(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) Publication number: **0 101 419**
A1

(12) # EUROPEAN PATENT APPLICATION

(21) Application number: 83850184.9

(22) Date of filing: 29.06.83

(51) Int. Cl.³: H 01 R 4/22
H 01 R 11/28, H 01 M 2/30

(30) Priority: 09.07.82 SE 8204251

(43) Date of publication of application:
22.02.84 Bulletin 84/8

(84) Designated Contracting States:
BE DE FR GB IT NL

(71) Applicant: HB Bohus Maskinutveckling
Box 122
S-445 01 Surte(SE)

(72) Inventor: Lundqvist, Göran
Skomakargränd 12
S-445 00 Surte(SE)

(74) Representative: Graudums, Valdis
Backers Patentbyrå AB Drottninggatan 15
S-441 14 Göteborg(SE)

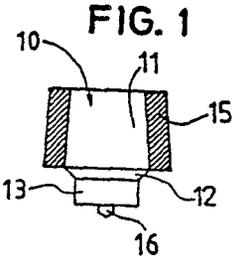
(54) **An electric connector device.**

(57) An electric connector device comprising a contact pin (10) and a cable clip for connection thereto.

The pin is provided with a protective sleeve (15) arranged to cover an electric connection region (11) of the pin. Preferably, the pin is conical at least within the area of said connection region thereof.

The cable clip is mounted with press fit onto the pin.

FIG. 1



EP 0 101 419 A1

Title of the invention

An electric connector device.

Field of the invention

The present invention relates to an electric connector device comprising a contact pin and a cable clip.

Background of the invention

The problem behind the invention is to provide a connector device having a contact pin/cable clip which guarantees a good electric contact between the cable clip and the contact pin as well as sufficient strength in the connection region between the clip and the pin.

Additionally, the pin should be mountable in structural members, for instance thin plate sheets, which are to be surface treated, for instance by aggressive surface treating agents and/or lacquer, after the pin has been mounted.

Further on, the connector device should be such that manual handling mounting failure sources are eliminated.

The mounting should be simple and it should be possible to determine by a simple inspection whether the connection between the cable clip and the pin is correct or not.

In other words, the connector device has to meet high standards of function as well as mass producion utility.

The connector device should be useful - with advantage - as an earthing arrangement of thin plate sheet structural members of for instance motor vehicles, household machines, electric heaters, etc.

Prior art within the actual field

A great variety of connector devices comprising a contact pin and a cable clip are of course known. British patent No. 121 442 330, for instance, discloses an arrangement of bendable pins insertable into a cable clip. Provided the term contact pin is broadened to include also accumulator terminals, for instance British patent No. 1 288 001 discloses a cable clip arranged to be tightened by a locking screw on a conical accumulator terminal.

As far as connector devices for earthing purposes are concerned, there are known several arrangements of pins that are weldable to sheet members.

However, such pins require that specific measures are taken, for instance cleaning by a steel brush, after the sheet having the pin mounted thereon has been surface treated. Such a cleaning is not reliable enough to guarantee a long-term well operating earth connection. It is not possible to mount the known pins after a surface treating of the lacquering type, because the lacquer is destroyed and/or the mounting causes regions of corrosion.

The lack of better alternatives has caused that to-day, for earthing metal sheets, there is used the conventional method of applying a cable clip, a washer and a self-tapping screw, in spite of a number of drawbacks, as:
The screw cracks the lacquer, which causes corrosion and poor electric contact.
The clamping force of the screw union is small implying that the screw gets untightened.
Lacquer of the screw union "sets" and contributes to the untightening of the screw union.
A barbed washer tears the lacquer.
Washers are expensive to mount.
It is difficult to control the tightening torque.
Careless tightening mistakes are difficult to reveal.
It is expensive to make holes in car body sheets.

Therefore, the object of the invention is to obviate said drawback(s) and offer a more advantageous alternative.

Summary of the invention

In the broadest sense thereof, the invention provides an electric connector device comprising a contact pin and a cable clip for connection thereto.

The device is characterized in that the contact pin is provided with a protective sleeve arranged for being removed after the pin has been mounted to a surrounding structural member, and in that the protective sleeve is arranged to cover at least an electric connection region of the pin.

Preferably, said connection region comprises a conical region.

In an escpecially preferred embodiment, the conical region is arranged to form a press union with the cable

clip arranged for co-operation with the contact pin.

From a strength point of view, the dimension relations preferably are such that the yield limit of the material of the collared part is passed when said press union is obtained.

In order to arrange for a rational fastening of the contact pin, the pin preferably has a portion to be welded to the structural member, consisting for instance of thin plate. Other fastening methods are not excluded.

Primarily, the contact pin is arranged to form an earthing pin.

Advantageously, the protective sleeve consists of metal meeting the required protection standards but also allowing a rational demounting. Plastics material withstanding for instance heat may also be used as material of the protective sleeve.

In the preferred embodiment, the protective sleeve is arranged such that it prevents for instance surface treating agents, including lacquer for said structural member, from affecting the electric connection region of the contact pin.

Brief description of the drawings

Figure 1 partially in section shows a first type of a contact pin provided with a protective sleeve,

Figure 2 shows the contact pin mounted to a structural member and with the protective sleeve removed,

Figure 3 shows a modified version of a contact pin, and

Figure 4 in a partial section view shows a cable clip, more precisely the collared portion thereof.

Description of preferred embodiments

The contact pin denoted by 10 in Figure 1 consists of metal, for instance stainless steel, and has an upper truncated conical envelope surface 11. The envelope surface region of the contact pin continues in a generally cylindric attachment portion via a downwards conical portion 12. The cylindrical portion is arranged for being welded to a thin plate structural member 14 and therefore said portion is provided with a tip 16 for initiating the welding arc.

Along the conical envelope surface 11 of the contact pin 10 there is a protective sleeve 15, consisting of a relatively soft metal, for example copper, in the embodiment shown. The fit between the sleeve 15 and the envelope surface 11 is made sufficient from a protective point of view with regard to aggressive, from an electric point of view detrimental surface treating agents, but such that simple demounting by axial removal is possible.

In Figure 2 the envelope surface 11 is shown uncovered, basically after two consecutive steps, namely welding of the contact pin 10 to the sheet 14 and lacquering of the structural member (generally involving a preceding further surface treatment) by a lacquer layer 17. A portion 18 of the lacquer layer remains on the tip of the pin 10 after the protective sleeve has been drawn off. A rational drawing off is carried out by a puller.

The welding is made for instance by an automatically loaded welding gun, where any contact pins for some reason lacking protective sleeves are discarded without action from the operator, implying that an otherwise doubtful source of failure is eliminated.

The lacquer free portion 11 of the contact pin in Figure 2 forms the electric connection region. A collared cable clip 19 having a collar 20 dimensioned for press fit relative the pin surface 11 is shown in Figure 4. The material of the cable clip preferably is soft, for instance copper, brass, and the dimension of the collar and the pin surface 11 are such that the yield limit of the material of the collar is passed, at least partially, when the collar is mounted onto the pin.

As an example of dimensions the following may be mentioned. Surface 11: hight 3,5 mm, top dimension 3,0 mm, bottom dimension 3,5 mm; collar 19: hight 3,5 mm (the conical portion thereof), top dimension 3,0 mm, bottom dimension 3,5 mm.

The hight relations given also imply that the collar 20 will be at the same level as the top surface 18 of the pin 11 after the cable clip has been mounted. This gives a

simple, quick and reliable inspection possibility after mounting.

In Figure 3 there is shown a modified contact pin 10 provided with a protective sleeve 15. The transition region 12 is here extended and cylindric.

Further alternatives are of course possible within the scope of the claims. If desired, the electric contact surface may comprise also the top surface of the contact pin, which requires a "cup"-shaped protective sleeve.

CLAIMS

1. An electric connector device, comprising a contact pin (10) and a cable clip (19) for connection thereto, wherein the contact pin is provided with a protective sleeve (15) arranged for being removed after the pin has been mounted to a surrounding structural member (14), and the protective sleeve (15) is arranged to cover at least an electric connection region (11) of the pin.

2. A device as in claim 1, c h a r a c t e r i z e d in that the pin comprises a conical region forming said connection region.

3. A device as in claim 2, c h a r a c t e r i z e d in that the conical region is arranged for forming a press fit with the cable clip.

4. A device as in claim 3, c h a r a c t e r i z e d in that the cable clip is provided with a collared hole (20) for obtaining said press fit.

5. A device as in claim 4, c h a r a c t e r i z e d in that the dimension relations between the collared hole (20) and the conical connection region (11) are such that the yield limit of the material of the collared portion is passed when said press fit is formed.

6. A device as in anyone or any of the preceeding claims, c h a r a c t e r i z e d in that the contact pin has a portion (13) to be welded to the structural member (14), for instance consisting of thin plate.

7. A device as in anyone or any of claims 1 to 6, c h a r a c t e r i z e d in that the contact pin (10) is arranged for forming an earthing pin.

8. A device as in anyone or any of the preceeding claims, c h a r a c t e r i z e d in that the protective sleeve (15) consists of metal.

9. A device as in anyone or any of the preceeding claims, c h a r a c t e r i z e d in that the protective sleeve is arranged to protect the electric connection region (11) of the pin, for instance from a surface treating agent, including lacquer, for said structural member (14).

1/1

FIG. 1

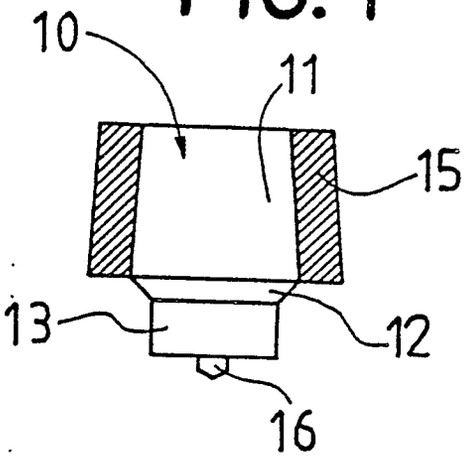


FIG. 2

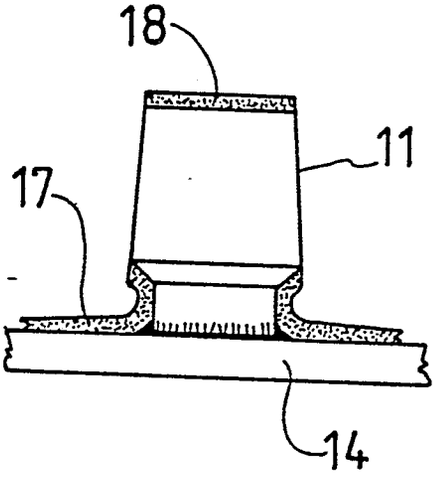


FIG. 3

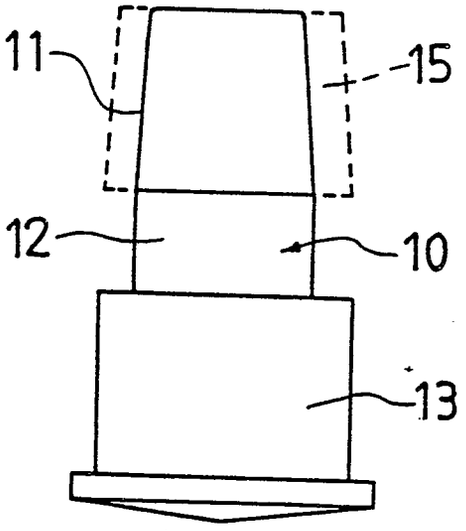
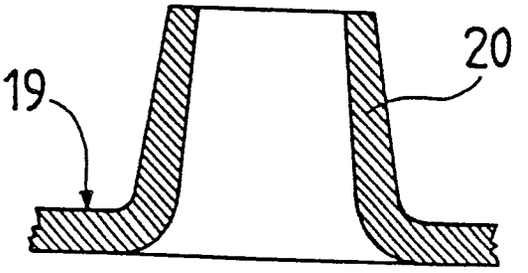


FIG. 4



0101419

European Patent Office

Application number

EP 83 85 0184

EUROPEAN SEARCH REPORT

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl. ³)
X	GB-A-1 381 250 (STE FULMEN et al.) * Page 1, lines 68-73; figure 2 *	1,2,9	H 01 R 4/22 H 01 R 11/28 H 01 M 2/30
X	DE-A-2 359 429 (MULTI-CONTACT) * Page 7, line 1 - page 8, line 3; page 8, line 26 - page 9, line 3; figures 1, 2 *	3,4,6	
A	BE-A- 763 154 (AMP) * Claim 1; figures 1, 2 *	2,3	

TECHNICAL FIELDS SEARCHED (Int. Cl. ³)

H 01 M 2/30
H 01 R 4/22
H 01 R 11/28

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
BERLIN	19-10-1983	HAHN G

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

EPO Form 1503 03 82