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(54) STRAIN RELIEF DEVICE FOR ELECTRICAL CONNECTORS

(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 strain relief devices for releasable connection to electrical connector housings and to electrical connector assemblies including strain relief devices.

According to one aspect of the present invention, a strain relief device for releasable connection to an electrical connector housing, the housing having a pair of spaced apertures for receiving legs of the device, comprises first and second members each having a pair of spaced, parallel legs extending in the same direction from a body, each leg having at its free end extending laterally of the leg, the foot having a rounded heel, the feet of the first member extending in the same direction, the direction being opposite to the direction in which the feet of the second member extend, a recess in each body, the recesses defining between them an aperture, means for releasably connecting the bodies together, the connecting means being adjustable to permit adjustment of the aperture size, the legs on each member being adapted to pass through the apertures in the housing with the heels of one pair of feet immediately adjacent the respective heels of the other pair of feet so that the members can be pivoted towards and away from each other about the adjacent heels whilst being releasably connected to the housing by the feet.

According to a further aspect of the present invention, an electrical connector assembly comprises an electrical connector housing of insulating material having a plurality of through passageways extending from

a rear surface to an opposite front surface, each passageway containing an electrical connector terminating an end of a conductor wire, the conductor wires extending rearwardly from the rear surface of the housing, the housing having adjacent the rear surface a pair of spaced apertures and a strain relief device comprising first and second members each having a pair of spaced, parallel legs extending in the same direction from the body and passing through the apertures in the housing, each leg having a foot at its free end extending laterally of its leg the foot having a rounded heel, the feet of the first member extending in the same direction, said direction being opposite to the direction in which the feet of the second member extend so that the heels of one pair of feet are immediately adjacent the respective heels of the other pair of feet to permit the members to pivot towards and away from each other about the adjacent heels whilst being releasably connected to the housing by the feet, a recess in each body, the recesses defining between them an aperture through which the conductor wires extend, means connecting the bodies together, the connecting means being adjustable to permit adjustment of the aperture size to accommodate and provide a strain relief for the conductor wires.

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 perspective view with parts in section of the electrical connector assembly of Figure 1 with a strain relief device in its closed, operative position; and

Figure 3 is a perspective view similar to that of Figure 2 with the strain relief device in an open position.

As shown in Figure 2, an electrical connector assembly comprises an electrical connector housing 2 of insulating material hav-

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ing a plurality of through passageways 4 extending from a rear surface 6 to an opposite front surface (not shown), a plurality of electrical connectors (not shown) each positioned in a passageway 4 and terminating an end of a conductor wire 8 and a strain relief device 10.

Referring also to Figures 1 and 3, the housing 2 has a flange 12 which extends from opposite sides of the housing 2 at the rear surface 6. Spaced apertures 14, 16 extend through the flange 12 on opposite sides of the housing 2. The conductor wires 8 extend rearwardly from the rear surface 6 of the housing 2.

The strain relief device 10 comprises first and second members 20, 22. Member 20 has a pair of spaced, parallel legs 24, 26 extending in the same direction from a body 28. Each leg 24, 26 has a foot 30, 32 at its free end extending laterally of the leg 24, 26 and having a rounded heel 38, 40. A stop 34, 36 is provided on each leg 24, 26 adjacent the foot 30, 32. The body 28 includes a flange 42 in which is formed a recess 44 having a surface 46 and a bevelled surface 48. The flange 42 has a bevelled surface 50 formed in a portion 52 of reduced thickness which portion defines a shoulder 54. A clearance hole 56 is formed through the body 28 for receiving a screw 58 and a blind hole 60 is formed in the body 28 for receiving a screw 62.

Member 22 is similar to member 20 in that it includes a pair of spaced, parallel legs 74, 76 extending in the same direction from a body 78. Each leg 74, 76 has a foot 80, 82 at its free end extending laterally of the leg 74, 76 and having a rounded heel 88, 90. A stop 84, 86 is provided on each leg 74, 76 adjacent the foot 80, 82. The body 78 includes a flange 92 in which is formed a recess 94 having a surface 96 and a bevelled surface 98. The flange 92 has a bevelled surface 100 formed in a portion 102 of reduced thickness which defines a shoulder 104. A clearance hole 106 is formed through the body 78 for receiving the screw 62 and a blind hole 110 is formed in the body 78 for receiving the screw 58.

On assembly, the legs 24, 26; 74, 76 are passed through respective apertures 14, 16 as shown in Figure 3 so that the feet 30, 32; 80, 82 engage behind the flange 12. In this position, the heels of each pair of feet are immediately adjacent the respective heels of the other pair of feet so that the members can be pivoted towards and away from each other whilst being releasably connected to the housing 2. The members 20, 22 are pivoted apart as shown in Figure 3 so that the conductor wires 8 extend between them. The members 20, 22 are then pivoted together and screws 58, 62 are passed through their respective holes to draw the bodies

28, 78 together and thereby engage the conductor wires 8 with the surfaces 46, 96 of the recesses 44, 94 which define an aperture through which the conductor wires 8 pass. The screws 58, 62 can be tightened to adjust the aperture size until sufficient strain relief effect is achieved.

In the present embodiment, the screws 58, 62 are self-tapping and form their own threads in the blind holes 60, 110.

The steps 34, 36 limit axial movement of the legs 24, 26; 74, 76 through the apertures 14, 16.

In the closed, operative, strain relief position shown in Figure 2, the bodies 28, 78, in effect, interdigitate with a portion of flange 42 extending over the bevelled surface 100 and a portion of flange 92 extending over the bevelled surface 50. The two bodies 28, 78 thereby become interlocked and relative axial movement is inhibited.

In the condition in which the screws 58, 62 are tightened to adjust the aperture to its smallest size, a portion of flange 42 will abut shoulder 104 and a portion of flange 92 will abut shoulder 54.

WHAT WE CLAIM IS:—

1. A strain relief device for releasable connection to an electrical connector housing, the housing having a pair of spaced apertures for receiving legs of the device, comprising first and second members each having a pair of spaced, parallel legs extending in the same direction from a body, each leg having a foot at its free end extending laterally of the leg, the foot having a rounded heel, the feet of the first member extending in the same direction, the direction being opposite to the direction in which the feet of the second member extend, a recess in each body, the recesses defining between them an aperture, means for releasably connecting the bodies together, the connecting means being adjustable to permit adjustment of the aperture size, the legs on each member being adapted to pass through the apertures in the housing with the heels of one pair of feet immediately adjacent the respective heels of the other pair of feet so that the members can be pivoted towards and away from each other about the adjacent heels whilst being releasably connected to the housing by the feet.

2. A device as claimed in claim 1, in which each recess has a bevelled surface.

3. A device as claimed in claim 1 or 2, in which a stop is provided on each leg adjacent its foot for limiting movement of the leg within its respective aperture in the housing.

4. An electrical connector assembly comprising an electrical connector housing of insulating material having a plurality of through passageways extending from a rear

ing a plurality of through passageways 4 extending from a rear surface 6 to an opposite front surface (not shown), a plurality of electrical connectors (not shown) each positioned in a passageway 4 and terminating an end of a conductor wire 8 and a strain relief device 10.

Referring also to Figures 1 and 3, the housing 2 has a flange 12 which extends from opposite sides of the housing 2 at the rear surface 6. Spaced apertures 14, 16 extend through the flange 12 on opposite sides of the housing 2. The conductor wires 8 extend rearwardly from the rear surface 6 of the housing 2.

The strain relief device 10 comprises first and second members 20, 22. Member 20 has a pair of spaced, parallel legs 24, 26 extending in the same direction from a body 28. Each leg 24, 26 has a foot 30, 32 at its free end extending laterally of the leg 24, 26 and having a rounded heel 38, 40. A stop 34, 36 is provided on each leg 24, 26 adjacent the foot 30, 32. The body 28 includes a flange 42 in which is formed a recess 44 having a surface 46 and a bevelled surface 48. The flange 42 has a bevelled surface 50 formed in a portion 52 of reduced thickness which portion defines a shoulder 54. A clearance hole 56 is formed through the body 28 for receiving a screw 58 and a blind hole 60 is formed in the body 28 for receiving a screw 62.

Member 22 is similar to member 20 in that it includes a pair of spaced, parallel legs 74, 76 extending in the same direction from a body 78. Each leg 74, 76 has a foot 80, 82 at its free end extending laterally of the leg 74, 76 and having a rounded heel 88, 90. A stop 84, 86 is provided on each leg 94, 76 adjacent the foot 80, 82. The body 78 includes a flange 92 in which is formed a recess 94 having a surface 96 and a bevelled surface 98. The flange 92 has a bevelled surface 100 formed in a portion 102 of reduced thickness which defines a shoulder 104. A clearance hole 106 is formed through the body 78 for receiving the screw 62 and a blind hole 110 is formed in the body 78 for receiving the screw 58.

On assembly, the legs 24, 26; 74, 76 are passed through respective apertures 14, 16 as shown in Figure 3 so that the feet 30, 32; 80, 82 engage behind the flange 12. In this position, the heels of each pair of feet are immediately adjacent the respective heels of the other pair of feet so that the members can be pivoted towards and away from each other whilst being releasably connected to the housing 2. The members 20, 22 are pivoted apart as shown in Figure 3 so that the conductor wires 8 extend between them. The members 20, 22 are then pivoted together and screws 58, 62 are passed through their respective holes to draw the bodies

28, 78 together and thereby engage the conductor wires 8 with the surfaces 46, 96 of the recesses 44, 94 which define an aperture through which the conductor wires 8 pass. The screws 58, 62 can be tightened to adjust the aperture size until sufficient strain relief effect is achieved.

In the present embodiment, the screws 58, 62 are self-tapping and form their own threads in the blind holes 60, 110.

The steps 34, 36; 84, 86 limit axial movement of the legs 24, 26; 74, 76 through the apertures 14, 16.

In the closed, operative, strain relief position shown in Figure 2, the bodies 28, 78, in effect, interdigitate with a portion of flange 42 extending over the bevelled surface 100 and a portion of flange 92 extending over the bevelled surface 50. The two bodies 28, 78 thereby become interlocked and relative axial movement is inhibited.

In the condition in which the screws 58, 62 are tightened to adjust the aperture to its smallest size, a portion of flange 42 will abut shoulder 104 and a portion of flange 92 will abut shoulder 54.

WHAT WE CLAIM IS:—

1. A strain relief device for releasable connection to an electrical connector housing, the housing having a pair of spaced apertures for receiving legs of the device, comprising first and second members each having a pair of spaced, parallel legs extending in the same direction from a body, each leg having a foot at its free end extending laterally of the leg, the foot having a rounded heel, the feet of the first member extending in the same direction, the direction being opposite to the direction in which the feet of the second member extend, a recess in each body, the recesses defining between them an aperture, means for releasably connecting the bodies together, the connecting means being adjustable to permit adjustment of the aperture size, the legs on each member being adapted to pass through the apertures in the housing with the heels of one pair of feet immediately adjacent the respective heels of the other pair of feet so that the members can be pivoted towards and away from each other about the adjacent heels whilst being releasably connected to the housing by the feet.

2. A device as claimed in claim 1, in which each recess has a bevelled surface.

3. A device as claimed in claim 1 or 2, in which a stop is provided on each leg adjacent its foot for limiting movement of the leg within its respective aperture in the housing.

4. An electrical connector assembly comprising an electrical connector housing of insulating material having a plurality of through passageways extending from a rear



surface to an opposite front surface, each
passageway containing an electrical connec-
tor terminating an end of a conductor wire,
the conductor wires extending rearwardly
5 from the rear surface of the housing, the
housing having adjacent the rear surface a
pair of spaced apertures and a strain relief
device comprising first and second members
each having a pair of spaced, parallel legs
10 extending in the same direction from the
body and passing through the apertures in
the housing, each leg having a foot at its
free end extending laterally of its leg the
foot having a rounded heel, the feet of the
15 first member extending in the same direc-
tion, said direction being opposite to the
direction in which the feet of the second
member extend so that the heels of one pair
of feet are immediately adjacent the respec-
20 tive heels of the other pair of feet to permit
the members to pivot towards and away
from each other about adjacent heels whilst
being releasably connected to the housing by
the feet, a recess in each body, the recesses
25 defining between them an aperture through

which the conductor wires extend, means
connecting the bodies together, the connect-
ing means being adjustable to permit adjust-
ment of the aperture size to accommodate
and provide a strain relief for the conductor
30 wires.

5. An assembly as claimed in claim 4,
in which each recess has a bevelled surface.

6. An assembly as claimed in claim 4 or
5, in which a stop is provided on each leg
35 adjacent its foot which stop engages the
rear surface of the housing.

7. A strain relief device constructed and
arranged substantially as hereinbefore de-
scribed with reference to and as illustrated
40 in the Figures of the accompanying drawings.

8. An electrical connector assembly con-
structed and arranged substantially as here-
inbefore described with reference to and as
45 illustrated in the Figures of the accompany-
ing drawings.

For the Applicants:
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