# United States Patent [19]

**Collier et al.**

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[54] **ELECTRICAL CONNECTOR TO CONNECT TO FLAT FLEXIBLE CABLE**


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[51] **Int. Cl.** ..... **H01r 11/20**

[58] **Field of Search** ..... 339/17 F, 95, 97–99, 339/176 MF, 276; 174/84 C



[56] **References Cited**

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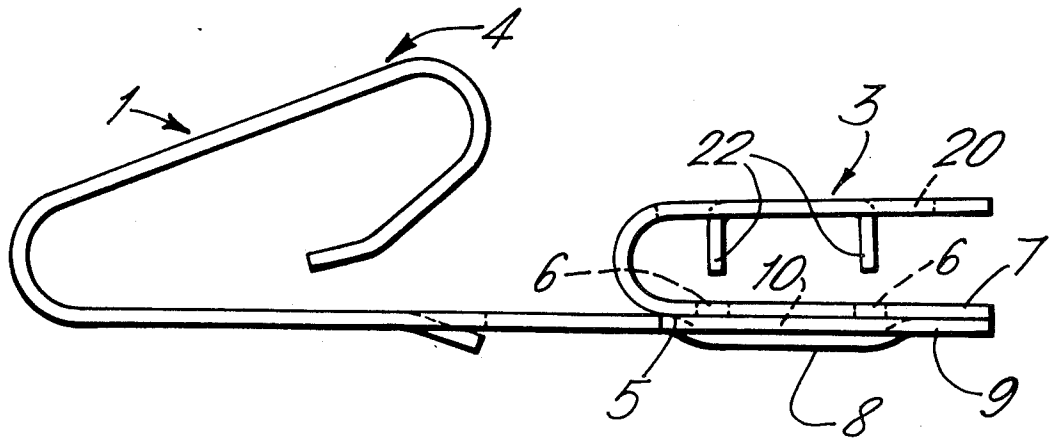
[57] **ABSTRACT**

An electrical connector made from sheet material which includes a portion for connection to a flat conductor of a flat flexible cable. The connection portion includes a base and a platform spaced from but overlying the base. The platform has a lance so that on crimping the connecting portion to a flat flexible cable operatively positioned between the platform and the base, the lance pierces the cable and operatively engages a flat conductor.


**5 Claims, 2 Drawing Figures**



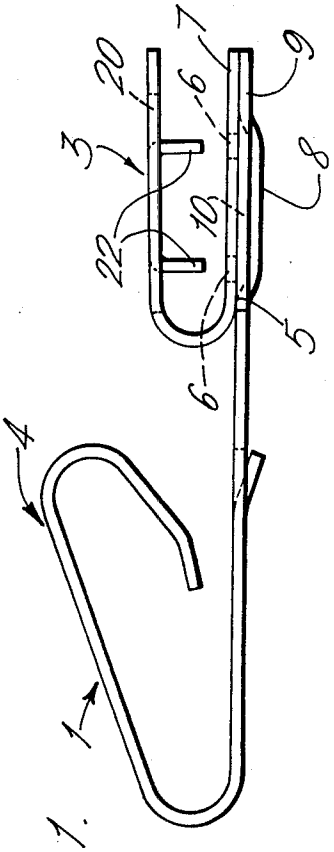



Fig. 1.

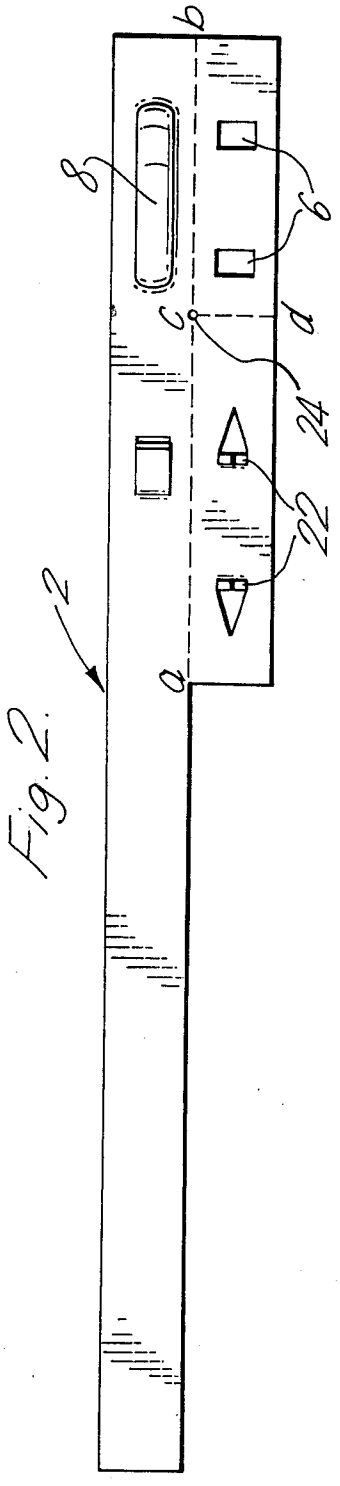



Fig. 2.

# ELECTRICAL CONNECTOR TO CONNECT TO FLAT FLEXIBLE CABLE

The present invention relates to an electrical contact for connection to a flat conductor of a flat, flexible cable.

The expression "flat flexible cable" is intended to include flexible cable in which a plurality of spaced, flat conductors are embedded in or supported on an insulating material or flexible etched circuitry in which flat conductors are supported on a flexible substrate.

The flat conductors of flat flexible cable can, in many applications, have a thickness of only 0.0015 inches and although many electrical contacts have been proposed for crimped connection to such flat conductors, difficulties have arisen in producing a crimped connection which consistently gives the required electrical and mechanical properties. Further, when thin flat conductors are being used, frequently the spacing between the conductors is extremely small and any contact for crimped connection to such a conductor must, as a consequence, also be narrow to prevent accidental engagement of adjacent contacts.

According to the present invention, an electrical contact made from a sheet metal blank comprises a portion for connection to a flat conductor of a flat, flexible cable, the connection portion including a base of double thickness a first layer of the base having a through aperture in alignment with an embossment formed in the second layer of the base, the embossment presenting a concave surface towards the aperture, and a platform spaced from but overlying the first layer, the platform having a lance in alignment with the aperture so that on crimping the connecting portion to a flat, flexible cable operatively positioned between the platform and the base, the lance pierces the cable and passes through the aperture to engage the concave surface of the embossment which deflects the lance laterally and inhibits withdrawal of the lance through the apertures.

In a preferred embodiment, the base of double thickness is formed by folding the connection portion along a line extending from a front end to an opposite rear end of the connection portion the first and second layers being of generally equal width.

The platform may be of the same width as the layers and joined to the front end of the first layer.

The contact portion, which may be of any known configuration, is preferably joined to the front end of the second layer and is of the same width as the second layer so that the overall width of the electrical contact is generally equal to the width of the base.

Two spaced lances may be provided on the platform each of which is in alignment with an aperture in the first layer, the embossment being elongate and extending to cover the spaced apertures.

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:

FIG. 1 is a side view of an electrical contact; and

FIG. 2 is a plan view of a sheet metal blank from which the electrical contact of FIG. 1 is formed.

As shown, an electrical contact 1 is made from a sheet metal blank 2 of electrically conductive material. The contact 1 includes a portion 3 for connection to a flat conductor of a flat, flexible cable (not shown) and



a contact portion 4 for electrical engagement with a mating electrical contact.

The connection portion 3 includes a base 5 of double thickness formed by folding the portion 3 along a median fold line *a–b* as seen in FIG. 2, so that apertures 6 in a first layer 7 of the base 5 are in alignment with an embossment 8 in the second layer 9 of the base 5. The embossment 8 presents a concave surface 10 towards the apertures 6.

A platform 20 is joined to the front end of the first layer 7 and is folded to overlie the first layer 7. As can be seen from FIG. 2, platform 20 is folded along a line *c–d* after the fold line *a–b* is severed along the length *a–c*. A small hole 24 is formed at the position *c* to simplify the severing and folding operations.

Lances 22 are formed from the platform 20 and extend towards and are in alignment with the apertures 6.

The contact portion 4 which can be of any configuration is the same width as the connecting portion 3.

In operation, the end of a flat flexible cable (not shown) is inserted between the platform 20 and base 5 of the connecting portion 3 so that a flat conductor is in alignment with the platform and the base. The connecting portion 3 is then crimped to the cable so that the lances 22 pierce the cable insulation and the flat conductor and pass through their respective apertures 6 to engage the concave surface 10 of the embossment 8. The surface 10 causes the lances to be deflected laterally thereby inhibiting withdrawal of the lances through their respective apertures 6 should any relaxation of the crimp take place.

One advantage of the electrical contact of the above described embodiment, is that a good electrical and mechanical contact is made with a flat conductor of a flat, flexible cable with a crimp which is easy to apply. The deflection and consequent locking of the lances minimizes the possibility of the contact deteriorating with the passage of time and the subsequent relaxing of the crimp.

A further advantage of the electrical contact of the above described embodiment, is that the contact is suitable for crimped connection to flat conductors arranged at close pitch distances along a cable since the contact portion and the connection portion are of the same width.

A still further advantage of the electrical contact of the above described embodiment, is that a plurality of electrical contacts can be preloaded without difficulty, in passageways in an insulating housing, each passageway having an opening for permitting entry of a die for applying a crimping pressure to the platform 20 on the insertion of a flat flexible cable between the platform 20 and the base 5. This facilitates the assembly of electrical harnesses which include flat flexible cable and their corresponding connectors.

What is claimed is:

1. An electrical contact made from a sheet metal blank comprising a portion for connection to a flat conductor of a flat, flexible cable, the connection portion including a base of double thickness, a first layer of the base having a through aperture in alignment with an embossment formed in the second layer of the base, the embossment presenting a concave surface towards the aperture and a platform spaced from but overlying the first layer, the platform having a lance in alignment with the aperture, so that on crimping the connection portion to a flat, flexible cable operatively positioned

between the platform and the base, the lance pierces the cable and passes through the aperture to engage the concave surface of the embossment which deflexes the lance laterally and inhibits withdrawal of the lance through the aperture.

**2.** An electrical contact as claimed in claim **1**, in which the base of double thickness is formed by folding the connection portion along a line extending from a front end to an opposite rear end of the connection portion, the first and second layers being of generally equal width.

**3.** An electrical contact as claimed in claim **1**, in which the platform is of the same width as the layers and is joined to the front end of the first layer.



**4.** An electrical contact as claimed in claim **1**, in which the contact portion is joined to the front end of the second layer and is of the same width as the second layer.

**5.** An electrical contact as claimed in claim **1**, in which two spaced lances are provided on the platform, each of which lances is in alignment with an aperture in the first layer, the embossment being elongate and extending to cover the spaced apertures.

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