United States Patent

Lafont

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[54] **ELECTRIC CONNECTOR**

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[30] **Foreign Application Priority Data**

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[52] **U.S. Cl.** ..... **339/46**, 200/51.09, 339/45 M, 339/91 B

[51] **Int. Cl.** **H01r 13/62**

[58] **Field of Search** ..... 200/51.09; 339/45 M, 91 B, 339/111, 46

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[57] **ABSTRACT**

The electrical connections between the two sections of the connector are obtained through the use of coupling elements carried by an insulating disk disposed in front of the ends of the cables of the fixed section, locked inside the body of the fixed section, displaceable axially inside of said fixed section and having no electrical contact with said ends of the cables when the two sections of the connector are disconnected.

2 Claims, 8 Drawing Figures

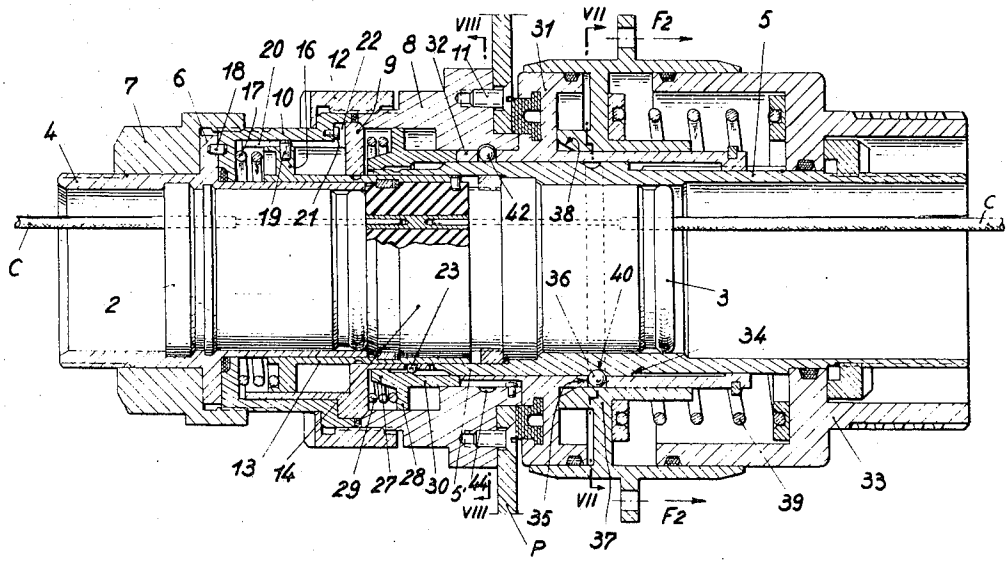


Fig.1

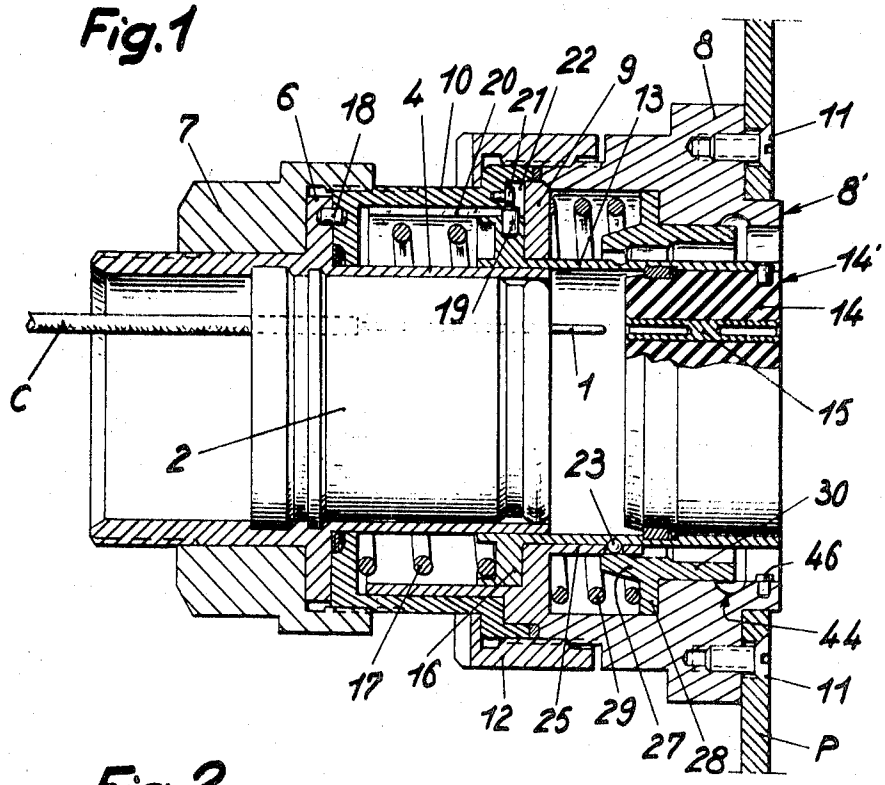
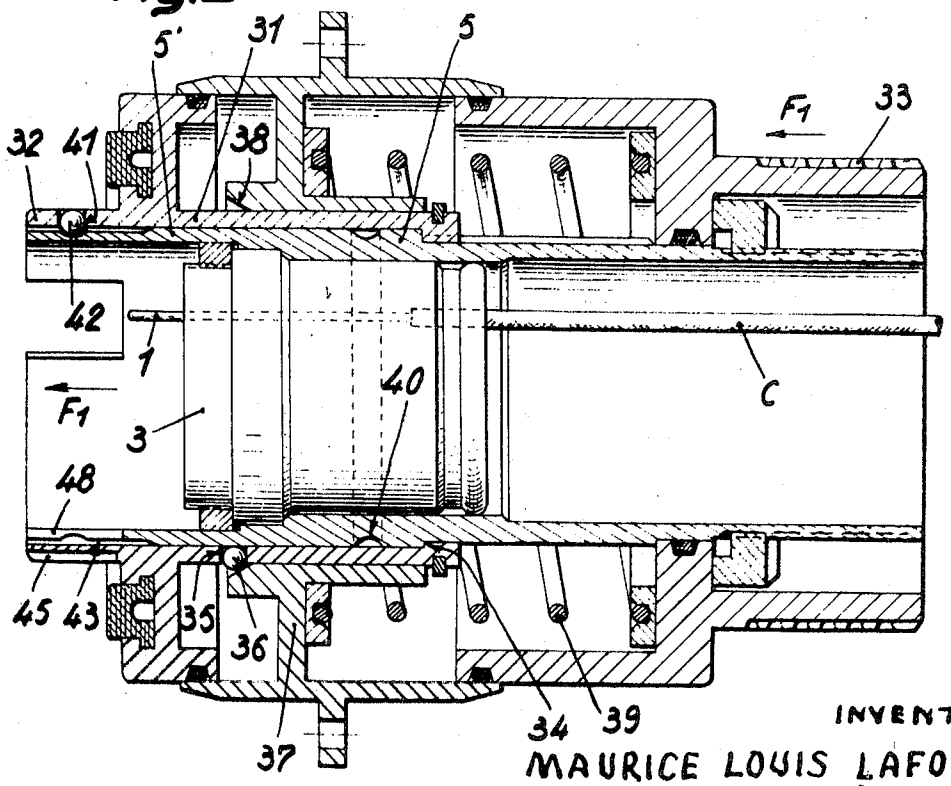
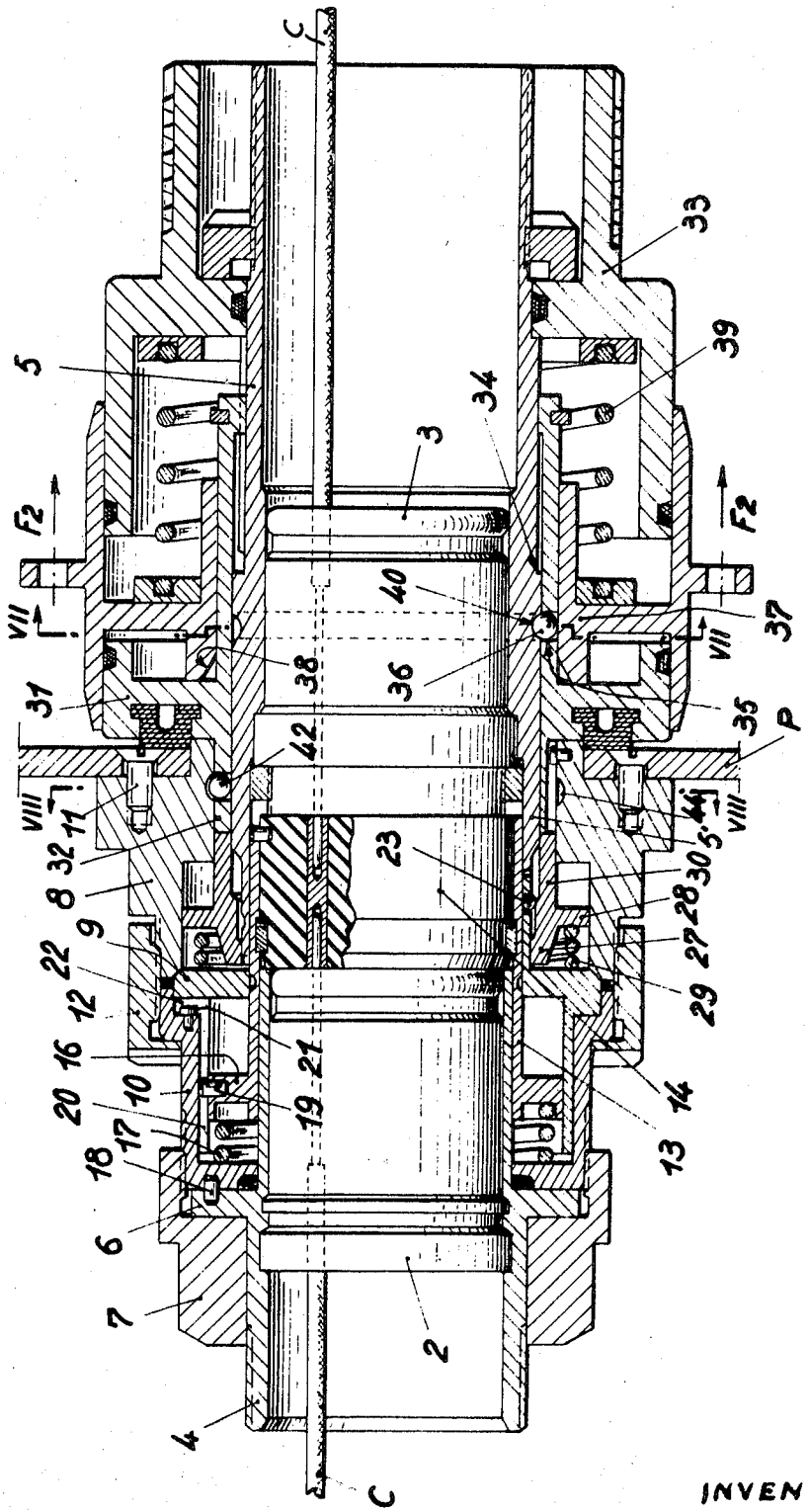


Fig.2



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Fig. 3



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Fig. 4

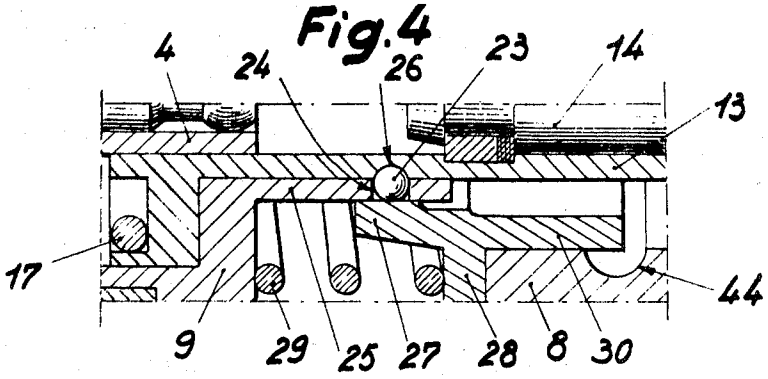


Fig. 5

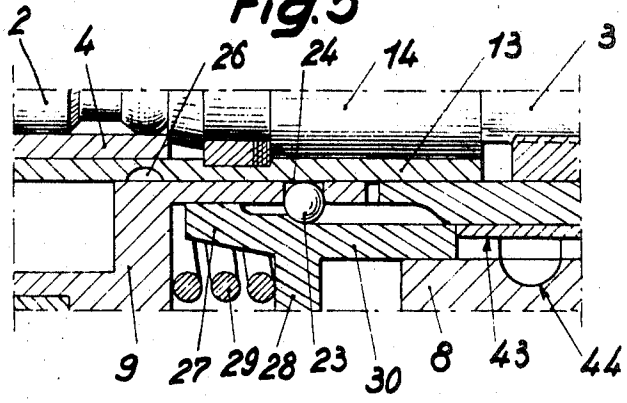
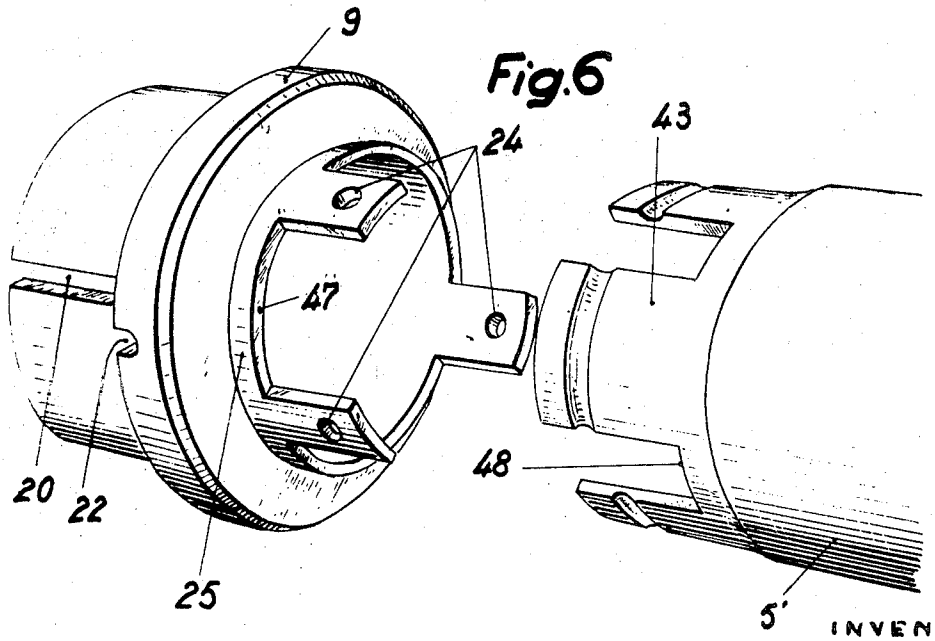


Fig. 6



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Fig. 7

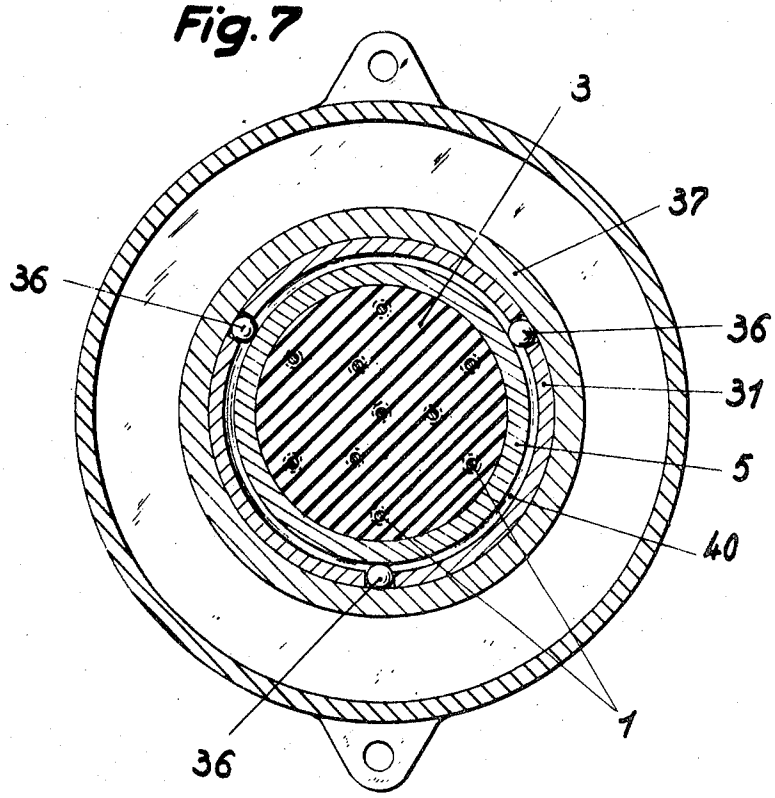
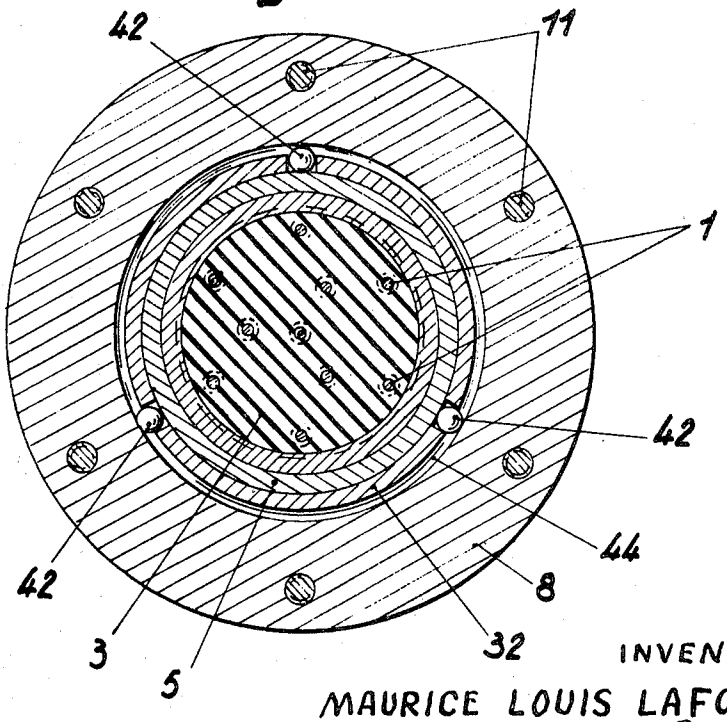


Fig. 8



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ELECTRIC CONNECTOR

DESCRIPTION OF THE INVENTION

The present invention is concerned with an electric cable connector.

Connectors are usually formed by means of elementary electrical connecting parts, respectively male and female, making it possible to join two strands of cable end to end.

The female section of the connector is generally fixed to the interior and against the wall of a tightly sealed area containing electrical receivers or generators, the ends of the connecting sockets extending outward from said enclosure.

These connectors are not satisfactory, since the extremities of the sockets are not protected and they may therefore be brought together either deliberately or by accident, thereby causing serious short circuits.

Furthermore, an abrupt rise in the outside temperature can also cause short circuits. In fact, the above-mentioned sockets are generally sunk in a part made of an insulating thermoplastic material which can soften and even melt under the effect of a sharp rise in temperature; the destruction of this insulating part causes, therefore, undesirable contacts between the connecting sockets.

The present invention, which provides a remedy for these disadvantages, is characterized by the fact that the electrical connections between the two sections of the connector are obtained by means of connecting elements carried on an insulating disk disposed in front of the ends of the cables of the fixed sections, displaceable axially inside of the latter, and having no electrical contact with said ends of the cables when the two sections of the connector are disconnected.

In this position, the insulating disk is locked in position and it is impossible for it to be driven into the body of the fixed section.

The unlocking of the insulating connecting disk is obtained by the front end of the removable section of the connector when it is fitted onto the fixed section.

This device offers the advantage of forming a secure seal preventing access on the part of the cables connected to the fixed section of the connector, which are generally charged.

Moreover, a sharp momentary increase in the outside temperature, causing the eventual destruction of the insulating disk, cannot produce short circuits, since the metallic connecting elements which it contains are sufficiently far from the free ends of the electric cables, which are, in addition, suitably insulated from the mass of the fixed section of the conductor.

Other characteristics will appear more clearly from the description which follows and in reference to the annexed drawings, given solely as an illustrative example, in which:

FIG. 1 is a longitudinal sectional view of the fixed section of the connector;

FIG. 2 is a longitudinal sectional view of the removable section of the connector;

FIG. 3 is a sectional view of the mounted unit;

FIG. 4 is a partial view on a larger scale showing the locked connecting disk;

FIG. 5 is a view similar to that of FIG. 4, showing the unlocked connecting disk;

FIG. 6 is a blown-up view in perspective showing a detail of the construction;

FIG. 7 is a sectional view made along the line VII—VII of FIG. 3;

FIG. 8 is a sectional view made along the line VIII—VIII of FIG. 3.

With reference to the drawings and according to one form of embodiment, the ends of the electric cables C to be connected are provided with plugs 1 extending beyond the insulating cores 2 and 3 held respectively in wire-clamping jackets 4 and 5.

The jacket 4 presents a ring-shaped flange 6 permitting it to be fastened to the body of the fixed section of the connector by means of a nut 7.

The body of the fixed section of the connector consists of three parts 8, 9 and 10, the part 8, which forms the sole, being fastened against a wall P by means of a screw 11, while 9 and 10, appropriately separated, are held on the part 8 by means of a nut 12.

The three parts 8, 9 and 10, are suitably positioned relative to each other at the time of assembly.

On the jacket 4, a tubular sleeve 13 can slide, closed off by an insulating disk 14 with which it has been integrated and which comprises connecting sockets 15 open on each of its faces and in which the above-cited plugs 1 can engage from each side.

The sleeve 13 comprises a flange 16 which is constantly subjected to the action of a spring 17, so that the sockets 15 do not engage with the plugs 1 of the jackets 4.

The run of the sleeve 13, under the action of the spring 17, is limited by a shoulder on the part 9 and it is such that, in the connecting position, the outer face 14' of the disk 14 is flush with part 8' of the sole 8 (FIG. 1).

Given the fact that the distribution and diameter of the plug-in pins can vary according to the use contemplated, it is important to align the disk 14 at an angle with respect to the jacket 4.

The angular positioning of the jacket 4 is ensured by a pin 18 on its flange 6 fitting into a corresponding seat in the part 10.

The angular positioning of the sleeve 13 is ensured by a spur 19, forming a sliding pin guided in a longitudinal groove 20 on the part 9, the latter being positioned, moreover relative to the part 10 by means of a finger 21 engaged in a hole 22 in said part 9.

The locking into position of the disk 14 is ensured by balls 23 housed in radial holes 24 of a skirt 25 on the part 9 and are held engaged in a groove 26 of the sleeve 13 by means of a ring 27 which can slide over the extremity of said skirt 25.

The ring 27 presents a flange 28 which is constantly biased by means of a spring 29 against an inner shoulder of the sole 8 (FIG. 1).

The ring 27 includes a skirt 30 extending toward the face 8' of the sole 8 and having an inner diameter which is greater than the outer diameter of the skirt 25, the clearance thus created permitting the balls 23 to disengage from the groove 26 without, however, leaving their hole 24 when the ring 27 is displaced by the compression of its spring 29 under the action of an axial thrust exerted on the extremity of said skirt 30.

The removable section of the connector consists principally of the jacket 5 extending at 5' beyond its plug 1 and is able to slide and be locked in a tubular body 31 bearing upon the partition P when the connection is made.

The body 31 consists of a tubular tip 32 which can be introduced into the aforementioned sole 8, and the length of which is such that, when said body 31 rests against the wall P, the end of said tip presses back the ring 27 of the fixed section while ensuring the unlocking of the sleeve 13.

The jacket 5, which forms an integral part of a manipulating grip 33, presents a shoulder 34 which abuts against an inner shoulder of the bore in the body 31 limiting its recoil.

The body 31 presents radial holes 35 in which are housed the balls 36, the diameter of which is greater than the thickness of said body.

A ring 37 capable of sliding on the body 31 rests, by means of a countersink 38 in its bore, on the balls 36 under the action of a spring 39 interposed between a shoulder of said ring 37 and the bottom of a bore in the grip 33.

The jacket 5 presents a peripheral groove 40 situated on the opposite side of its extremity 5' with respect to the balls 36 (FIG. 2).

When the body 31 is applied against the partition P and pressure is exerted on the grip 33 in the sense of the arrow F_1, the spring 39 is compressed, so as to rest against the ring 37; the jacket 5 is displaced in the same direction, penetrating the fixed section of the connector.

When the groove 40 is brought in front of the balls 36, the latter, pushed by the ramp 38, enter said groove. At this moment, the ring 37 advances, pressed by the spring 39 which partly expands, ensuring the locking of the jacket 5 which, held by the balls 36, can no longer recede.

The locking of the body 31 on the sole 8 of the fixed section can take place in the following manner:

The tip 32 presents radial holes 41 in which are engaged balls 42 in contact with the perimeter of a set-off portion 43 of the extremity 5' of the jacket 5 which adjusts itself, by means of a suitably inclined plane, to the outer diameter of said jacket.

As the jacket 5 slides, the balls 42 are pressed back in a radial direction and can project forth at the perimeter of the tip 32 so as to engage in an inner groove 44 made in the sole 8, thereby ensuring the locking of the removable section of the connector on the fixed section.

The total run of the jacket 5 is sufficient to ensure the entrance of the plugs 1 of the jackets 4 and 5 into the sockets 15 of the disk 14.

The angular positioning of the body 31 relative to the sole 8 is ensured by a longitudinal groove 45 on its tip 32 fitting onto a finger 46 of the bore in the sole 8.

The jacket 5 is naturally positioned, by any of the usual means, relative to he body 31 so as to avoid mistakes in making the connection.

The extremities of the skirt 25 and the section 5' of the jacket 5 present respectively notches 47 and 48 forming a dog-clutch device capable of absorbing the eventual effects of torque between the two assembled sections so that said torque is not applied on the plugins or on the positioning fingers and spurs.

The device for locking the removable section on the fixed section is particularly advantageous, since it does not rely on forces transmitted by elastic members or on members subject to loosening.

The separation of the two sections of the connector can only be accomplished, moreover, by an action contrary to that described for their assembly, and hence any unexpected traction of the cables connected to the removable section of the said connector is without effect.

The unlocking of the removable section is obtained by a sharp pull on the rings 37 according to arrow F_2 (FIG. 3).

As a result of this action, the ring 37 pulls back, compressing the spring 39, which comes to rest against the grip 33.

In its backward movement, the ring 37 uncovers the holes 35; the balls 36 are pushed out of their groove 40, and the jacket 5 also recedes.

As this recall takes place, caused by the relaxation of the spring 39 which again comes to rest on the balls 36 under the action 'f the ring 37, the plugs 1 are disengaged from their sockets 15.

Pushed simultaneously by the spring 17 which expands, the disk 14 disengages itself from the plugs 1 of the jacket 4.

When the jacket 5 has sufficiently retreated, the balls 42 are no longer held in their groove 44, and the removable section of the connector completes its disengagement under the action of the skirt 30 on the ring 27 pressed back by the spring 29, which expands, ensuring the locking of the disk 14 by means of the balls 23 which enter the groove 26.

It is understood, of course, that the present invention is not limited to the form of embodiment described and represented, but includes, on the contrary, all variations in its forms and dimensions.

I claim:

1. An electric connector comprising, in combination, a fixed section, a jacket inside said fixed section a cable plug carried by said jacket, a removable section, an insulating disk displaceable axially inside of said fixed section, electrical connecting elements in said disk, a tubular sleeve capable of sliding on said jacket and supporting said disk, a flange on said jacket, a spring for acting on said flange in order to hold said disk apart from the end of the cable plug of said fixed section when said sections are disconnected, a skirt in said fixed section encircling said displaceable sleeve bearing said disk, a shoulder at the rear extremity of said skirt serving as a stop for said flange, radial holes on said skirt, balls positioned in said holes, a peripheral groove on said sleeve which said balls can partly enter when said sections are disconnected, a sliding lock ring encircling said skirt, a second spring pushing said ring towards the exterior of said fixed section and pressing it against a shoulder on said fixed section, another skirt extending outwardly of said fixed section and situated on said locking ring and having an inner diameter which is greater than the outer diameter of said locking ring, a second cable plug carried by said removable section, means on said removable section for unlocking said disk when said sections are connected, and means for arming the unlocking device of said removable section, and to actuate the unlocking device on said removable section for disconnecting it from said fixed section.

2. An electric connector comprising, in combination, a fixed section, a jacket inside said fixed section, a cable plug carried by said jacket, a removable section, a second cable plug carried by said removable section, an insulating disk axially displaceable inside said fixed section, electric connecting elements in said disk, a tubular sleeve capable of sliding on said jacket and supporting said disk, a flange on said jacket, a spring acting on said flange in order to hold said disk apart from the cable plug of said fixed section when said two section are disconnected, a skirt on said fixed section encircling said disk-bearing displaceable sleeve, a shoulder on the rear extremity of said skirt serving as a stop for said flange on the disk-bearing sleeve, radial holes on said skirt, balls in said holes, a peripheral groove on said sleeve which said balls can partly enter when said sections are disconnected, a sliding lock ring encircling said skirt, a second spring pushing said ring toward the exterior of said fixed section, pressing it against a shoulder in said fixed section and in such a manner that said ring holds said balls in their groove, another skirt extends outwardly on said lock ring and the inner diameter of the same is greater than that of said ring, a second jacket capable of sliding in said removable section and resting against said fixed section when said sections are connected, and a tip at the front end of said second jacket for pushing back said locking ring of said displaceable disk upon the connection of said sections.

* * * * *