United States Patent [19]

Codrino

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[54] **DEVICE FOR THE ELECTRICAL CONNECTION BETWEEN CABLES AND RIBBON-LIKE**

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[52] **U.S. Cl.** .... **339/91 R,** 339/176 MF, 339/184 M

[51] **Int. Cl.** **H01r 13/54,** H01r 13/64

[58] **Field of Search** ..... 339/17 F, 17 L, 17 LM, 339/176 MF, 176 MP, 65, 91, 184 M, 186 M

[56] **References Cited**

UNITED STATES PATENTS

3,158,421	11/1964	Hasenauer	339/176 MF
3,275,968	9/1966	McCaughey	339/176 MF X
3,277,425	10/1966	Marshall et al.	339/176 MF
3,365,694	1/1968	Parker	339/176 MP X
3,372,308	3/1968	Noschese et al.	339/176 M UX
3,568,134	3/1971	Anhalt et al.	339/176 MP X
3,636,503	1/1972	Bernutz et al.	339/186 M X
3,638,164	1/1972	Glance et al.	339/176 MF X
3,670,290	6/1972	Angele et al.	339/176 MF X
3,696,319	10/1972	Olsson	339/176 MF X

FOREIGN PATENTS OR APPLICATIONS

725,032	3/1955	Great Britain	339/17 L
1,163,085	9/1969	Great Britain	339/91 R
1,498,405	9/1967	France	339/17 L
1,229,199	4/1971	Great Britain	339/176 MF

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[57] **ABSTRACT**

Device for the electrical connection between cables and ribbon-like flexible conductors, and more particularly a connecting device, adapted to perform the electrical continuity between the traditional-type cables and ribbon-like flexible conductors.

4 Claims, 12 Drawing Figures

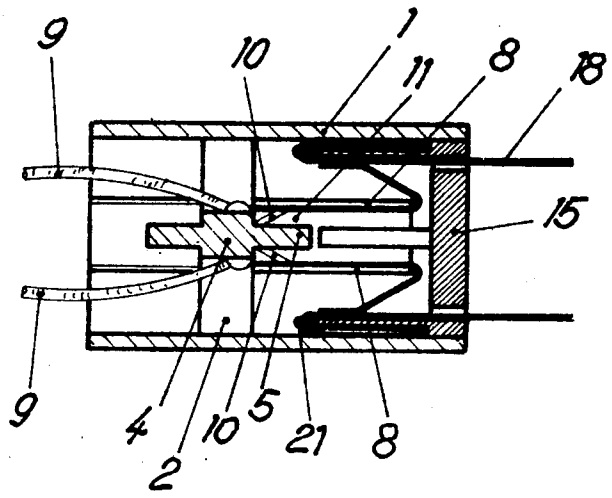


FIG. 1

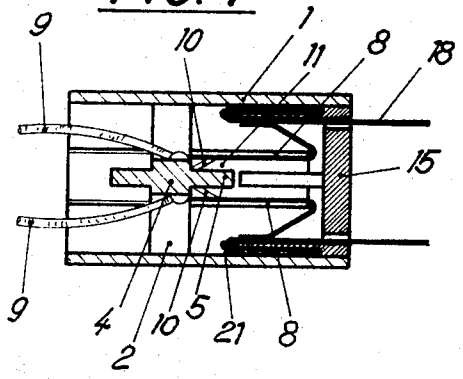


FIG. 2

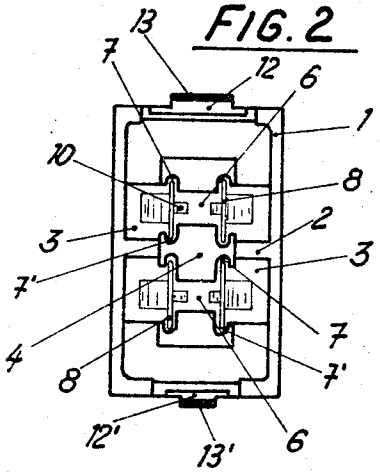


FIG. 3

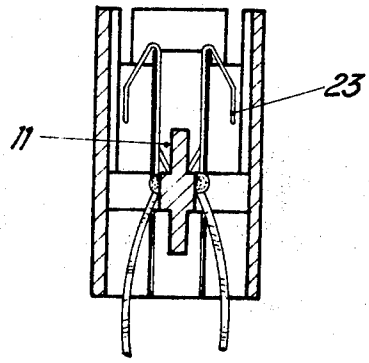


FIG. 4

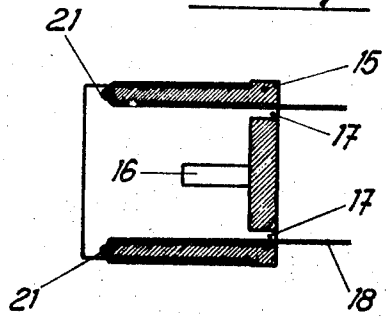


FIG. 5

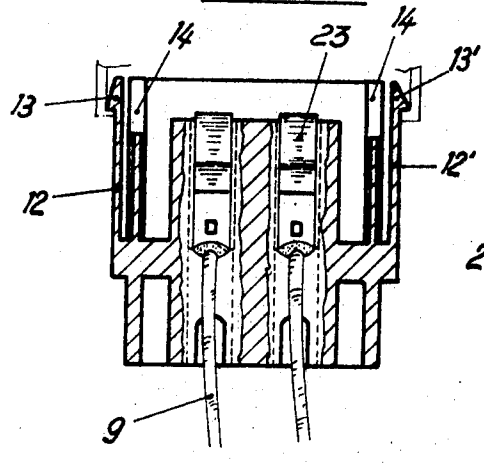


FIG. 6

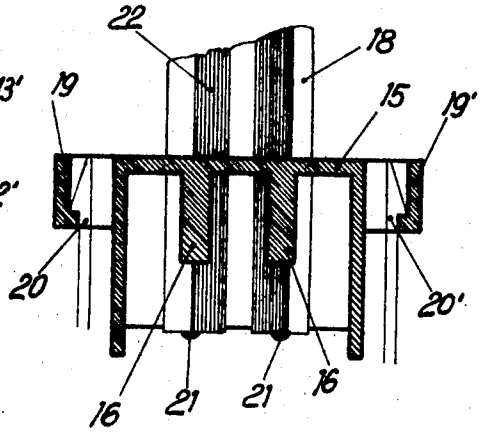


FIG. 7

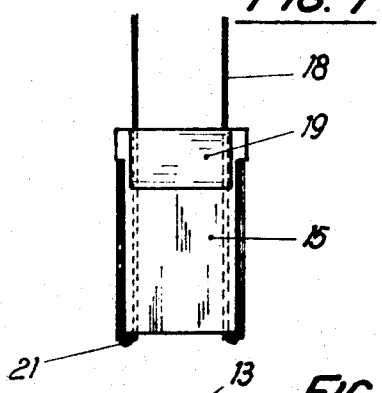


FIG. 8

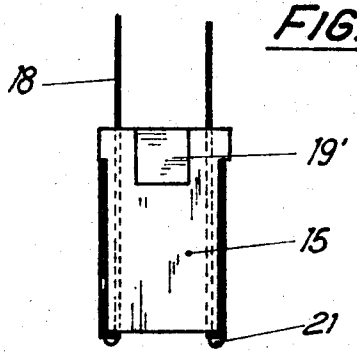


FIG. 9

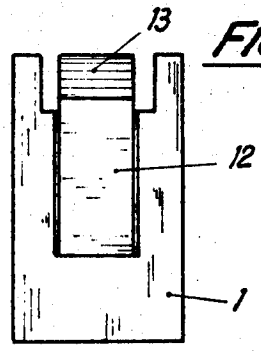


FIG. 10

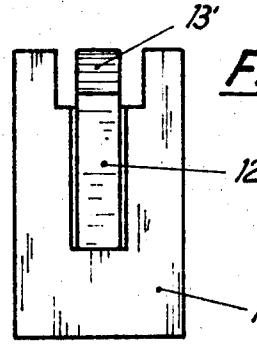


FIG. 11

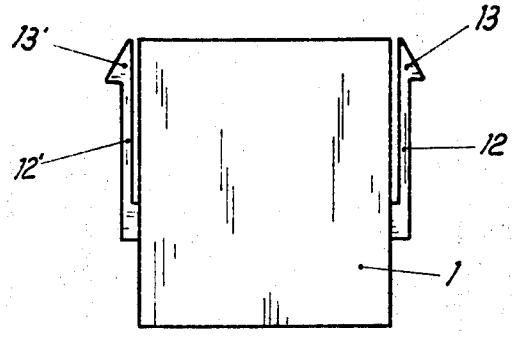
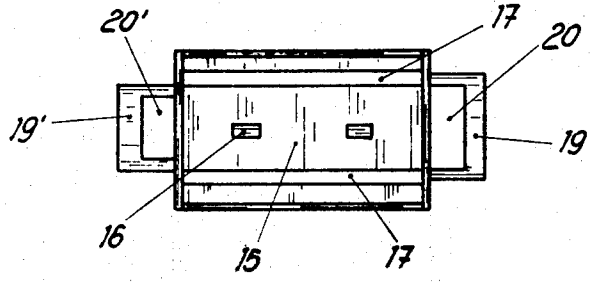


FIG. 12



DEVICE FOR THE ELECTRICAL CONNECTION BETWEEN CABLES AND RIBBON-LIKE

This invention relates to a device for the electrical connection between cables and ribbon-like flexible conductors, and more particularly a connecting device, adapted to perform the electrical continuity between the traditional-type cables and ribbon-like flexible conductors.

Also the manufacturing method of the instant device is an integral part of the present invention.

As it is well known, ribbon-like flexible conductors are being built and find practical application, especially in the motor car industry.

Said conductors are essentially made up of a thin ribbon or band of plastic material as support means, on which there is coated a film, consisting of a good electrically conducting material.

Said conductive coat is then sheathed and protected by a further film, consisting of insulating plastic material.

By taking into account that several apparatyses either utilizing or generating electrical energy are provided with individual or braided cables, showing a circular section and that the connectors being at present commercially available comply with such characteristics, the problem now arises to develop a device, permitting to arrange in a simple manner and in immediate sequence for the connection between the aforementioned two cables and ribbon-like conductors.

Said problem is solved by the connecting device of the present invention.

As a matter of fact, said connecting device is shaped so as to bring one portion of the surface of a ribbon-like conductor into direct contact with the suitably shaped terminal of a circular or almost circular cable.

More accurately, the aforesaid connecting device consist of two parts, which may be connected to each other via a rigid prismatic-type coupling.

The hollow part, which may be considered as approximately corresponding to a socket, is provided with pairs of suitably grooved internal seats, in which may be engaged terminals, consisting of a plate in the body of which there is formed a tongue being inclined downwardly.

Said plate shows further a portion of smaller width, which folds over upwardly.

Into the aforementioned hollow body, showing essentially a box-like structure engages a tap, corresponding approximately to a plug.

Said member shows some slots into which engage the end portions of the ribbon-like cables to be connected to the traditional cables.

The above-mentioned end portions are folded over and fastened to the edges of the member itself brought into contact with the upper part of the plates, constituting the terminals.

The stability of the connection between the two part of the connector is ensured by a flexible type coupling, made up of two arms, integral with the hollow member the ends of which enter two drilled lugs, shown on the sides of the tap member.

These and still further characteristic features of a functional and constructional nature of the connector according to this invention to accomplish the electrical continuity between circular cables and ribbon-like flexible conducts could be better understood from the following detailed description and the various figures on the accompanying drawings, in which:

FIG. 1 represent a schematic view of the vertical section of the connector of this invention;

FIG. 2 shows a view from the high of the hollow member, constituting the "socket" of the connector;

FIG. 3 shows the vertical section of the socket given the preceding figure;

FIG. 4 shows the vertical section of the tap member, constituting the plug of the connector;

FIG. 5 represents a horizontal section of the socket given in FIGS. 2 and 3;

FIG. 6 shows the horizontal section of the plug;

FIGS. 7 and 8 show in a schematical form two side views, opposite each other, of the plug;

FIGS. 9 and 10 illustrate in a schematical form two side views, opposite each other, of the socket;

FIG. 11 represents a schematical front view of the socket; and

FIG. 12 shows a schematical view from the high of the plug.

Referring now particularly to the numeral symbols of the various figures on the accompanying drawings, the connector of this invention is made up of a box-like body **1**, consisting of plastic material.

Said box-like body **1** is provided with an intermediate transversal wall **2**, in which there are formed two or more parallel slots **3** suitable width for the passage of the cable **9**.

Orthogonally of said wall **2** there develops a plate-like shaped member **4**, showing a series of parallel arms **5**, which delimit small empty spaces **6**.

In the same plate-like shaped member **4** and along the aforesaid arms **5** there are formed pairs of grooves **7** and **7'**, between which there may be lodged the flat portions of the plates **8**, acting as terminals for the cables **9**.

The plates **8** are provided on the lower part with small tongues **10** engaging tripwise in a lowered zone **11**, formed in the member **4** between the various pairs of arms **5**, thereby ensuring the stability of the terminal inside the box-like body **1**.

Along the smaller sides of the box-like body **1** and suitably spaced therefrom there develop further, starting from the transversal wall **2** two bars **12** and **12'** of rectangular section, also consisting of plastic material.

Said bars, which are sufficiently flexible, are provided at their free ends with raised portions **13** and **13'** being shaped like a hook.

The same bars **12** and **12'** show further a different width, whereas they are equal in length and reach the edge of the box-like body **1** on the sides of which at said bars there are provided two openings **14**, permitting to bend to an adequate extent the bars themselves.

The connector according to the present invention is completed with a tap member **15**, which serves as plug, provided with an outer section, being equal to the internal section of said box-like body.

From the bottom of said tap member **15** extend two or more reliefs **16**, which may enter the empty spaces **6**, delimited by the arms **5** of the plate-like member **4**.

In the bottom of the same member **15** there are further formed at the larger sides two slots **17** of adequate thickness to ensure the passage of the ribbon **18**, serv-

ing as support for the conducting bands to be connected.

The tap member **15** is provided with two side lugs **19** and **19'**, showing with different dimensions a rectangular configuration, in which there are formed through-openings **20** and **20'** of different sections.

More accurately, the aforesaid through-openings are so dimensioned as to ensure the passage of the ends **13** and **13'** of the bars **12** and **12'**, integral with the box-like body **1**, when said member **15** is fastened into the box-like body.

The end portions of the flexible ribbons **18** to be connected with the plates **8** of the terminals of the cables **9** are inserted into the longitudinal slots **17** and folded over rearwardly on the wall adjacent them of the tap member **15.**

Said end portions are secured to the projecting edge of the member **15** by means of rivets **21** or screws.

The conducting bands **22** are cut off for functional reasons prior to beding their support ribbon **18** and furthermore between two adjacent bands there is formed in the body of the support ribbon itself a groove, adapted to improve the insulating characteristics of the conductors themselves.

The electrical connection between the two cable types is ensured by the contact between the upper rearwardly folded up part **23** of the plates **8** of the terminals and a portion of the conducting bands **22,** from which the insulating material layer has been obviously removed.

From the foregoing and from perusal of the various figures on the accompanying drawings, one may see the great functional character and practical application of the device according to the present invention, adapted to electrically connect the circular cables to the ribbon-like flexible conductors.

The connecting device and related manufacturing method have been described by making reference to a particular embodiment form given by way of non-limiting example of this invention.

Obviously, several changes and modifications as to shape and dimensions may be introduced in the connecting device of this invention upon putting it into effect, without departing from the scope of the invention.

It is likewise understood that any such changes and modifications shall be deemed as falling into the letters patent applied for.

I claim:

1. A separable electrical connector, particularly for use between cables of circular cross section and flat cross section, comprising a plug part comprising an outer peripheral wall defining a cavity, two lugs fixedly secured to the outer surface of said wall and each having an opening therein, two slots provided in said plug part to receive flat cables, and at least two parallel central members in the interior of said cavity spaced apart from each other and from said peripheral wall; and a socket part comprising a housing of insulating material defining a recess adapted to receive said outer peripheral wall of said plug part, two arms fixedly secured to said housing and adapted to engage said lugs by snap action when said plug part is inserted into said socket part, a transverse wall provided with parallel slots for the passage of a conducting cable, and conducting plate members connected to said conducting cable so situated so as to make electrical contact with said flat cables in said plug part when said plug part is inserted into said socket part.

2. A connector as defined in claim **1,** further comprising screws attached to said flat cables and securing said cables to said plug part.

3. A connector as defined in claim **1,** wherein said arms are of synthetic plastic material, and have a rectangular cross section.

4. A connector as defined in claim **1,** wherein each of said arms terminate in a hook-shaped raised end portion.

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