and the other two legs 104, 106 thereof extend outwardly therefrom. A resilient end section 108 which is U-shaped in cross-section is connected at the legs of the U to the outwardly extending legs 104 and 106 of the mounting member 100 to form a resilient, easily compressible mounting member 110, having a hollow center 112 extending longitudinally thereof.

The mounting panel 74*a* includes an aperture 114 therethrough, the aperture being dimensioned to receive mounting member 110 therein. To mount the connector element to the mounting panel 74*a*, the mounting member 110 is merely inserted into aperture 114 in the panel from one surface 82*a* thereof (FIG. 5). The member 110 collapses as it is forced through the aperture 114. Upon being pushed through the panel 74*a*, the member returns to its normal condition. At this time surface 116 of the block 96 is resting on surface 82*a* of the panel and a pair of shoulders 118 and 120 formed at the juncture of the outwardly extending legs of base member 100 and the U-shaped section 108, overlays surface 88*a* of the

panel about aperture **114**, to secure the connector element to the panel (FIG. 6).

To release the connector element, the resilient section **108** is squeezed inwardly toward the hollow center **112** thereof to release shoulders **118** and **120**. This permits the removal of the mounting member **110** from within aperture **114** and in turn the removal of the connector element **12***a* from panel **74***a*.

Thus, a connector element according to the invention is easily and efficiently mounted on its side on one surface of a mounting panel. The connector element is quickly mounted and released from the panel without difficulty and with slight effort.

While particular embodiments of the invention have been shown and described, it should be understood that the invention is not limited thereto since many modifications may be made. It is therefore contemplated to cover by the present application any and all such modifications as fall within the true spirit and scope of the appended claims.

What is claimed is:

1. An electrical connector element for mounting on a support surface having an aperture therethrough, said connector element comprising: a housing, a plurality of terminals mounted in said housing for connection with terminals of a complementary connector element, and mounting means connected to side wall of said housing, said mounting means including a resilient member extending from said side wall, said member being insertable in said aperture in said support surface, thereby to mount said connector element on its side on said support surface, said support surface further including an edge spaced apart from said first-mentioned aperture; said resilient member comprising an arm having a first end thereof connected to said side wall and the second, free end of said arm extending outwardly along said side wall in spaced apart relation therewith, said free end including a locking nib thereon, said arm being receivable in said first-mentioned aperture from a first surface of said support surface, so as to bridge the space between said aperture and said edge, said locking nib being engageable with said edge from the opposite surface of said support surface, thereby to secure said connector element to the first surface of said support surface.

2. An electrical connector element as claimed in claim **1**, further including a platform portion interposed between said arm and said side wall, said platform portion being adapted to rest said electrical connector element securely against said first surface of said support surface upon mounting said connector element therein.

3. An electrical connector element as claimed in claim **1** wherein said locking nib includes at a first end thereof an inclined surface and at the opposite end thereof a shoulder portion, said inclined surface being adapted to cam over the edge of said aperture nearest said one edge upon the mounting of said connector element to said support surface, thereby to cause the shoulder portion of said locking nib to engage said one edge to lock said arm and connector element to said support surface.

4. An electrical connector element as claimed in claim **2** further including guide means interposed between said platform portion and said first end of said arm, said guide means being substantially equal to the width of said first aperture, for correctly aligning said arm and locking nib on said support surface.

5. An electrical connector element as claimed in claim **4** wherein said guide means comprise a pair of spaced apart guide members connecting said first end of said arm to said platform portion.

6. In combination: an electrical connector element including a housing having a plurality of wired terminals mounted therein and being exposed at one end of said housing for engagement with terminals of a complementary connector element, mounting means extending from a side wall of said housing and including a resilient arm member attached at one end thereof to said side wall, the opposite free end of said arm member extending outwardly along said side wall in spaced-apart relation therewith and having a raised nib extending into the space between the side wall and arm member, and a mounting panel including first and second apertures therethrough, said apertures being spaced apart with a predetermined section of said mounting panel therebetween, said first aperture receiving said arm member from a first surface of said panel so that said arm member extends therethrough toward said second aperture in bridging relation with said panel section, said raised nib being received in said second aperture from the opposite surface of said mounting panel, thereby to lock said connector element to the first surface of said panel.

7. The combination of claim **6** wherein said connector element and mounting means are of a plastic insulating material and formed integrally with each other, wherein said mounting means further includes a flat platform portion interposed between said arm member and the side wall of said housing, said platform resting on said first surface of said panel upon mounting said connector element thereto, and wherein said nib includes on one end thereof, a shoulder portion for engaging the panel along the edge of said second aperture, thereby to lock said connector element to said panel.

8. The combination of claim **7**, wherein said mounting means further includes a pair of outwardly extending spaced-apart elements interposed between said platform portion and said one end of said resilient arm member, the outside width of said elements being substantially equal to the width of said first aperture so that said elements align said arm member and nib upon receiving the latter in one of said respective apertures.

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RICHARD E. MOORE, Primary Examiner