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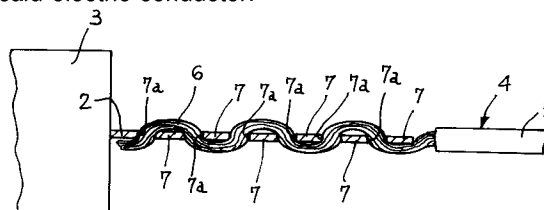
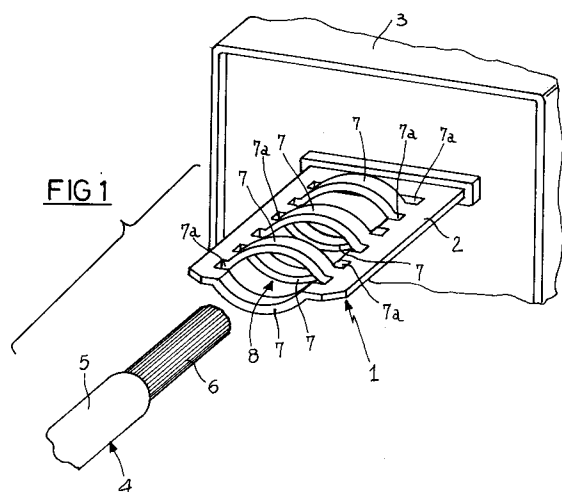
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I-20159 Milano (IT)(54) **Connecting terminal for electric apparatus.**

(57) A connecting terminal (1) for electric apparatus comprises a plate-like body (2) having at least one shaped portion (7) formed by blanking from the body itself and adapted to define a fitting seat (8) for an

end portion (6) of a thread-like electric conductor (4), the shaped portion (7) being deformable by squeezing so that it fixedly engages the end portion (6) of said electric conductor.

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The present invention relates to a connecting terminal for electric apparatus of the type comprising a plate-like body engaged to an electric apparatus and adapted to define a contact with an end portion of an electric thread-like conductor.

It is known that connecting terminals for electric apparatus and devices such as switches, double-throw switches, optical signallers, pressure meters, thermostats and in general all components passed through by medium-intensity current flows, say until 16 A, as it happens for example in the field of household appliances, consist of flat connectors each formed with a plate-like body made of a material having a high electric conductivity, engaged to the apparatus itself and emerging therefrom.

Ending at said plate-like body is the bare end portion, that is devoid of the outer insulating sheath, of a thread-like electric conductor of the rigid or flexible type, which is to be connected thereto.

Connections of a thread-like electric conductor to said plate-like bodies may take place according to different modalities in order to ensure an appropriate electric contact in time, avoiding any slackening which will bring about sparkings between the parts above all in the presence of vibrations or tractive stresses in use.

For example provision may be made for the use of a connecting element integral with the ends of the thread-like conductor and adapted to be fitted on the flat connector of the apparatus.

This known connecting element is substantially formed with a plate having, at one end, a hooking appendage clasping the end portion of the thread-like electric conductor, devoid of the insulating sheath and, at the other end, two spaced apart and undulated portions.

The latter portions practically define with their edges and in cooperation with a flat portion of the connecting element, a seat of appropriate sizes into which, by virtue of the material elasticity, the flat connector integral with the electric apparatus can be forcedly introduced.

However, the mechanical and electric connecting technique briefly described above has some drawbacks.

In fact, above all a specific step is required for fastening the hooking appendage of the connecting element to the thread-like electric conductor.

Subsequently the tight fitting of the flat connector of the apparatus in the seat of the connecting element generally involves an important effort because obviously coupling must be conveniently forced in order to avoid the occurrence of slackenings and separations between the parts as much as possible, above all in the presence of vibrations.

In the case of automated assemblings it is therefore necessary to use rather complicated equipments capable of giving a calibrated fitting force, sufficient to ensure the complete fitting of the flat connector in the connecting element.

Even in the case of manual operations, exerting an important effort is at all events rather inconvenient, above all if a great number of connections is to be made.

In addition, interposing a connecting element between a thread-like electric conductor and a flat connector integral with the electric apparatus means that an additional cost, say of the further component, is to be added to the total manufacturing costs, and this charge, although reduced, may affect production.

The cited connecting elements sometimes give rise to problems also from an operating point of view.

For example, at their hooking appendages the connecting elements from rigid extensions projecting from the flat connectors which may represent an unacceptable encumbrance.

In these cases the hooking appendage may be bent, which however brings about the risk of the undesired formation of breaks or cuts, or the risk that said appendage may get too close to conductive parts of the apparatus. Under these situations it is therefore necessary to protect the end portion of the hooking appendages with insulating elements, which operation involves further and undesired costs and workings.

Finally, the forced fitting does not always give an appropriate ensurance against slackening in the connection. In fact, important inaccuracies in construction may occur which condition the degree at interference created between the parts to be mutually engaged.

Practically, the connecting elements of the cited type not only increase the costs of the electric connections either directly or indirectly, but also have serious limits in terms of operation.

Another known modality for mechanically and electrically engaging a thread-like conductor to a flat connector of an electric apparatus often consists of a direct welding of the above components.

This modality is time-consuming and in addition skilled persons are required, as well as obviously, the availability of a welding device.

It is to be pointed out that both the above described modalities, in case of servicing interventions in which it is for example necessary in an apparatus to restore the electric connection between a conductor and a new flat connector of a device that has been replaced, involve the knowledge by the operator of the type of connection he must make, so that he may have at his disposal either the welding equipment or the specific con-

necting element to be engaged to the end portion of the thread-like electric conductor.

Under this situation, the general task of the present invention is to provide a connecting terminal for electric apparatus capable of substantially obviating the above drawbacks.

Within the scope of this general task, it is an important object of the present invention to provide a connecting terminal enabling a stable and safe connection to be made between an electric apparatus and a thread-like conductor and capable of reducing not only the intrinsic costs of the components used for the connection, but also the manual or automated operating steps correlated therewith.

The above specified objects are substantially achieved by a connecting terminal for electric apparatus characterized in that said plate-like body comprises at least one shaped portion formed by blanking from the body itself and adapted to define a fitting seat for said end portion of the thread-like electric conductor, and in that said shaped portion can be deformed by squeezing so as to secure said end portion of the thread-like electric conductor introduced into said fitting seat, to said plate-like body in a stable manner.

The description of a preferred embodiment of a connecting terminal for electric apparatus is given hereinafter in accordance with the accompanying drawings, in which:

- Fig. 1 is a perspective view of a connecting terminal in accordance with the invention and a thread-like electric conductor before being coupled with each other; and
- Fig. 2 diagrammatically shows a longitudinal section of the connecting terminal of Fig. 1 as arranged for clamping the thread-like conductor.

Referring to the drawings, the connecting terminal for electric apparatus according to the invention has been generally identified by reference numeral 1.

It comprises a plate-like body 2, made of a material having a high electric conductivity and engaged to one electric apparatus or device 3.

The plate-like body 2 practically is designed to form a substantially flat connector for a thread-like electric conductor 4 coated with an insulating sheath 5 and exhibiting a bare end portion 6, that is a portion from which the sheath has been removed.

In an original manner, a plurality of shaped portions 7 each defined by a curved strip is formed in the plate-like body 2 by blanking and subsequent deformation.

More particularly, each shaped portion 7 is obtained by straight cuts 7a parallel to each other, formed in the plate-like body 2, each of which defines two adjacent shaped portions.

Preferentially each cut 7a is made in the form of a transverse slot having such a width that the facing edges of two contiguous shaped portions 7 are suitable spaced apart from each other.

Advantageously, the shaped portions 7 are parallel to each other and alternately emerge from opposite faces of the plate-like body 2, practically defining a substantially tubular fitting seat 8 into which the end portion 6 of the thread-like electric conductor 4 can be easily introduced.

The use of the connecting terminal described above mainly as regards structure is as follows.

After the thread-like electric conductor 4 has been conveniently prepared through removal of the insulating sheath 5 from the end portion 6, said end portion is introduced into the fitting seat 8 of the connecting terminal 1.

Subsequently, either manually (for example by means of pliers) or with the aid of devices of the automated type, the shaped portions 7 are deformed by squeezing and they will therefore tend to flatten, and the shaped portions emerging from one face of the plate-like body 2 will tend to move close to the shaped portions projecting from the second face of the same plate-like body, taking substantially a coplanar position with respect to each other.

In this manner the end portion 6 of the electric conductor 4 is submitted to a clamping causing a change in the conformation thereof, so that it no longer has a straight conformation, but acquires a substantially sinusoidal conformation (see Fig. 2).

Under this situation, the end portion 6 passes over each of the shaped portions 7 on alternately opposite sides passing through the slits 7a inside which the end portion is fixedly retained.

Consequently the conductor 4 is fixedly engaged to the connecting terminal and can resist high tractive efforts without the occurrence of slackenings or separations therefrom.

The invention achieves important advantages.

First of all fitting of the thread-like conductor in the connecting terminal does not require any particular effort because the provided fitting seat constitutes a wide housing for the end portion of the bare conductor.

Consequently, not only this operation is quick, but, if carried out with automated equipments for example, does not require precise and calibrated efforts to be carried out by said equipments which, as a result, may be very simple.

In addition, the connecting terminal of the invention does not require the presence of connecting elements interposed between the terminal itself and a thread-like electric conductor.

Therefore neither additional costs for other components are required nor operating steps for fastening said further connecting elements to the

conductors. Due to the absence of additional connecting elements, the bulkiness of the connection is exclusively represented by the connecting terminal because the thread-like conductor can be immediately bent on its coming out of the connecting terminal without any damage.

Even during possible servicing operations in which it is necessary to replace the electric connections of apparatus and devices, as said apparatus and devices are provided with the terminals of the invention, the operator need not have at his disposal any additional component, or particular tools, for welding for example, because connections are made directly and exclusively with the terminals themselves.

It is also to be pointed out that clamping of the end portion of a thread-like conductor made by the connecting terminal in accordance with the invention is very safe and steady even in the presence of vibrations, because the clamping force achieved between the deformed shaped portions of the connecting terminal and the end portion of the conductor is very high.

All of the details may be replaced by technically equivalent means and on carrying out the invention in a practical manner the materials used and sizes may be of any nature and magnitude, depending on requirements.

Claims

1. A connecting terminal for electric apparatus of the type comprising a plate-like body (2) engaged to an electric apparatus (3) and adapted to define a contact with an end portion (6) of an electric thread-like conductor (4), characterized in that said plate-like body (2) comprises at least one shaped portion (7) formed by blanking from the body itself and adapted to define a fitting seat (8) for said end portion (6) of the thread-like electric conductor (4), and in that said shaped portion (7) can be deformed by squeezing so as to secure said end portion (6) of the thread-like electric conductor (4) introduced into said fitting seat (8), to said plate-like body (2) in a stable manner.
2. A connecting terminal according to claim 1, characterized in that said plate-like body (2) is substantially flattened and in that said at least one shaped portion (7) is defined by a curved strip, said blanking comprising straight cuts (7a) parallel to each other.
3. A connecting terminal according to claim 2, characterized in that each of said straight cuts (7a) is made in the form of a transverse slot, so that two contiguous shaped portions (7)

exhibit respective facing edges spaced apart from each other.

4. A connecting terminal according to claim 2, characterized in that at least two of said curved strips (7) extending parallel to each other are provided.
5. A connecting terminal according to claim 4, characterized in that said curved strips (7) alternately emerge from opposite faces of said plate-like body (2).

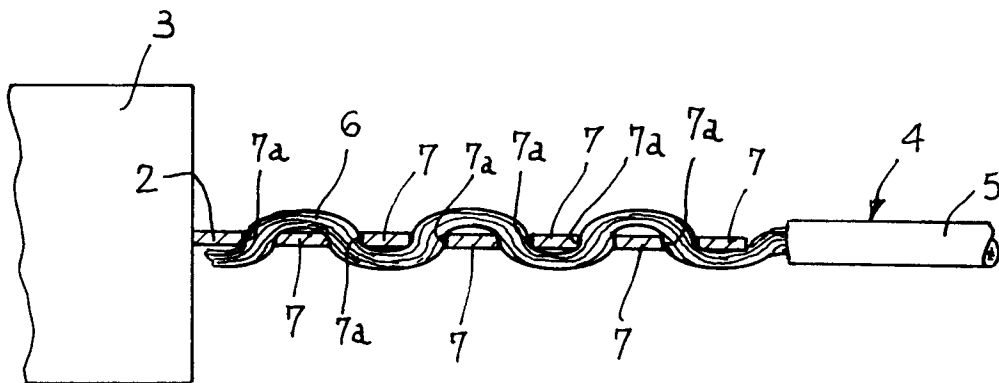
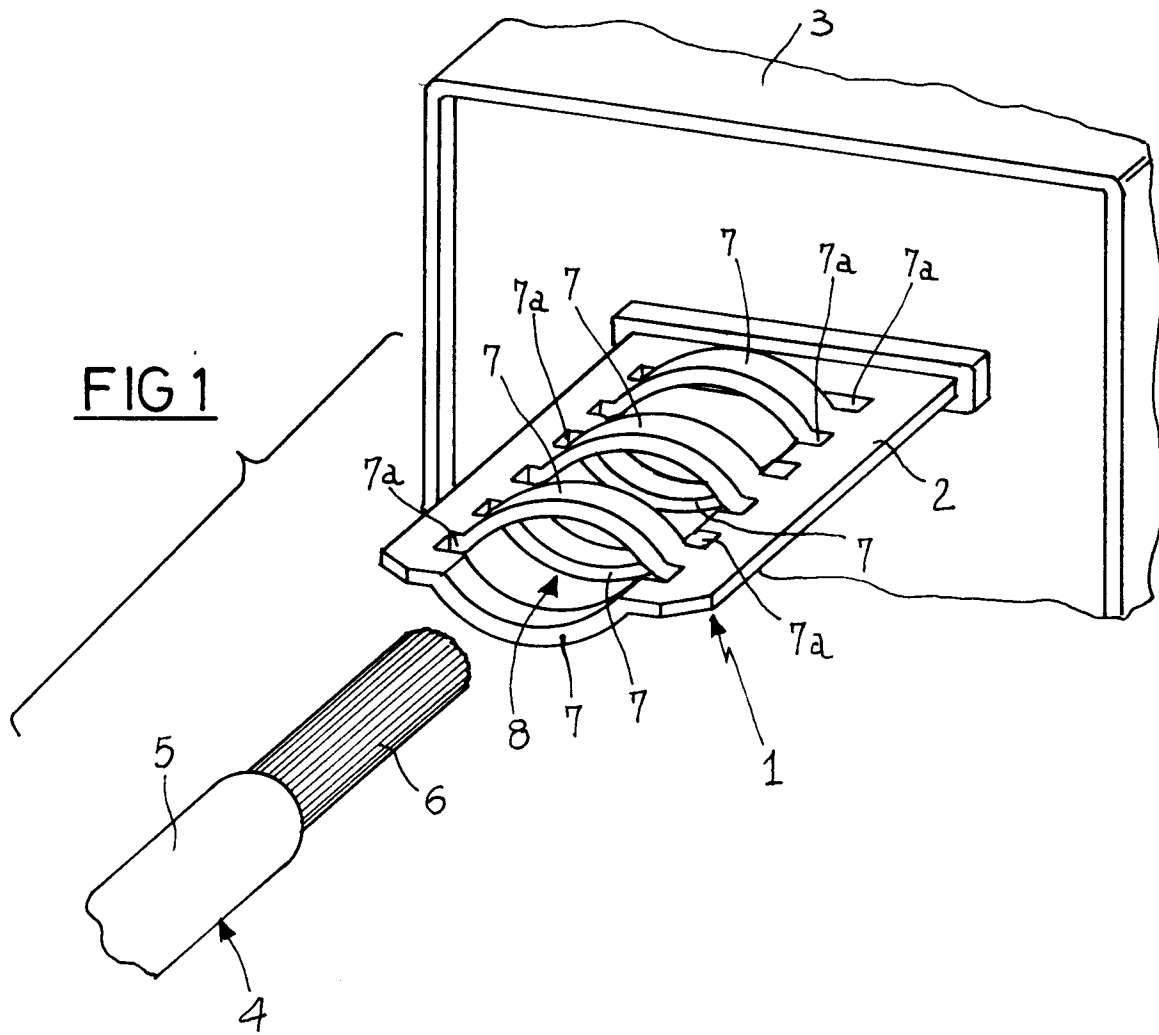


FIG 2



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EUROPEAN SEARCH REPORT

Application Number

DOCUMENTS CONSIDERED TO BE RELEVANT			EP 93830347.6
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.5)
X	<u>DD - A - 233 692</u> (TECHNISCHE HOCHSCHULE LEIPZIG) * Totality *	1-3	H 01 R 4/18
A	<u>DE - A - 3 046 026</u> (AKTIEBOLAGET KONSTRUKTIONS- -BAKELIT) * Fig. 2-4; page 7, lines 7-30 *	1-5	
A	<u>US - A - 3 699 328</u> (MURRAY) * Fig. 3-5 *	1-3	
A	<u>DE - A - 1 097 507</u> (MINNESOTA MINING) * Fig. 2,3; column 3, lines 20-39 *	1-5	
A	SOVIET INVENTIONS ILLUSTRATED, E1 section, week 9249, January 27, 1993 DERWENT PUBLICATIONS LTD., London; & SU-A-1700 659 (SHIP) -----	1	TECHNICAL FIELDS SEARCHED (Int. Cl.5) H 01 R 4/00 H 01 R 9/00
The present search report has been drawn up for all claims			
Place of search VIENNA		Date of completion of the search 23-09-1994	Examiner SCHMIDT
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			