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(71) Applicant: **CA.TO.BO. S.n.c. di Cavalleretti Lavia
& Tondelloni Daniele**
43029 Traversetolo (Parma) (IT)

(72) Inventor: **Tondelloni, Daniele**
43029 Traversetolo (Parma) (IT)

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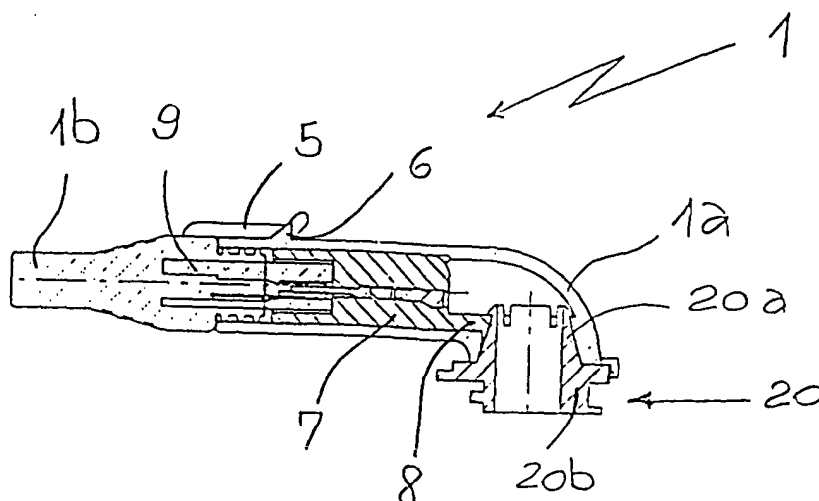
(74) Representative: **Gotra, Stefano**
Bugnion S.p.A.
Via Garibaldi 22
43100 Parma (IT)

(54) **Electrical connector**

(57) An electrical connector (1), comprising a first portion (1a) so shaped as to be coupled to a junction box (2), and a second portion (1b) associated to electrical cables/wires (4) and so shaped as to be coupled with the first portion (1a). The connector (1) originally comprises means for rotating the first portion (1a) relative to

the junction box (2). In particular, the first portion (1a) develops according to a substantially right angle, i.e. in two mutually perpendicular directions, wherein a part of first portion (1a) which develops orthogonally to the box (2) where to it is applied is far smaller than a part of first portion (1a) which develops parallel to the box (2).

FIG. 1



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Description

[0001] The present invention relates to an electrical connector.

[0002] In the prior art, a large number of electrical connectors are known, for various uses and of various shapes and types.

[0003] In particular, in the heating boiler sector, electrical connectors are used for wiring the boiler, in order to connect electrical cables/wires to the various components of the boiler or to boxes adapted for electrical connections and provided with fairlead.

[0004] The main drawback of the electrical connectors used in the heating boiler sector is represented by their poor mounting rapidity and by the laborious operations required for inserting the cables. The boxes must be opened, the fairleads unscrewed, then the cables must be inserted, the fairleads reapplied, screwing them back on, and lastly the boxes must be closed again.

[0005] Another drawback is given by the fact that connectors available on the market develop radially relative to the box and therefore constitute an undesired encumbrance which often complicates cable mounting operations, especially in situations, such as inside the boilers, where the dimensions and operating spaces are particularly reduced to minimise the total dimensions of the boiler.

[0006] Another drawback is given by the fact that prior art connectors, once installed, cannot be moved, for instance to change the direction of exit of the cables from the box. If this should become necessary, one is forced to disassemble the box and the fairlead and to reinstall the connectors in the desired position.

[0007] An aim of the present invention is to eliminate the aforesaid drawbacks making available a rapid electrical connector which can be easily employed even in small spaces and without having to open the junction box.

[0008] A further aim of the present invention is to propose an electrical connector that is able to reduce the time required to connect the cables.

[0009] Another aim of the present invention is to make available an electrical connector which can be moved, in order to change the direction of exit of the cables from the box.

[0010] Yet a further aim of the present invention is to provide an electrical connector that is hermetic, economical and easy to build.

[0011] Said aims are fully achieved by the electrical connector of the present invention, which is characterised by the content of the claims set out below.

[0012] These and other aims shall become more readily apparent from the description that follows of a preferred embodiment illustrated, purely by way of non limiting example, in the accompanying drawings, in which:

- Figure 1 shows a section view of an electrical con-

necter according to the invention;

- Figure 2 shows an axonometric view of the connector of Figure 1;
- Figures 3 and 4 respectively show a top and a bottom view of the connector shown in the previous figures;
- Figure 5 shows a section view of the connector of Figure 1 with some parts removed;
- Figure 6 shows an axonometric section view of the connector of Figure 5;
- Figures 7, 8 and 9 show three views, respectively axonometric, partially sectioned axonometric and sectioned front view of a constructive element of the connector of Figure 1;
- Figure 10 shows an electrical connector according to the invention applied to a junction box;
- Figures 11 and 12 respectively show perspective views of a female coupler and male coupler.

[0013] With particular reference to Figures 1 through 4 and to Figure 10, the electrical connector according to the invention is globally indicated with number 1 and is preferably made of plastic material.

[0014] The connector 1 comprises a first portion 1a so shaped as to be coupled to a junction box 2, and a second portion 1b which bears with it a multi-wire cable 4 and which is coupled to the first portion 1a.

[0015] To assure a secure mating between the two portions 1a, 1b, appropriate means are provided, associated both to the first and to the second portion.

[0016] Said means are constituted by an element 5 associated to the first portion and which extends externally therefrom, defining a slot within which is inserted a corresponding protuberance 6 externally associated to the second portion 1b (Figure 11).

[0017] Since the element 5 and the protuberance 6 are present only on a side of the two portions, the two portions have only one side or direction for correct coupling and this assures the correspondence between the wires borne by the second portion and the contacts present in the first portion.

[0018] The first portion 1a houses within it a female connector bearing male contacts, called male coupler 7, whereto are connected electrical cables/wires, not shown, which come from the box 2.

[0019] With particular reference to Figures 1 and 12, the male coupler 7 is externally provided with an appendage 8 which internally engages the first portion 1a, in correspondence with a 90° elbow, to prevent the accidental extraction of the male coupler from the first portion 1a.

[0020] The second portion 1b houses a male connector bearing female contacts, called female coupler 9, whereto are connected the electrical cables/wires from the power supply.

[0021] In the preferred embodiment, the female coupler 9 is assembled by heat-melting with the portion 1b whereof it constitutes an essential and inseparable part

(after heat-melting).

[0022] The fact the power supply is on the part of the female coupler is an additional safety guarantee provided by the connector.

[0023] The portions 1a, 1b develop prevalently parallel to the connection box 2 where to they are applied.

[0024] Specifically, the first portion 1a has a first part which develops orthogonally to the box 2 and a second part which develops parallel to the box and which is far larger than the first.

[0025] With particular reference to Figures 1, 7 and 8, the electrical connector 1 originally comprises means for rotating the first portion 1a relative to the junction box 2.

[0026] In the illustrated example, said means comprise a connecting element 20, preferably crown shaped, having a first end 20a pivotally inserted inside the first portion 1a, and a second end 20b integrally coupled to the junction box 2.

[0027] In accordance with the preferred and illustrated embodiment, the connector 1 comprises at least a locking element associated to the means for rotating the first portion 1a, to lock it in a pre-set angular position. In particular, said locking element is constituted by a locking tooth 21 integrally fastened to the first portion 1a of the connector 1 and so shaped as to couple with seats 22 obtained in correspondence with the second end 20b of the connecting element 20.

[0028] In the illustrated example, the seats 22 are substantially small pits obtained on the crown 20.

[0029] In an alternative embodiment, not shown herein, the connecting element 20 may be obtained in a single body with the junction box 2.

[0030] The presence of the crown 20 allows the connector 1 to assume a plurality of angular positions, according to the direction to be given to the cables exiting from the junction box 2.

[0031] With particular reference to Figure 4, the connector 1 preferably assumes four angular position, four being the pits 22 obtained in correspondence with the second end 20b of the crown 20. Specifically, the connector 1 in question may assume 4 mutually orthogonal angular positions, corresponding respectively to 0°, 90°, 180° and 270° starting, for instance, from the position shown in Figure 4.

[0032] In the illustrated example, the perimeter of the crown 20 between the seats 22 is substantially curvilinear, in order to facilitate the rotation of the portion 1a.

[0033] In the preferred embodiment, illustrated herein, the crown 20 is provided with an abutting body 23 to prevent the portion 1a of the connector, albeit easily rotating between the seats 22, from completing a rotation equal to or greater than 360°, causing the twisting of the cables present within the box 2.

[0034] The invention achieves important advantages.

[0035] First of all, such a connector, being capable of rotating, allows to position the cables exiting from the junction box according to any angular direction and hence it is particularly suitable for use in small spaces.

Moreover, a connector in accordance with the invention considerably reduces the time required to connect the cables.

[0036] Another advantage is given by the fact that such a connection is hermetic, economical and easy to build.

[0037] In particular, the deep insertion of the end 20a of the crown 20 within the first portion 1a of the connector, guarantees an efficient hermetic seal and enables the connector to reach an IP65 level of protection.

[0038] Advantageously, such an electrical connector can also be used outside the sector of heating boilers.

Claims

1. An electrical connector (1), comprising:

a first portion (1a) so shaped as to be coupled to a junction box (2),
a second portion (1b) associated to electrical cables/wires (4) and so shaped as to be coupled with the first portion (1a),

characterised in that it comprises means (20) for rotating the first portion (1a) relative to the junction box (2).

2. A connector as claimed in claim 1, **characterised in that** it comprises at least a locking element associated to the means for rotating the first portion (1a), to lock it in a pre-set angular position.

3. A connector as claimed in claim 1, **characterised in that** the means for rotating the first portion (1a) comprise a connecting element (20) having a first end (20a) pivotally coupled to the first portion (1a) and a second end (20b) integrally coupled to the junction box (2).

4. A connector as claimed in claim 3, **characterised in that** it comprises at least a stopping tooth (21) connected to said first portion (1a) of the connector (1) and so shaped as to be coupled to seats (22) obtained in correspondence with the second end (20b) of the connecting element.

5. A connector as claimed in claim 1, **characterised in that** the first portion (1a) assumes at least four predetermined angular positions.

6. A connector as claimed in claim 3, **characterised in that** the connecting element (20) is made in a single body with the junction box (2).

7. A connector as claimed in claim 1, **characterised in that** the first and the second portion (1a;1b) develop prevalently parallel to the box (2) where to

they are applied.

8. A connector as claimed 1, wherein are present means associated to the first and to the second portion (1a, 1b) to assure a secure mating between said two portions (1a;1b). 5

9. A connector as claimed 8, wherein said means comprise an element (5) associated to the first portion (1a) which extends externally thereto and defines a slot within which is inserted a corresponding protuberance (6) associated externally to the second portion (1b), in such a way as to make unique the direction of insertion of each portion (1a;1b). 10
15

10. A connector as claimed 1, wherein the first portion (1a) houses within it a so-called male coupler (7) provided externally with an appendage (8) which is internally engaged in the first portion (1a) to prevent the accidental extraction of the male coupler (7) from the first portion (1a). 20

11. A connector as claimed 1, wherein the second portion (1b) bears a so-called female coupler (9). 25

12. A connector as claimed 1, wherein the first portion (1a) develops according to a substantially right angle, i.e. in two mutually perpendicular directions, wherein a part of first portion which develops orthogonally to the box (2) whereto it is applied is far smaller than a part of first portion (1a) which develops parallel to the box (2). 30

13. A connector as claimed 4, **characterised in that** the connecting element (20) is provided with an abutting body (23) to prevent the portion (1a) of the connector (1) from rotating by an angle equal to or greater than 360°. 35

14. An electrical connector (1), of the type comprising: 40
 - a first portion (1a) so shaped as to be coupled to a junction box (2),
 - a second portion (1b) associated to electrical cables/wires (4) and so shaped as to be coupled to the first portion (1a), **characterised in that** the first and the second portion (1a, 1b) develop prevalently parallel to the box (2) whereto they are applied. 45
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15. A box for the junction of electrical cables, **characterised in that** it comprises at least a connector (1) as claimed in any of the previous claims. 55

FIG.1

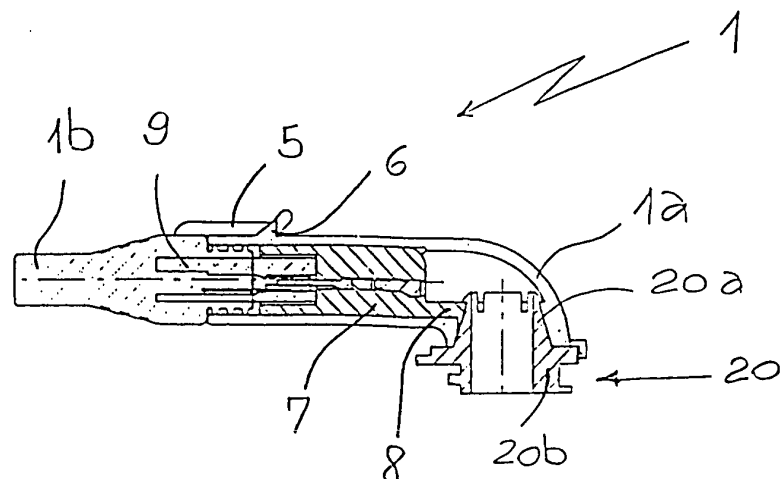


FIG.2

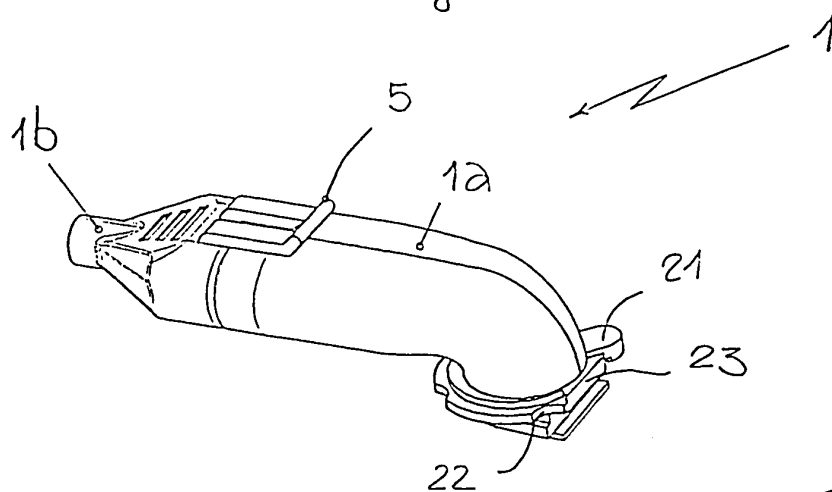


FIG.3

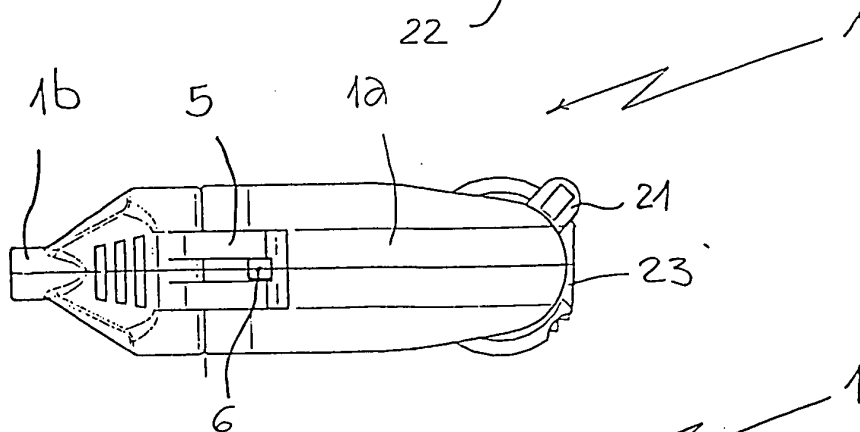


FIG.4

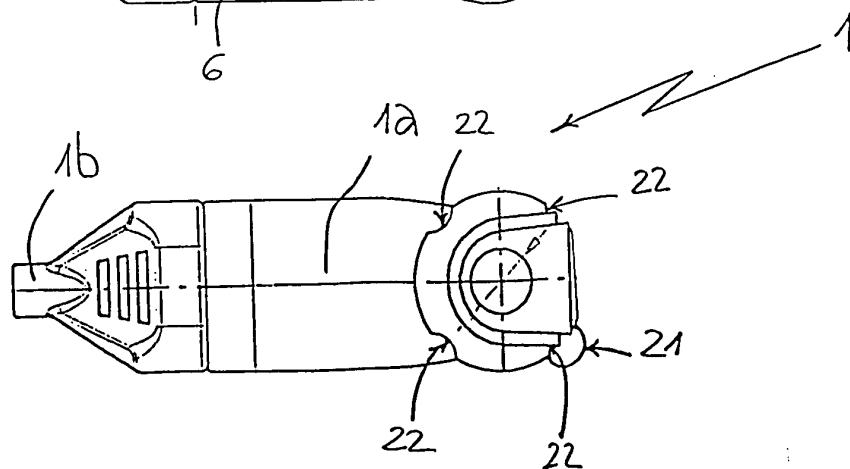


FIG. 5

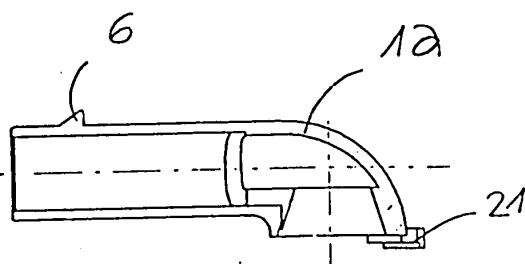


FIG. 6

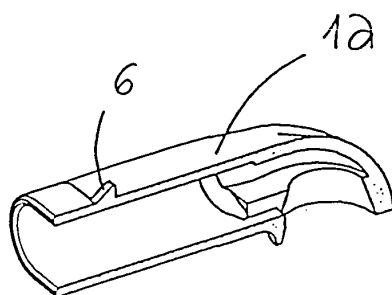


FIG. 7

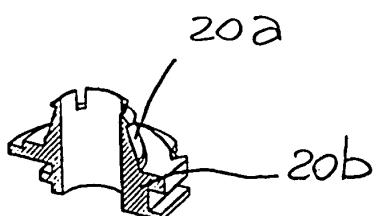
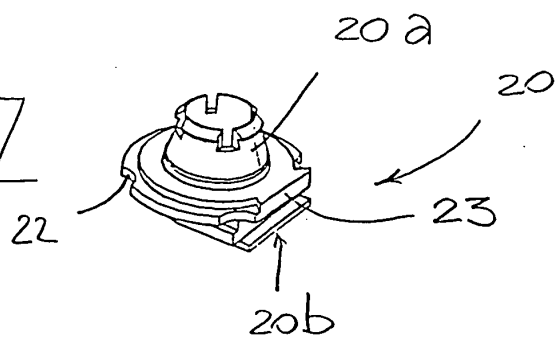


FIG. 8

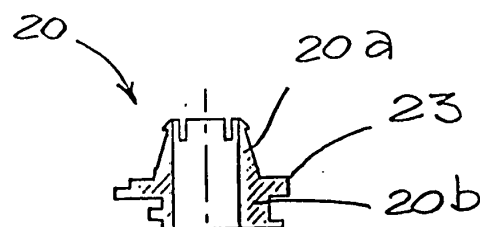


FIG. 9

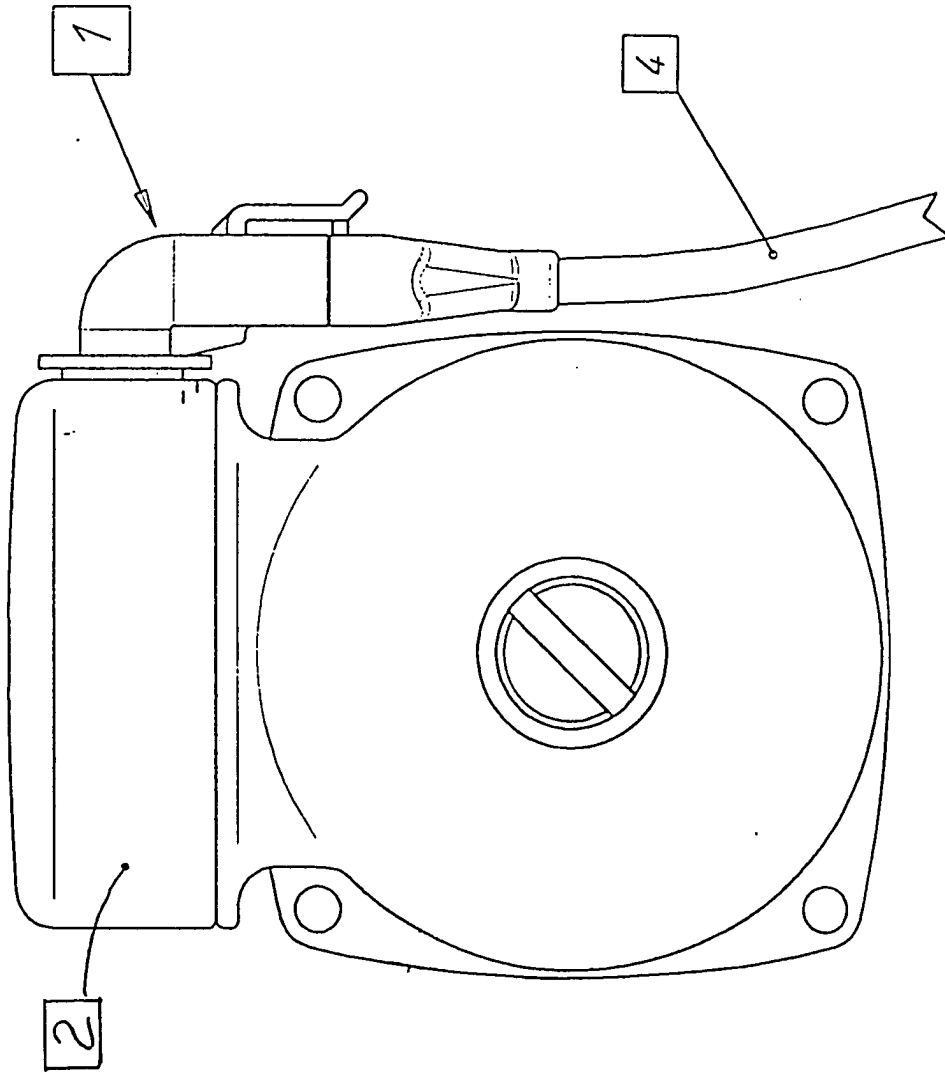


FIG. 10

FIG. 11

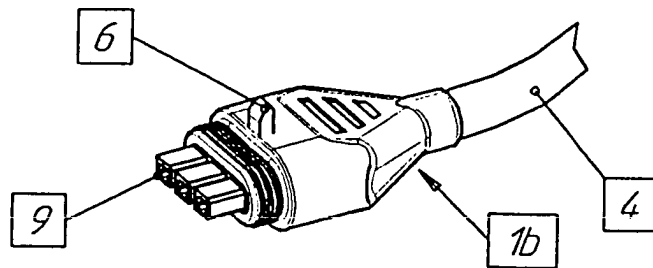
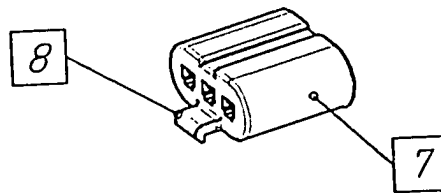


FIG. 12





European Patent
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EUROPEAN SEARCH REPORT

Application Number
EP 03 01 7051

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			TECHNICAL FIELDS SEARCHED (Int.Cl.7)
			H01R
The present search report has been drawn up for all claims			
Place of search Berlin		Date of completion of the search 19 March 2004	Examiner Alexatos, G
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EP 03 01 7051

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19-03-2004

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