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| [72] | Inventor | Norman Welburn
Watford, England |
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| [73] | Assignee | AMP Incorporated
Harrisburg, Pa. |
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| [33] | | Great Britain |
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Primary Examiner—Marvin A. Champion

Assistant Examiner—Robert A. Hafer

Attorneys—Curtis, Morris and Safford, Marshall M.

Holcombe, William Hintze, William J. Keating, Frederick

W. Raring, John R. Hopkins, Adrian J. LaRue and Jay L.

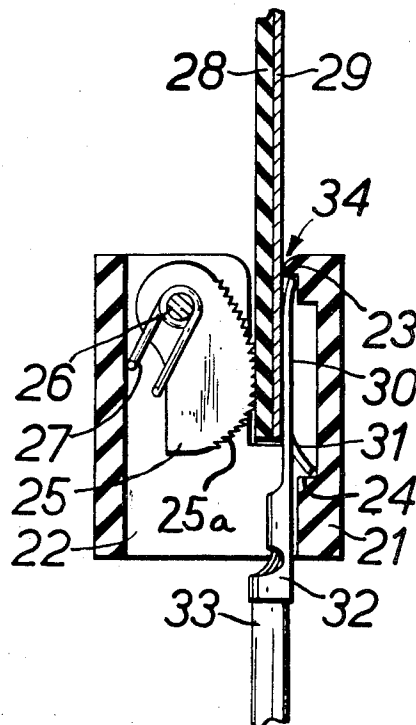
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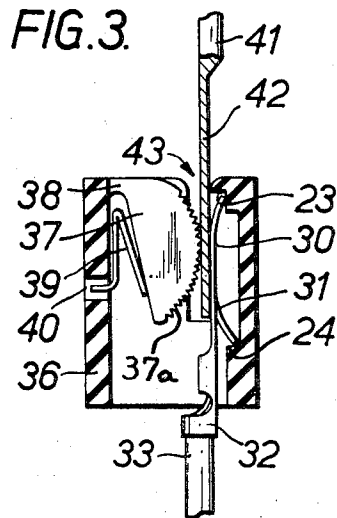
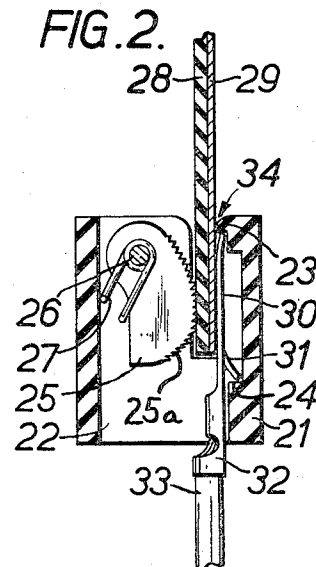
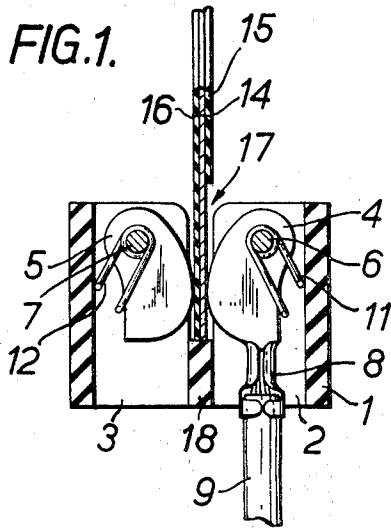
- [54] **CAM GRIP FLAT CONDUCTOR CONNECTOR**
2 Claims, 3 Drawing Figs.
- [52] **U.S. Cl.**..... **339/217,**
339/274
- [51] **Int. Cl.**..... **H01r 9/08**
- [50] **Field of Search**..... **24/249**
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ABSTRACT: An electrical connector primarily for flat conductor cable uses a spring-loaded cam to provide backup pressure between a conductor of the cable and a contact in the connector.





INVENTOR
 NORMAN WELBURN
 BY *Adrian J. LaRue*

CAM GRIP FLAT CONDUCTOR CONNECTOR

This invention relates to a connector for making a connection to a surface of a conductor of flat strip material.

The connector is particularly designed for connection with a conductor of a ribbon-type cable, *i.e.*, a cable having a, or a plurality of, flat conductors embedded in a flat insulating covering material. The conductor material is usually a copper foil in such cables. However, the connector is not limited in its application to the ribbon-type cables and can be used to make contact with a surface conductor formed on a board by printed circuit or allied techniques. Furthermore, the connector can be used to make contact to a conventional conductor if the end is suitably shaped into a rectangular form.

Ribbon-type cable conductors are not able to have connections made to them by conventional techniques of soldering or crimping since the conductor is usually of a fragile nature. To overcome this, connectors have been devised which have a plurality of teeth which are caused by a wedging action to bite through the insulation of the cable and into the conductor. One disadvantage of this type of connector is that once a connection has been made to a cable end it cannot be reliably remade without cutting off the end and presenting a fresh end to the connector. If a connection is to be remade a number of times, a limit on the amount of cable available may be encountered. The present invention overcomes this disadvantage and permits the end of a ribbon-type cable to be connected and disconnected many times without the need for a fresh cable ending to be prepared.

An object of the invention is to provide a connector for making a connection to a surface of a conductor of flat strip form which comprises a housing of insulating material having a passageway in which a contact member is located, an opening in a wall of the housing through which the conductor can be passed to make contact with the contact member and a spring-loaded cam mounted in the housing and arranged to urge the conductor into engagement with the contact member.

Another object of the invention is that the contact member may be either separate from the cam or form a part thereof. Preferably, the contact member includes an integral crimping ferrule for connection with a further conductor.

A further object is that the cam is preferably arranged so as to present a minimum force on the conductor when moved in the direction of insertion of the conductor into the housing and a maximum force on the conductor when moved in a direction opposite to the direction of insertion. The surface of the cam is preferably such as to enable it to make a good grip on the conductor, and this may in one embodiment, be achieved by making the surface serrated.

An additional object is that the housing may also include means for enabling the cam to be lifted against the force of the spring to release pressure on the conductor and to enable it to be withdrawn easily from the conductor.

Other objects and attainments of the present invention will become apparent to those skilled in the art upon a reading of the following detailed description when taken in conjunction with the drawings in which there are shown and described illustrative embodiments of the invention; it is to be understood, however, that these embodiments are not intended to be exhaustive nor limiting of the invention but are given for purposes of illustration in order that others skilled in the art may fully understand the invention and the principles thereof and the manner of applying it in practical use so that they may modify it in various forms, each as may be best suited to the conditions of a particular use.

Three different embodiments of a connector in accordance with the present invention will now be described, by way of example only, with reference to the three FIGS. of the accompanying drawing. In this drawing:

FIG. 1 shows a cross-sectional view of the first embodiment in connection with a ribbon cable end;

FIG. 2 shows a cross-sectional view of the second embodiment in connection with a printed circuit board; and

FIG. 3 shows a cross-sectional view of the third embodiment in connection with a conventional wire conductor.

Referring now to FIG. 1, the connector comprises a housing 1 of insulating material having two passageways 2,3 in which cams 4,5 respectively are positioned. Each cam is rotatably mounted on a pivot post 6,7 respectively molded in the passageways. The cams 4,5 are formed by stamping them from sheet metal, such as copper. The cam 4 is a contact cam and has an integral ferrule 8 which is crimped onto a wire conductor 9 which enters the rear of the passageway 2 of the housing 1. The cam 5 is a backup pressure cam and requires no ferrule.

Both cams 4,5 are spring loaded by respective springs 11,12 which are wound about posts 6,7 and engage the walls of the housing 1 and the undersides of the cams. The effect of the springs 11,12 is to bias the cams to rotate towards the center of the housing, and, when no conductor is present, the two cams are in engagement. FIG. 1 shows a ribbon cable in connection in the connector. The cable comprises a foil conductor 14 embedded between two layers of insulating material 15,16. To make a connection, the insulation 15 is stripped from one side of the end of the cable and the conductor 14 with insulation 16 is inserted through an opening 17 in the front of the housing. As the stripped end of the cable meets the surface of the cams 4,5 with cam 4 wipingly engaging conductor 14, they are pushed away from each other loading the springs 11,12. With the conductor 14 fully inserted against a stop 18 in the housing 1, electrical continuity exists between the conductors 14 and 9 through cam 4. The opposing surfaces of the cams may be serrated thereby increasing their retentive characteristics.

Due to the action of the spring-loaded cams, if a force is exerted on the cable in a direction which would withdraw the cable from the connector, the gripping force of the cams 4,5 on the conductor 14 will increase. This is on account of friction between the conductor and cam surfaces pulling the cams towards the center with the aid of the springs and thus increasing the wedging effect.

If the conductor 14 is to be purposely withdrawn, the cams 4,5 can be biased away from the center by the insertion of suitable tools into the passageways 2,3. Alternatively, the cams can be modified by providing them with arms extending from the housing which can be lifted manually to release the conductor. The embodiment of FIG. 1 can be further modified and simplified by dispensing with the cam 5 and allowing the conductor to engage the side of the housing on one side. In such a modification, the cam 4 is used for both electrical contact and wedging of the connector. A less positive retention of the conductor is likely though than with the illustrated embodiment.

Turning now to the second embodiment shown in FIG. 2, the connector comprises a housing 21 of molded plastic insulating material having a passageway 22. One wall of the passageway is molded to provide a front and a rear shoulder 23,24 respectively. A cam 25 is rotatably mounted on a post 26 and provided with a biasing spring 27. Surface 25a of the cam is serrated to provide a better grip on the back of a printed circuit board inserted in the connector. This printed circuit board is formed of an insulating board 28 having a printed circuit conductor 29 on one surface.

A contact member 30 is inserted in the passageway 22. This contact member is of a bowed shape and is formed from a spring conductive metal. The front edge of the member engages the front shoulder 23 and a rearwardly extending lance 31 engages the rear shoulder 24 to lock the member in the housing. The member 30 has an integral ferrule 32 which is crimped to a wire 33. In operation, the printed circuit board is inserted into the connector through a front slot 34 of the housing 21. The printed circuit 29 slides over the bowed surface of the contact 30 in a wiping manner and giving an abutting contact. The cam 25 is rotated away from the contact member 30 as the board is inserted. When the board is in position, the cam 25 under the action of spring 27 presses the circuit 29 into good electrical contact with member 30. The serrations of ser-

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rated surface 25a on the cam 25 grip the back of the board 28 and prevent the dislodgement of the board or its accidental withdrawal from the connector.

The third embodiment of a connector is illustrated in FIG. 3 to which reference is now made. Here contact member 30 is similar to that shown in FIG. 2 and fits in a housing 36 in a similar manner. The same reference numerals are used for these similar parts in FIGS. 2 and 3. The cam 37 is, however, formed integrally with the housing during molding and the plastic material is chosen to be such that the cam 37 is resiliently connected with the wall of the housing 36 by a web 38 connected to one end of the cam. A V-spring 39 is fitted in compression between the cam 37 and the wall of the housing with one end of the spring located in a hole 40 in the wall of the housing 36. Surface 37a of the cam 37 is serrated, as in the previous examples, to improve the withdrawal forces. The conductor in this embodiment is a solid varnish covered wire 41 which has been stripped of insulant at its end 42 and flattened to form a tab. This tab is pushed into the connector through opening 43 causing cam 37 to flex away from the contact member 30 and bend about the web 38 compressing the V-spring 39. The contact member 30 wipingly makes contact with one side of the tab 42 of the conductor and is pressed into good contact therewith by the action of the spring 39 acting on the cam 37.

Although in the three examples just described a different type of ribbon conductor is used in each one, it should be appreciated that the particular type of conductor is not peculiar in its use to the connector with which it is described but may be used with any connector.

It will, therefore, be appreciated that the aforementioned and other desirable objects have been achieved; however, it should be emphasized that the particular embodiments of the invention, which are shown and described herein, are intended as merely illustrative and not as restrictive of the invention.

I claim:

1. A connector for making electrical connection between a side of an end portion of a flat cable and a contact member, comprising a housing of insulating material having a through passageway, a resilient contact member and a spring-loaded cam extending longitudinally of the passageway and mutually urged into abutting relation, the contact member comprising a contact spring bowed towards the cam between its ends which are held against shoulders formed in a sidewall of the passageway, a slot extending inwardly from one end of the passageway in alignment with the interface between the contact member and the cam for reception of the end portion of the flat cable into the passageway, the contact member having a lead connecting portion extending outwardly of the passageway away from the slot, reception of the end portion of the flat cable in the passageway tending to urge the cam and contact member apart.

2. A connector for making electrical connection between a side of an end portion of a flat cable and a contact member, comprising a housing of insulating material having a through passageway, a resilient contact member and a spring-loaded cam extending longitudinally of the passageway and mutually urged into abutting relation, the contact member comprising a further spring-loaded cam positioned on the opposite side of the passageway to the first mentioned cam, a slot extending inwardly from one end of the passageway in alignment with the interface between the contact member and the cam for reception of the end portion of the flat cable, means for limiting the extent of insertion of the flat cable into the passageway, the contact member having a lead connecting portion extending outwardly of the passageway away from the slot, reception of the end portion of the flat cable in the passageway tending to urge the cam and contact member apart.

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