

PATENT SPECIFICATION

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(54) IMPROVEMENTS IN AND RELATING TO ELECTRICAL CONNECTOR HOUSINGS

(71) We, AMP INCORPORATED a corporation organised and existing under the laws of the State of New Jersey, United States of America, of Eisenhower Boulevard, Harrisburg, Pennsylvania, United States of America, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

The present invention relates to electrical connector housings for mounting in profiled apertures of apertured panels.

According to the present invention, an electrical connector housing for mounting in a profiled aperture of an apertured panel, comprises a block of electrically insulating material having a through passageway extending from a forward mating surface to an opposite rear surface of the block for receiving an electrical contact, substantially identical resiliently deformable biasing bars provided on opposite side surfaces of the block and arranged parallel to the forward and rear surfaces and bosses provided on opposite side surfaces of the block, the biasing bars co-operating with the bosses to grip resiliently between them marginal edge portions of the panel when the housing is operatively mounted in the aperture, and a resilient latching bar arranged parallel to the forward and rear surfaces of the block, the aperture being profiled so that when the block is passed through the aperture the bosses pass through the aperture and lie behind the rear surface of the panel whilst the biasing bars and the latching bar are resiliently deformed by engagement with the front surface of the panel, the block being movable parallel to the plane of the panel until the latching bar projects into the aperture and the bosses engage the rear

surface of the panel whilst the biasing bars maintain engagement with the front surface of the panel.

In a preferred embodiment, a flange extends around the block laterally outwardly of the block, the biasing bars being formed from the material of the flange on a first pair of opposite side surfaces of the block each biasing bar having a central lug extending outwardly from the bar in two directions towards the front and rear surfaces of the block, the latching bar also having a central lug extending from the latching bar in two directions towards the front and rear surfaces of the block. The latching bar being formed from the material of the flange and arranged parallel to and positioned inwardly between one biasing bar and the adjacent side surface of the block, the bosses being spaced from the flange and arranged on opposite sides of the flange on a second pair of opposite side surfaces of the block.

An embodiment of the invention will now be described, by way of example, reference being made to the Figures of the accompanying diagrammatic drawings in which:—

Figure 1 is an exploded perspective view of an electrical connector assembly;

Figure 2 is a partially exploded perspective view of the electrical connector assembly of Figure 1, a female connector of which is mounted in an aperture of an apertured panel;

Figure 3 is a side elevation, partly in cross-section showing the female connector fully inserted into the panel aperture;

Figure 4 is a side elevation, similar to Figure 3 showing the female connector in its final position after a movement in the plane of the panel;

Figure 5 is a cross-section taken along line 5—5 of Figure 3;

Figure 6 is a cross-section taken along line 6-6 of Figure 3;

Figure 7 is a perspective view of a cable clamp;

Figure 8 is a detail showing a plurality of profiled cable clamp receiving recesses; and

Figure 9 is a detail showing the cable clamp positioned in one of the cable clamp receiving recesses.

As shown, an electrical connector assembly includes a female connector 10 and a male connector 12. The female connector is shown in Figure 2 mounted in an aperture of an apertured panel 14. However, both connectors 10, 12 have substantially identical mounting means so that either connector can be detachably mounted in the panel 14.

The female connector 10 comprises a housing including a substantially rectangular block 16 of electrically insulating material having a forward mating surface 18 surrounded by a hood 20 and an opposite rear surface 19. Located in the mating surface 18 is a threaded hole 22. A plurality of contact pins 24 are mounted in through passageways in the block 16 extending from the forward mating surface 18 to the rear surfaced 19. Two pairs of polarizing ribs 26, 28 are formed integral with the inside of the hood 20. Extending around the block 16 and laterally outwardly therefrom is a flange 30. On each side of the flange 30, and spaced therefrom, are a plurality of rigid stepped bosses 32 integral with and on opposite side surfaces of the block 16. Substantially identical biasing bars 34 are formed from the material of the flange 30 on a different pair of opposite side surfaces of the block 16 each having a substantially centrally located biasing lug 36 extending from opposite sides of the biasing bar. The biasing bars 34 are arranged parallel to the forward and rear surfaces 18, 19. Also formed from the material of the flange 30 and spaced from but parallel to one of the biasing bars 34, is a latching bar 38 having a substantially centrally located lug 40 extending from opposite sides thereof.

The male connector 12 comprises a housing including a substantially rectangular block 42 having two pairs of grooves 44 adapted to receive the ribs 26, 28 of the female connector 10. The male connector 12 also has a plurality of contact receiving through passageways 46 extending from a forward mating surface to an opposite rear surface 49. A plurality of receptacle terminals (not shown) are mounted in respective passageways 46. A jackscrew 50 passes through the block 42 and is positioned to engage in the threaded aperture 22 of the female connector 10. A flange 52 extends integrally from the block 42 in the same manner as the flange 30 of the

female connector 10. A plurality of rigid stepped bosses 54 integral with the body portion 42 are provided on opposite side surfaces of the block 42 and are spaced from and arranged on opposite sides of the flange 52. Substantially identical biasing bars 58 are formed from the material of the flange 52 on a different pair of opposite side surfaces of the block 42, each bar 58 having a centrally located lug 60 extending from opposite sides of the biasing bar 58. A latching bar 62 extends across one end of the flange 52 parallel to and spaced from one biasing bar 58. The latching bar 62 has a centrally located, integral lug 64 extending from opposite sides thereof. The biasing bars 58 and latching bar 62 are arranged parallel to the forward and rear surfaces of the block 42. A pair of housing shell members 66, 68 are arranged to enclose the rear of the block 42 and are substantial mirror images of one another apart from an integral abutment 74 on the housing shell member 68 which limits rotary movement of the jackscrew 50. The housing shell members 66, 68 are secured together by bolts 70. Each shell member includes an inwardly directed flange 72 adapted to engage some of the bosses 54.

A cable strain relief device includes a cable clamp 76 having first and second cooperating members 78, 80 which are secured together by means of bolts 82. One member 78 has a T-shaped end profile which is adapted to be received in a selected one of the profiled recesses 86, 88, 90 in the housing shell members. These recesses 86, 88, 90 are angularly positioned with respect to each other so that the cable clamp 76, and the cable secured thereby, can be fixed to the shell members 66, 68 in either one of three different angular orientations.

The steps of mounting a connector 10 or 12 in a profiled aperture in a panel 14 will be described with reference to Figures 2 to 6. These Figures show the mounting of the female connector 10 but the male connector 12 could be mounted in a similar manner.

The profiled aperture 94 in the panel 14 is an elongated, rectangular opening with a plurality of recesses 96 spaced along two opposite sides thereof with a spacing and alignment equal to the spacing between the bosses 32 of the female connector 10 to be received. The overall profile of the aperture 94 corresponds substantially with that of the block 16 to be received therein with the exception that it is slightly longer. The female connector 10 is initially inserted into the aperture 94, as shown in Figure 3, with the bosses 32 in general alignment with the recesses 96. The bosses 32 pass through the recesses 96, as shown in Figure 3, and the flange 30 is pressed firmly against the front surface of the panel 14 until the bosses 32 lie

behind the rear surface of the panel 14. In this position, both the biasing bars 34 and the latching bar 38 will be resiliently deformed by engagement of their respective lugs 36, 40 against the front surface of the panel 14. The biasing bars 34 and latching bar 38 will assume the configurations shown in Figures 5 and 6 respectively. The block 16 is then moved in the plane of the panel 14 (downwardly as shown) until the latching bar 38 clears the upper edge 98 of aperture 94 and will resume its normal position with the lug 40 extending into the aperture 94, as shown in Figure 4. In this position the bosses 32 lie behind the panel 14 adjacent to, but not in alignment with, the recesses 96 in the panel. In other words, the bosses 32 engage the rear surface of the panel 14 whilst the biasing bars 34 maintain engagement with the front surface of the panel 14.

The stepped configuration of the bosses 32 allows the block 16 to be mounted on panels of different thicknesses. By having bosses 32 on both sides of the flange 30, the block 16 can be detachably mounted from either the front or the rear of a panel 14. Further, while only a single step has been shown in each of the bosses, more than one step can be provided or, alternatively, the steps in the bosses on the opposite sides of the flange 30 can be of different heights to accommodate a number of different panel thicknesses.

As another alternative, the biasing bars and/or the latching bar can be formed by pairs of cantilever beams and the biasing bars can be located on the same side surfaces of the block as the bosses.

A modified cable strain relief device will be described with reference to Figures 7 to 9. The cable clamp 76' is shown in Figure 7 with a cable 92 being shown in phantom. The clamp 76' has first and second cooperating members 78', 80' and is assembled onto a cable and secured by the bolts 82'. The member 78' has a T-shaped end profile 84'. Figure 8 shows a side elevation of the housing shell member 66 with the recesses 86, 88 and 90 being clearly illustrated. Recesses 86 and 88 extend substantially normal to one another and the third recess 90 intersects and bisects the angle defined by the first two recesses. Each recess has an overall T-shaped configuration. The cable clamp is mounted or positioned in the shell members with the T-shaped end profile 84' received in one of the recesses as shown in Figure 9. The housing shell members 66, 68 are then assembled together by means of bolts 70.

WHAT WE CLAIM IS:—

1. An electrical connector housing for mounting in a profiled aperture of an apertured panel, comprising a block of

electrically insulating material having a through passageway extending from a forward mating surface to an opposite rear surface of the block for receiving an electrical contact, substantially identical resiliently deformable biasing bars provided on opposite side surfaces of the block and arranged parallel to the forward and rear surfaces and bosses provided on opposite side surfaces of the block, the biasing bars co-operating with the bosses to grip resiliently between them marginal edge portions of the panel when the housing is operatively mounted in the aperture, and a resilient latching bar arranged parallel to the forward and rear surfaces of the block the aperture being profiled so that when the block is passed through the aperture the bosses pass through the aperture and lie behind the rear surface of the panel whilst the biasing bars and the latching bar are resiliently deformed by engagement with the front surface of the panel, the block being movable parallel to the plane of the panel until the latching bar projects into the aperture and the bosses engage the rear surface of the panel whilst the biasing bars maintain engagement with the front surface of the panel.

2. An electrical connector housing as claimed in Claim 1, in which a flange extends around the block laterally outwardly of the block, the biasing bars being formed from the material of the flange on a first pair of opposite side surfaces of the block each biasing bar having a central lug extending outwardly from the bar in two directions towards the front and rear surfaces of the block, the latching bar also having a central lug extending from the latching bar in two directions towards the front and rear surfaces of the block, the latching bar being formed from the material of the flange and arranged parallel to and positioned inwardly between one biasing bar and the adjacent side surface of the block, the bosses being spaced from the flange and arranged on opposite sides of the flange on a second pair of opposite side surfaces of the block.

3. An electrical connector housing as claimed in Claim 1 or 2, in which each boss has a stepped configuration on the surface facing the flange.

4. An electrical connector housing as claimed in Claim 1, 2 or 3, in which the housing includes a pair of co-operating shell members each having a plurality of recesses angularly positioned with respect to each other, and a cable clamp adapted to fit into a selected one of the recesses.

5. An electrical connector housing, constructed and arranged substantially as herein described with reference to and as illustrated in the Figures of the accompanying drawings.

behind the rear surface of the panel 14. In this position, both the biasing bars 34 and the latching bar 38 will be resiliently deformed by engagement of their respective lugs 36, 40 against the front surface of the panel 14. The biasing bars 34 and latching bar 38 will assume the configurations shown in Figures 5 and 6 respectively. The block 16 is then moved in the plane of the panel 14 (downwardly as shown) until the latching bar 38 clears the upper edge 98 of aperture 94 and will resume its normal position with the lug 40 extending into the aperture 94, as shown in Figure 4. In this position the bosses 32 lie behind the panel 14 adjacent to, but not in alignment with, the recesses 96 in the panel. In other words, the bosses 32 engage the rear surface of the panel 14 whilst the biasing bars 34 maintain engagement with the front surface of the panel 14.

The stepped configuration of the bosses 32 allows the block 16 to be mounted on panels of different thicknesses. By having bosses 32 on both sides of the flange 30, the block 16 can be detachably mounted from either the front or the rear of a panel 14. Further, while only a single step has been shown in each of the bosses, more than one step can be provided or, alternatively, the steps in the bosses on the opposite sides of the flange 30 can be of different heights to accommodate a number of different panel thicknesses.

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3. An electrical connector housing as claimed in Claim 1 or 2, in which each boss has a stepped configuration on the surface facing the flange.

4. An electrical connector housing as claimed in Claim 1, 2 or 3, in which the housing includes a pair of co-operating shell members each having a plurality of recesses angularly positioned with respect to each other, and a cable clamp adapted to fit into a selected one of the recesses.

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