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(54) Electric contact metal elements for termination modules of copper cables, in particular for IDC strips

(57) The present invention relates to a connector (14) for termination modules of copper cables, in particular for IDC strips (1), made of a first component or flat component (15) for the connection with a conducting wire of said cables, and a second component or flexible component (17) for electric connection by contact with an identical component of a second connector (14), wherein said flat component (15) and said flexible component (17) are coupled with interference.

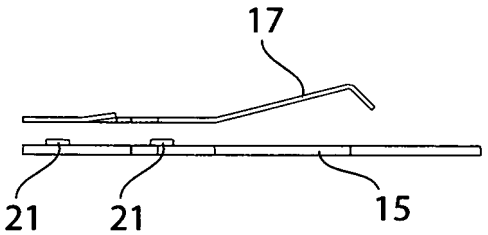

Fig. 7

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Description

[0001] The present invention concerns electric contact metal elements for termination modules of copper cables, in particular for IDC strips.

[0002] The invention refers in general to the field of the applications for telecommunication and in particular to the field of telephone communication and in particular refers to copper cables circuit termination modules and/or the so called telephone couples, i.e. modules of termination of the single telephone private lines of the telephone electric circuit (each made of a couple of conductors), in order to be connected or disconnected to the apparatuses of a telephone main station.

[0003] Said termination modules, defined IDC strips (standing for the English term "insulation displacement connection", referring to a particular kind of connection with insulating dislocation), collect a big number of telephone private lines in an ordered and compact arrangement and are used in all telephone main station copper cables terminations and/or in the road junction boxes, so called "line splitters".

[0004] More in particular, the features of such termination modules are defined in the previous patent applications N. RM2005A000528, with title "Termination module for couples of conductors, in particular an IDC strip" and N. RM2006000394, with title "Termination module for couples of conductors, in particular an IDC strip for high frequency transmitting signals", both filed in the name of the same Applicant and herein incorporated as a whole for reference.

[0005] As previously said, the function of an IDC strip is that of giving continuity or dividing two parts of a circuit made of copper cables and, particularly in telephone main station, that of giving continuity or dividing the telephone private line from the transmission apparatus. The normal function of an IDC strip is that of giving continuity to the circuit (transmitting function), whereas the function of dividing is used in exceptional circumstances such as maintenance and/or test.

[0006] In order to realise these functions, the cable coming from the telephone private line and that coming from the main station are each connected to one of the two elements of a couple of flexible metal elements conductors facing each other, herein below more simply called connectors.

[0007] Each couple of connectors is realised in such a way that the two elements constituting it touch each other, thus realising the function of continuity, whereas in order to realise the function of dividing it is necessary to interpose between the connectors an external insulating means. The flexibility of connectors is important to assure that they are not damaged when said insulating means is interposed between them.

[0008] In order to prevent the development of any transmission passive resistance, the surface of the parts of the connectors touching each other must be as wide as possible and long lasting.

[0009] Making reference to figures 1 - 4 the essential features of an IDC strip and a connector according to the prior art are shown.

[0010] An IDC strip, shown as a whole by the numeral 1, is made of a plurality of modular elements, twelve in figure 1, called packets and referred by the numeral 2, arranged one over another and inside which a plurality of couples 3 of metal connectors 4 are arranged side by side electrically connecting the cable coming from the telephone private line and that coming from the main station.

[0011] In particular, each packet houses as many metal connectors 4, facing to form a couple, as the number of wires of the telephone circuits connected to the IDC strip. The facing connectors 4 of each couple 3 are identical and each connector 4 is made of two components, a first component 5, flat, connecting, in correspondence of a charging clip 6, a conducting wire of the duplex cable constituting the telephone circuit, and a second component 7, flexible, realising the electric contact with an identical component of the other connector 4 of the couple.

[0012] An essential feature for the functioning of the strip is that the electric contact is realised in an optimal manner, i.e. without any "contact passive resistance", and is long-lasting. To this end it is necessary that the flexible component 7 of the connector 4 maintains its flexibility and adheres to the identical component of the other connector 4 of the couple, in the predetermined area, on a specific common contact plane.

[0013] The flat component 5 and the flexible component 7 of each connector 4 are coupled in correspondence of respective coupling areas, respectively a coupling area 8 of the flat component 5 and a coupling area 9 of the flexible component 7, positioned in the rear part of each component. According to the prior art, coupling occurs through a conventional mechanised process of welding.

[0014] The experience made during the years demonstrated that this kind of coupling technique can give rise to a series of drawbacks involving a decrease of the efficacy of the connector 4.

[0015] In fact, the uncontrolled temperature of welding produces a "relaxing" of the elastic memory of the flexible component 7, with the risk that, as a consequence of a maintenance operation, with the interposition of an insulating means between the connectors 4 of a couple 3, the flexible components 7 can not adhere again to one another.

[0016] Further, the uncontrolled temperature of welding can cause a mechanical deformation of the components and in particular of the flexible component 7, with the consequent misalignment of the plane of the surface of adhesion with the flexible component of the other connector 4 of the couple 3.

[0017] Finally, welding does not assure the correct position of the two components at coupling, in this case also with a decreasing of the adhesion between the flexible components 7 of the two connectors 4 of the couple 3.

[0018] In case that even only one of these three drawbacks occurs, false contacts can take place, with the consequent insufficient reliability over time of the IDC strip as a whole.

[0019] The problem is further emphasised in case that between the contacts, facing each other in a defective way and touching each other over points rather than over a surface, means are interposed to "draw" the contacts themselves, as is the case of "Line Testing" systems, applied on the IDC strip.

[0020] In this context it is presented the solution according to the present invention, with the aim of solving all the drawbacks previously described, through a change in the way of coupling the two components 5 and 7 of a connector 4, and a consequent change of the respective coupling areas 8 and 9 so to assure always an optimal functioning of the IDC strip.

[0021] An aim of the present invention is therefore that of realising a connector allowing to overcome the limits of the solutions according to the prior art and to obtain the technical results previously described.

[0022] A further aim of the invention is that said connector can be realised with substantially limited costs, both with respect to the production costs and the operative costs.

[0023] Not last aim of the invention is that of realising a connector that is substantially simple, safe and reliable.

[0024] It is therefore a specific object of the present invention a connector for termination modules of copper cables, in particular for IDC strips, made of a first component, or flat component, for the connection with a conducting wire of said cables, and a second component, or flexible component, for electric connection by contact with an identical component of a second connector, said flat component and said flexible component are coupled with interference.

[0025] Preferably, according to the invention, the coupling with interference of said flat component with said flexible component is obtained through the insertion of at least two indentations, realised on one of said components, inside two correspondent holes of the other component.

[0026] Still more preferably, according to the present invention, said flat component and said flexible component are produced by moulding, said indentations are obtained by extrusion and said holes are obtained by punching, and said indentations pass through said holes and are riveted.

[0027] The advantages of the technology of the present invention are evident, since it allows to realise IDC strips suitable for being equipped for a system of "Line testing", without false contacts for electric connection at use.

[0028] The present invention will now be described, for illustrative, non limitative purposes, according to a preferred embodiment, with particular reference to the figures of the enclosed drawings, wherein:

- figure 1 shows a perspective view of an IDC strip,
- figure 2 shows a perspective view of un packet della IDC strip of figure 1,
- figure 3 shows a side view of a couple of connectors according to the prior art,
- figure 4 shows a perspective view of a connector according to the prior art,
- figure 5 shows a top view of the flexible component of a connector according to the present invention,
- figure 6 shows a side view of the flat component of a connector according to the present invention,
- figure 7 shows a side view of the flexible component of figure 5 and of the flat component of figure 6, facing each other, and
- figure 8 shows a side view of a connector according to the present invention.

[0029] With reference to figures 5-8, a connector according to the present invention, indicated by the numeral 14, is made of a flat component 15 and a flexible component 17.

[0030] The flat component 15 is produced by moulding and presents two indentations 21 obtained by extrusion, positioned in a line at a set distance. The flexible component 17 is produced by moulding and presents two holes 20 obtained by punching, their position, shape and dimensions being such to allow the insertion of the indentations 21. The coupling between the flat component 15 and the flexible component 17 of each connector 14 therefore can be obtained by insertion of the two indentations 21 of the flat component 15 in the two holes 20 of the flexible component 17; thus, by means of a simple mechanical pressure of the two components in correspondence of the area of the indentations 21 and holes 20, it is realised a riveting of the indentations 21, constituting sort of a cold welding of the same.

[0031] By realising the two indentations 21 and the correspondent two holes 20 in a suitable position, it is therefore possible to guarantee that the coupling between the flat component 15 and the flexible component 17 always happens in a geometrically correct position.

[0032] As a result of this expedient, the solution according to the present invention realises a perfect coupling of the two components 15 and 17 of the connector 14, without any risk that forces are originated that could cause a mechanical deformation of the same components, by maintaining the functional features of the connectors 14 of the IDC strip 1 unaltered.

[0033] The present invention was described, for illustrative, non limitative purposes, according to a preferred embodiment, but it has to be understood that any variation and/or modification can be made by the skilled in the art without escaping the relative scope of protection as defined according to the enclosed claims.

Claims

1. Connector (14) for termination modules of copper cables, in particular for IDC strips (1), made of a first component or flat component (15) for connection with a conducting wire of said cables, and a second component or flexible component (17) for electric connection by contact with an identical component of a second connector (14), **characterised in that** said flat component (15) and said flexible component (17) are coupled with interference.

2. Connector (14) according to claim 1, **characterised in that** the coupling with interference of said flat component (15) with said flexible component (17) is obtained through the insertion of at least two indentations (21), realised on one of said components, inside two holes (20) of the other component.

3. Connector (14) according to claim 1 or 2, **characterised in that** said flat component (15) and said flexible component (17) are produced by moulding, said indentations (21) are obtained by extrusion and said holes (20) are obtained by punching.

4. Connector (14) according to any of claims 2 - 3, **characterised in that** said indentations (21) of one of the components of the connector pass through said holes (20) of the other component and are riveted.

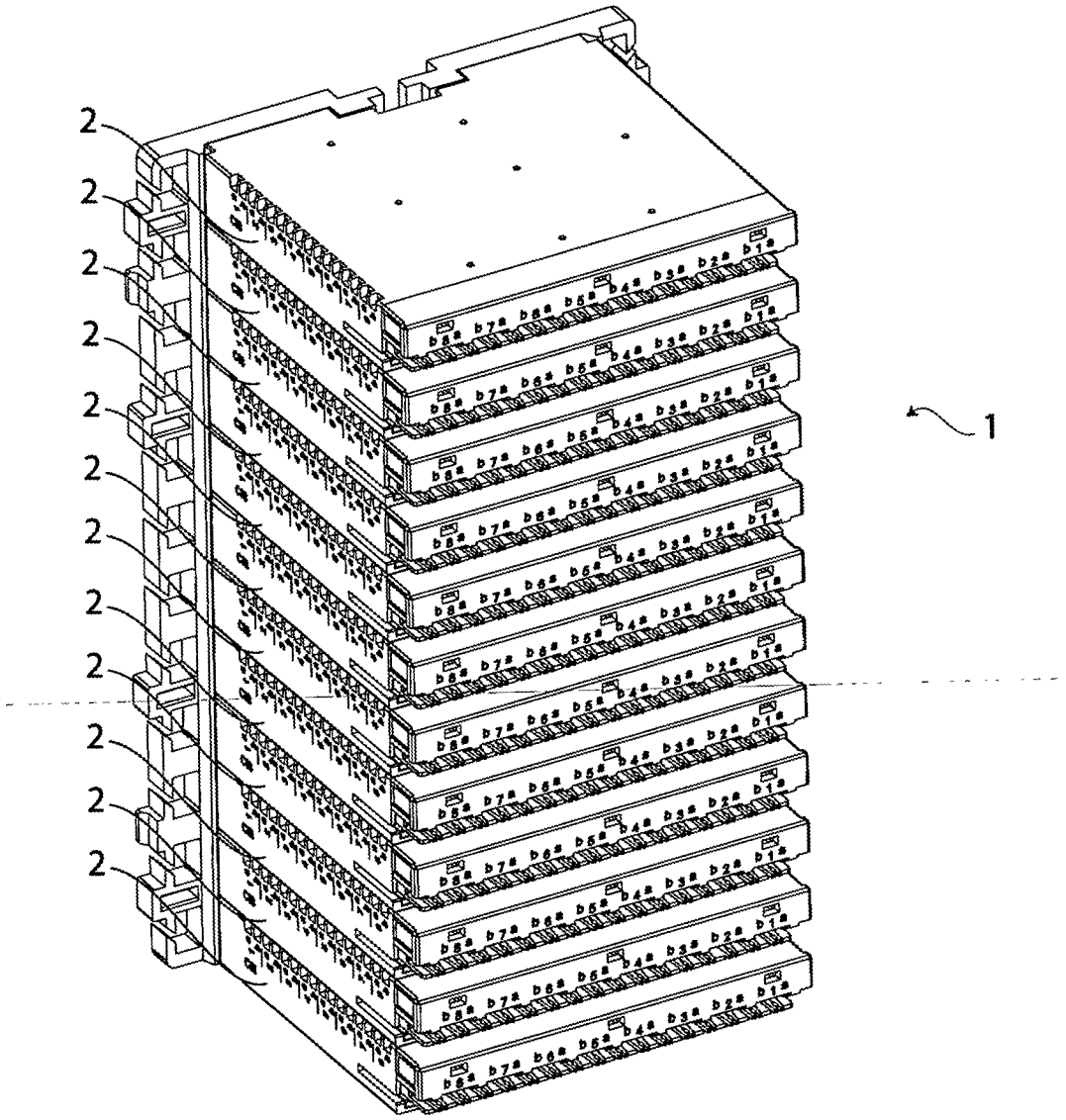

Fig. 1

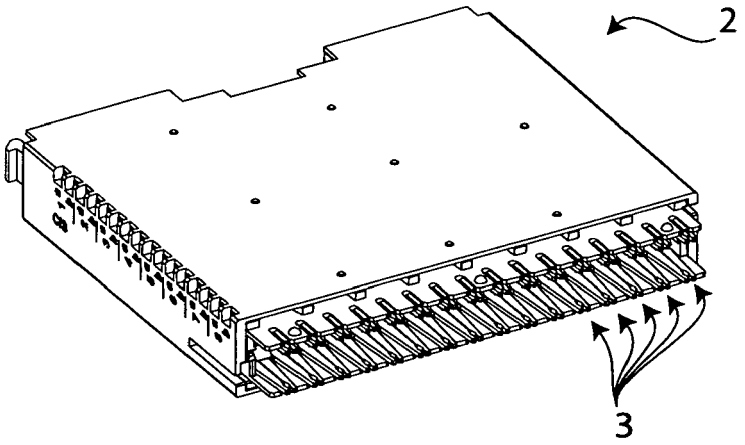

Fig. 2

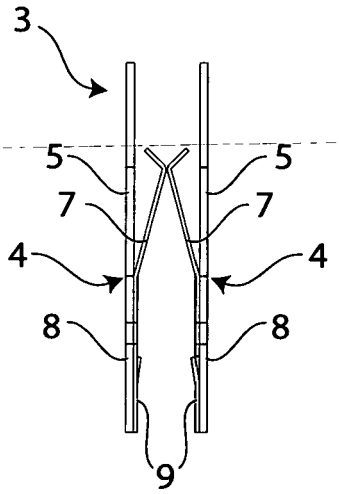

Fig. 3

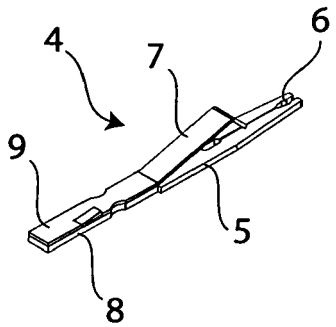

Fig. 4

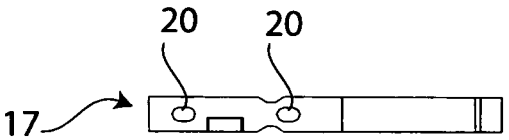

Fig. 5

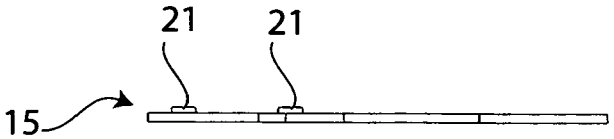

Fig. 6

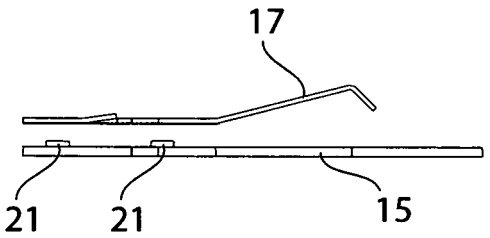

Fig. 7

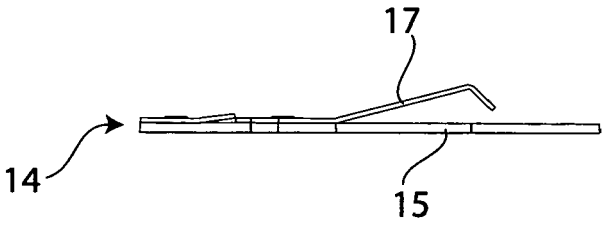

Fig. 8