

Description

Field of the Invention

This invention generally relates to the art of electrical connectors and, particularly, to an anti-vibration electrical connector which has means for relieving stress in an anti-vibration arm thereof.

Background of the Invention

Electrical connectors are used in a variety of applications or environments wherein it is desirable or necessary to protect the connector components or the mating connection of the connector with a complementary connector from vibrations due to the mounting of the connector. The applications can range from automobiles to refrigerators and countless other environments.

Likewise, the provision of anti-vibration means can take a wide range of forms, from fastening means for rigidly fixing the connector to its support, to more versatile means such as snap-action mounting means.

For instance, a connector housing of the type disclosed in document US-A-3523269 can be molded with an integral anti-vibration arm which is yieldable or sufficiently flexible to bias the connector against its mount and to take up any slack therebetween which might otherwise result in rattling of the connector in response to vibrations. The anti-vibration arm could engage and yield against one side of a panel, for instance, in a panel-mounted connector, or the anti-vibration arm might yieldably engage an abutment surface on a complementary connector.

One of the problems with using anti-vibration arms, flanges, or the like which are integral with a molded dielectric connector housing, is that the anti-vibration means are subject to stresses, particularly when cantilevered outwardly from a substantially rigidified housing wall. Dielectric housings of most connectors are fabricated of plastic material, and the cantilevered anti-vibration arms, flanges or the like too often are subject to breakage when encountering undue stress.

This invention is directed to solving these problems by providing a new and improved electrical connector which includes stress relief means in its anti-vibration means.

Summary of the Invention

An object, therefore, of the invention is to provide an electrical connector with anti-vibration means in which is incorporated stress relief means.

In the exemplary embodiment of the invention, the electrical connector is adapted for mounting in an aperture in a panel or the like and includes an appro-

priate housing. A yieldable or flexible anti-vibration arm projects from the housing for engaging the panel when the connector is mounted in the aperture to prevent vibration between the connector and the panel. Recess means are provided in the anti-vibration arm at a location to relieve stress in the arm during yielding thereof.

As disclosed herein, the anti-vibration arm is cantilevered from a rigid wall of the housing, as where the wall is thickened or rigidified by a polarizing rib. The recess means is formed in the antivibration arm either at or near the portion of the arm close to the polarized rib and may be in the form of a hole or rectangular portion either partially or completely through the arm. The recess means in the specific embodiment comprises at least one through hole in the anti-vibration arm immediately adjacent the polarized rib. In the specific embodiment, the anti-vibration arm is generally L-shaped, with one leg of the L-shaped arm projecting toward the panel for engagement therewith and with the through hole being formed in the other leg of the L-shaped arm adjacent the housing.

Other objects, features and advantages of the invention will be apparent from the following detailed description taken in connection with the accompanying drawings.

Brief Description of the Drawings

The features of this invention which are believed to be novel are set forth with particularity in the appended claims. The invention, together with its objects and the following description taken in conjunction with the accompanying drawings, in which like reference numerals identify like elements in the figures and in which:

FIGURE 1 is a perspective view of an electrical connector incorporating the concepts of the invention; and

FIGURE 2 is a fragmented sectional view, on an enlarged scale, through the anti-vibration arm area of the connector illustrated in Figure 1, mounted to a panel and showing the anti-vibration arm yielding against the panel.

Detailed Description of the Preferred Embodiment

Referring to the drawings in greater detail, and first to Figure 1, an electrical connector, generally designated 10, is shown to include a housing 12 having passages therethrough (not shown) for receiving and positioning appropriate terminals. The passages communicate with apertures 14 at the front end of the connector, the apertures being provided for receiving tubular portions of a complementary electrical connector (not shown) which has terminals for mating with the terminals of connector 10. A latch ramp 16 is formed integrally with the top of housing 12 for snap-

ping engagement with a snap latch of the complementary connector. The entire connector housing 12 is integrally molded of dielectric material, such as plastic or the like.

Electrical connector 10 is designed as a panel-mounted connector for mounting in an aperture in a panel or the like. However, it should be understood that the anti-vibration means, including the stress relief means of the invention, can be used in a variety of applications where the connector is provided with an anti-vibration means, such as a cantilevered arm, a flange or the like.

With panel-mounted connector 10, a resilient latch finger 18 projects outwardly from opposite sides of the connector (only one latch finger 18 being visible in Fig. 1). The latch finger has a ramp surface 20 for positioning through the aperture in the panel to bias the finger inwardly in the direction of arrow "A" until a shoulder 22 snaps behind the side of the panel opposite the insertion direction of the connector.

Anti-vibration means in the form of a generally L-shaped anti-vibration arm, generally designated 24, projects outwardly from each opposite side of connector housing 12 spaced longitudinally from shoulder 22 of latch finger 18. The L-shaped arm includes one leg 26 projecting toward shoulder 22 and a panel sandwiched therebetween, and the other leg 28 of the L-shaped arm projects outwardly from a side wall 30 of housing 12 in a cantilevered fashion in contact with a polarized rib 32.

Referring to Figure 2 in conjunction with Figure 1, cantilevered anti-vibration arm 24 is shown with the distal end of leg 26 engaging a back side 34 of a panel 36. Latch finger 18 and its shoulder 22 are not visible in Figure 2, because the figure is a section through anti-vibration arm 24, and the arm is offset relative to the latch finger as can be seen in Figure 1. Nevertheless, when panel 36 is sandwiched between shoulder 22 and the distal end of leg 26 of the anti-vibration arm, the spacing therebetween is such that the arm yields in the direction of arrow "B" from its static position (shown by dotted lines) and its stressed position (shown in full lines). The stress without the stress relieving means 38 would be greatest at a point on leg 28 just above the polarized rib.

The invention contemplates providing stress relief means in anti-vibration arm 24 to minimize stress causes by yielding or flexing of the arm and to reduce or eliminate breakage of the arm. More particularly, recess means in the form of a through hole 38 is provided in leg 28 of the L-shaped arm. In other words, the hole is provided in the leg of the arm which is subject to flexing or bending relative to rigidified wall 30 of the connector housing.

In the preferred embodiment of the invention, through hole 38 is located immediately adjacent polarizing rib 32. The hole is in direct alignment with polarizing rib 32 and may be of substantially the same

cross-sectional dimensions as that of the rib. This arrangement and dimensioning is easily fabricated during integral molding of the entire electrical connector housing by a core-thru at the location of the stress relief hole. It will be understood that the invention may be embodied in other specific forms without departing from the central characteristics thereof. The present examples and embodiments, therefore, are to be considered in all respects as illustrative and not restrictive, and the invention is not to be limited to the details given herein.

Claims

1. An electrical connector (10) for mounting in an aperture in a panel, comprising:
 - a housing (12) thickened on an outer surface by polarizing means (32);
 - a yieldable anti-vibration arm (24) formed integral with said polarizing means (32) projecting from the housing for engaging said panel when the connector is mounted in the aperture to prevent vibration between the connector and the panel, characterized by recess means (38) in the anti-vibration arm having generally the same cross-sectional area as that of the polarizing means and at a location to relieve stress in the arm caused by said polarizing means during yielding.
2. The electrical connector (10) of claim 1 wherein said housing (12) includes a rigid wall (30) from which the anti-vibration arm (24) projects, and said recess means (38) is located adjacent the polarizing means (32).
3. The electrical connector (10) of claim 2 wherein said recess means (38) comprises at least one through hole in the anti-vibration arm (24).
4. The electrical connector (10) of claim 2 wherein said recess means (38) comprises at least one hole partially through the anti-vibration arm (24).
5. The electrical connector (10) of claim 4 wherein said hole (38) partially through the anti-vibration arm (24) takes a rectangular shape.
6. The electrical connector (10) of claim 1 wherein said polarizing means comprises an elongated rib.
7. The electrical connector (10) of claim 1 wherein said recess means (38) comprises at least one through hole in the anti-vibration arm (24).
8. The electrical connector (10) of claim 1 wherein



ping engagement with a snap latch of the complementary connector. The entire connector housing 12 is integrally molded of dielectric material, such as plastic or the like.

Electrical connector 10 is designed as a panel-mounted connector for mounting in an aperture in a panel or the like. However, it should be understood that the anti-vibration means, including the stress relief means of the invention, can be used in a variety of applications where the connector is provided with an anti-vibration means, such as a cantilevered arm, a flange or the like.

With panel-mounted connector 10, a resilient latch finger 18 projects outwardly from opposite sides of the connector (only one latch finger 18 being visible in Fig. 1). The latch finger has a ramp surface 20 for positioning through the aperture in the panel to bias the finger inwardly in the direction of arrow "A" until a shoulder 22 snaps behind the side of the panel opposite the insertion direction of the connector.

Anti-vibration means in the form of a generally L-shaped anti-vibration arm, generally designated 24, projects outwardly from each opposite side of connector housing 12 spaced longitudinally from shoulder 22 of latch finger 18. The L-shaped arm includes one leg 26 projecting toward shoulder 22 and a panel sandwiched therebetween, and the other leg 28 of the L-shaped arm projects outwardly from a side wall 30 of housing 12 in a cantilevered fashion in contact with a polarized rib 32.

Referring to Figure 2 in conjunction with Figure 1, cantilevered anti-vibration arm 24 is shown with the distal end of leg 26 engaging a back side 34 of a panel 36. Latch finger 18 and its shoulder 22 are not visible in Figure 2, because the figure is a section through anti-vibration arm 24, and the arm is offset relative to the latch finger as can be seen in Figure 1. Nevertheless, when panel 36 is sandwiched between shoulder 22 and the distal end of leg 26 of the anti-vibration arm, the spacing therebetween is such that the arm yields in the direction of arrow "B" from its static position (shown by dotted lines) and its stressed position (shown in full lines). The stress without the stress relieving means 38 would be greatest at a point on leg 28 just above the polarized rib.

The invention contemplates providing stress relief means in anti-vibration arm 24 to minimize stress-causes by yielding or flexing of the arm and to reduce or eliminate breakage of the arm. More particularly, recess means in the form of a through hole 38 is provided in leg 28 of the L-shaped arm. In other words, the hole is provided in the leg of the arm which is subject to flexing or bending relative to rigidified wall 30 of the connector housing.

In the preferred embodiment of the invention, through hole 38 is located immediately adjacent polarizing rib 32. The hole is in direct alignment with polarizing rib 32 and may be of substantially the same

cross-sectional dimensions as that of the rib. This arrangement and dimensioning is easily fabricated during integral molding of the entire electrical connector housing by a core-thru at the location of the stress relief hole. It will be understood that the invention may be embodied in other specific forms without departing from the central characteristics thereof. The present examples and embodiments, therefore, are to be considered in all respects as illustrative and not restrictive, and the invention is not to be limited to the details given herein.

Claims

1. An electrical connector (10) for mounting in an aperture in a panel, comprising:
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 - a yieldable anti-vibration arm (24) formed integral with said polarizing means (32) projecting from the housing for engaging said panel when the connector is mounted in the aperture to prevent vibration between the connector and the panel, characterized by recess means (38) in the anti-vibration arm having generally the same cross-sectional area as that of the polarizing means and at a location to relieve stress in the arm caused by said polarizing means during yielding.
2. The electrical connector (10) of claim 1 wherein said housing (12) includes a rigid wall (30) from which the anti-vibration arm (24) projects, and said recess means (38) is located adjacent the polarizing means (32).
3. The electrical connector (10) of claim 2 wherein said recess means (38) comprises at least one through hole in the anti-vibration arm (24).
4. The electrical connector (10) of claim 2 wherein said recess means (38) comprises at least one hole partially through the anti-vibration arm (24).
5. The electrical connector (10) of claim 4 wherein said hole (38) partially through the anti-vibration arm (24) takes a rectangular shape.
6. The electrical connector (10) of claim 1 wherein said polarizing means comprises an elongated rib.
7. The electrical connector (10) of claim 1 wherein said recess means (38) comprises at least one through hole in the anti-vibration arm (24).
8. The electrical connector (10) of claim 1 wherein



said housing (12) includes wall means (30), said anti-vibration arm (24) is generally L-shaped and cantilevered outwardly from the wall means (30), with one leg (26) of the L-shaped arm (24) projecting toward the panel and said recess means (38) being formed in the other leg (28) of the L-shaped arm.

Patentansprüche

1. Elektrischer Steckverbinder (10) zum Anbringen in einer Öffnung einer Platte oder Konsole mit: einem Gehäuse (12), das an einer Außenfläche durch eine Ausrichtungs- oder Verpolungsschutzeinrichtung (32) verdickt ist; einem nachgiebigen Antivibrationsarm (24), der mit der Ausrichtungs- oder Verpolungsschutzeinrichtung (32) einstückig ausgebildet ist und so von dem Gehäuse vorsteht, daß er beim Anbringen in der Öffnung mit der Platte oder der Konsole in Eingriff tritt, um Vibrationen zwischen dem Steckverbinder und der Platte oder der Konsole zu verhindern, dadurch gekennzeichnet, daß in dem Antivibrationsarm an einer Stelle eine Aussparung (38) angeordnet ist, die im großen und ganzen die gleiche Querschnittsfläche wie die Ausrichtungs- oder Verpolungsschutzeinrichtung aufweist, um die Spannungen in dem Arm abzubauen, die durch das Biegen der Ausrichtungs- oder Verpolungsschutzeinrichtung hervorgerufen werden.
2. Elektrischer Steckverbinder (10) nach Anspruch 1, bei dem das Gehäuse (12) eine starre Wand umfaßt, von der aus der Antivibrationsarm (24) vorsteht, und bei dem die Aussparung (38) benachbart zu der Ausrichtungs- oder Verpolungsschutzeinrichtung (32) angeordnet ist.
3. Elektrischer Steckverbinder (10) nach Anspruch 2, bei dem die Aussparung (38) in dem Antivibrationsarm (24) zumindest ein Durchgangsloch umfaßt.
4. Elektrischer Steckverbinder (10) nach Anspruch 2, bei dem die Aussparung (38) zumindest ein teilweise durch den Antivibrationsarm (24) hindurchgehendes Loch umfaßt.
5. Elektrischer Steckverbinder (10) nach Anspruch 4, bei dem das teilweise durch den Antivibrationsarm (24) hindurchgehende Loch (38) eine rechteckige Form aufweist.
6. Elektrischer Steckverbinder (10) nach Anspruch 1, bei dem die Ausrichtungs- oder Verpolungs-

schutzeinrichtung eine längliche Rippe umfaßt.

7. Elektrischer Steckverbinder (10) nach Anspruch 1, bei dem die Aussparung (38) in dem Antivibrationsarm (24) zumindest ein Durchgangsloch umfaßt.
8. Elektrischer Steckverbinder (10) nach Anspruch 1, bei dem das Gehäuse (12) eine Wand (30) umfaßt und bei dem der Antivibrationsarm (24) im großen und ganzen L-förmig ist und von der Wand (30) freitragend nach außen vorsteht, wobei ein Schenkel (26) des L-förmigen Arms (24) in Richtung auf die Platte oder die Konsole vorsteht und wobei die Aussparung (38) in dem anderen Schenkel (28) des L-förmigen Arms ausgebildet ist.

Revendications

1. Connecteur électrique (10) adapté à être monté dans une ouverture de panneau, comprenant: un boîtier (12) épaissi au niveau d'une surface extérieure par un moyen de polarisation (32); un bras anti-vibration déformable élastiquement (24), qui formant une même pièce avec ledit moyen de polarisation (32), s'étend du boîtier pour porter contre ledit panneau lorsque le connecteur est monté dans l'ouverture, de manière à empêcher l'apparition de vibration entre le connecteur et le panneau, caractérisé en ce qu'un évidement (38) est ménagé dans le bras anti-vibration à un endroit permettant la relaxation des contraintes que cause ledit moyen de polarisation pendant la déformation élastique, ledit évidement ayant généralement la même section transversale que celle du moyen de polarisation.
2. Connecteur électrique selon la revendication 1, caractérisé en ce que ledit boîtier comprend une paroi rigide (30) à partir de laquelle ledit bras anti-vibration (24) s'étend, et ledit évidement (38) se trouve à proximité dudit moyen de polarisation (32).
3. Connecteur électrique selon la revendication 2, caractérisé en ce que ledit évidement comprend au moins un trou traversant entièrement le bras anti-vibration (24).
4. Connecteur électrique selon la revendication 2, caractérisé en ce que ledit évidement (38) comprend au moins un trou traversant partiellement le bras anti-vibration (24).
5. Connecteur électrique selon la revendication 4,



caractérisé en ce que ledit trou (38) traversant partiellement le bras anti-vibration (24) est de forme rectangulaire.

6. Connecteur électrique selon la revendication 1, caractérisé en ce que ledit moyen de polarisation comprend une nervure allongée. 5
7. Connecteur électrique selon la revendication 1, caractérisé en ce que l'évidement (38) comprend au moins un trou traversant entièrement le bras anti-vibration (24). 10
8. Connecteur électrique selon la revendication 1, caractérisé en ce que ledit boîtier (12) comprend des parois (30) et ledit bras anti-vibration (24) a une forme générale en L et s'étend des parois (30), en porte à faux, vers l'extérieur, avec une branche (28) du bras en L (24) s'étendant vers le panneau, et ledit évidement (38) étant formé sur l'autre branche (28) du bras en L. 15 20

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