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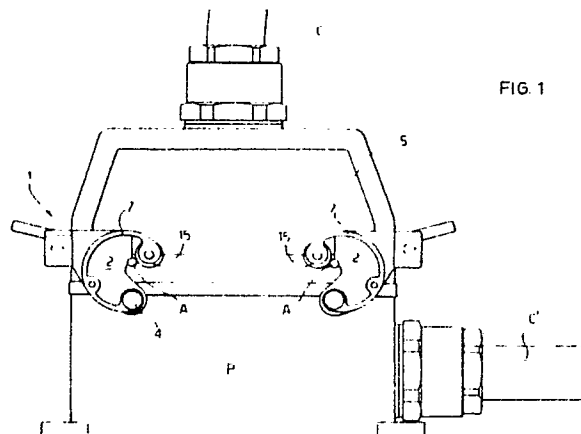
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54 **Trigger action coupling lever for multipolar connectors.**

57 The proposed device preferably comprises two pairs of springs (7), identical with each other, mounted on a respective side plate (2), which is made integral with a connecting crosspiece (11), having a tab (12a) which can be used as a name plate holder.

The springs (7) act on the locking stop (A) by means of an idle roller (15).

In addition, the springs (7) are in the shape of a flat semicircular ring, widening at its extremities into two ears, each having a hole (8, 9). In addition, each spring (7) has on its intermediate portion a semicircular projection which is also provided with a hole (10).



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## TRIGGER ACTION COUPLING LEVER FOR MULTIPOLAR CONNECTORS

This invention relates to the devices coupling plug and socket in multipolar connectors.

After a plug, connected to a multipolar electric cable, is inserted into the corresponding socket, it is necessary to effect the locking between plug and socket which can prevent the accidental withdrawal of the plug in the case of traction of the electric cable.

Devices are already known providing such locking; their working principle is based on a pair of trigger action levers mounted astride of the shorter sides of the multipolar socket and capable of rotating around the pin connecting them to the socket. Each of the said levers has a pair of facing notches which, when rotated, snap into position onto the corresponding pins provided on the body of the multipolar socket. Normally, such levers are made of a single piece of plate and have a pair of holes aligned for insertion of the hinge pin to the socket.

Assembly of the said coupling levers is performed in the following way: the lever is moved towards the socket, making its holes coincide with the holes on the socket; one pin is inserted, making it enter the accessible one of the two holes on the lever and the socket, after having inserted a spring, consisting of a shaped metallic wire, between the lever and the head of the pin. Finally the head of the pin is riveted to make the connection irremovable. When this operation is completed, the socket is rotated 180 degrees to give access to the other two holes on the socket and the lever, and the assembly process is repeated for the second extremity on the lever.

The device described shows some drawbacks, such as:

a) the springs to be inserted between the lever and the pin are of the right hand and left hand types, that is they are symmetrical, one with the other, but not equal; this makes it necessary to have two series of springs available, complicating assembly and increasing storage costs;

b) to assemble the lever onto the multipolar socket it is necessary to rotate the socket which makes the possibility of mechanized assembly difficult and expensive.

Aim of the present invention is therefore the production of a coupling device which is simple, sturdy and economical, and which allows the use of automatic assembling equipment.

Said aim has been reached by producing a trigger action coupling lever for multipolar sockets comprising two elastic side elements, identical with each other, rotatably mounted on the socket, each one being connected to a side plate, the said plates being joined to a connecting crosspiece.

In a preferred embodiment, each elastic side element is made with two identical springs coupled together, locking said plate between them.

Preferably, the extremity of the lever which makes contact with the pin provided on the plug is equipped with an idle roller.

One preferred solution provides an extension of the plate so as to form a limit stop for the movement of the lever.

In another preferred embodiment, the springs are flat and semicircular ring shaped.

In this case the spring can widen at its extremities into two drilled ears and have a semicircular drilled projection on its intermediate portion for fixing it to the plate.

Finally, the crosspiece can be equipped with a name plate holder tab.

A preferred embodiment of this invention will now be described, with reference to the enclosed drawings, in which:

Fig. 1 shows an overall schematic side view of the coupling lever which is the subject of the present invention, mounted on a multipolar socket;

Fig. 2 shows a side view of a plate making up part of the lever which is the subject of the present invention;

Fig. 3 shows a side view of one of the springs making up part of the lever which is the subject of this invention;

Fig. 4 shows a side view of a spring roller making up part of the lever which is the subject of the present invention;

Fig. 5 shows a top view of a crosspiece making up part of the lever which is the subject of the present invention;

Fig. 6 shows a side view of the spring in figure 3 after mounting on the side plate in fig. 2.

Figure 1 shows a connector with a multipolar plug 5, connected to an electric cable C. The plug S is inserted into the corresponding socket P out of which comes a second electric cable C'. The plug S and the socket P are locked by means of coupling levers 1, the subject of the present invention, which rotate around the pin 4, which is integral with the socket P, and engage on the coupling pins A, being integral with the plug S.

The proposed lever 1 comprises (figure 2) a shaped metallic side plate 2 with a circular hole 3 for inserting the pin 4 for fastening it to the socket, and with further holes, 5 and 6 respectively, the first of which serves for fastening the crosspiece and the second for fastening the spring 7. The hole 5 is located on a shaped extremity 2b which can be received into a notch 17 provided on the crosspiece 11, as will be explained later. The plate 2

also provides a ledge 2a which causes the lever to stop against the pin A.

With reference to figure 3, a metallic spring 7 in the shape of a flat semicircular ring can be seen, which widens at its extremities into two ears, 8 and 9 respectively, each of which has a circular through hole. On its intermediary portion, the spring 7 has a semicircular projection with a circular through hole 10.

Figure 4 shows a roller 15, equipped with two pins 16 consisting the hubs of said roller.

Figure 5 shows a crosspiece 11, which can be made of plastic material, comprising a bar 12 from which two arms 13a and 13b extend perpendicularly. A hub 12a provided on the bar 12 can be used as connector identification plate holder. The arms 13a and 13b are each crossed by a rectangular sectioned notch 17 for receiving the extremity 2b of the plate 2. Into the notch 17 enters a circular sectioned projection 14, capable of being received into the hole 5 at the extremity 2b of the plate 2. This projection will represent the means for locking the crosspiece 11 to the plate 2. To facilitate the introduction of the crosspiece 11 onto the plates 2, one wall 14a of the projection 14 is made sloping so as to form a guide when the crossplate is introduced onto the plate 2.

The assembly of a pair of coupling levers 1 is carried out as follows: a side plate 2 and a roller 15 are taken and made integral with two springs 7 positioned one on one side and one on the other side of the plate 2 and of the roller 15. Figure 6 shows the side plate 2 on which the two springs 7 have been inserted, one on one side and one on the other; only one of the springs is visible. The springs 7 are locked against the plate 2 by riveting the pins 16 of the roller 15, which is mounted idle in the holes 3 of the springs 7. In addition a rivet 21 is introduced and riveted into the hole 6 on the side plate 2 which has come into a corresponding position with the hole 10 on the spring 7. The hole 9 on the spring is now placed over the hole 3. The units thus formed are then brought close to the socket P to correspond with the two coaxial holes provided on the opposite sides of the socket; next the two locking pins 4 are inserted and then riveted. The crosspiece 11 is then brought close to the socket P and the arms 13a and 13b of the crosspiece 11 are inserted into the two extremities 2a of the side plates 2. The projections 14 will make the crosspiece integral with the plates 2.

To lock the plug to the socket it will be enough to operate the crosspiece 11 to make the lever 1 rotate around the pins 4, until the side plates 2 engage on the locking pins A. This will take place by elastically stressing of the springs. To unlock the plug, the operation is repeated by rotating the lever 1 in the opposite direction.

It is clear how the invention described is capable of reaching the above-mentioned aims; in fact the springs 7 and the plates 2 are of a type only, suitable for mounting on both sides of the socket. The coupling lever 1 can be assembled by automatic devices since the socket no longer needs to be rotated.

## Claims

1. A trigger action coupling lever for multipolar connectors, comprising a socket (P) equipped with a pin (4) around which the lever (1) rotates, and a plug (S), equipped with a coupling pin (A), characterized in that the lever (1) comprises two elastic elements (7), identical with each other, rotatably mounted on the socket (P), each one being connected to a side plate (2), the said plates being joined by a connecting crosspiece (11).

2. A lever according to claim 1, characterized in that each elastic element is made with two identical springs (7) coupled together, between which the plate (2) is inserted.

3. A lever according to claims 1 or 2, characterized in that the extremity of the lever (1) which makes contact with the pin (A) provided on the plug (S) is equipped with an idle roller.

4. A lever according to any one of the preceding claims, characterized in that the plate (2) extends in such a way as to form a ledge (2a) acting as a limit stop for the rotatory movement of the lever (1).

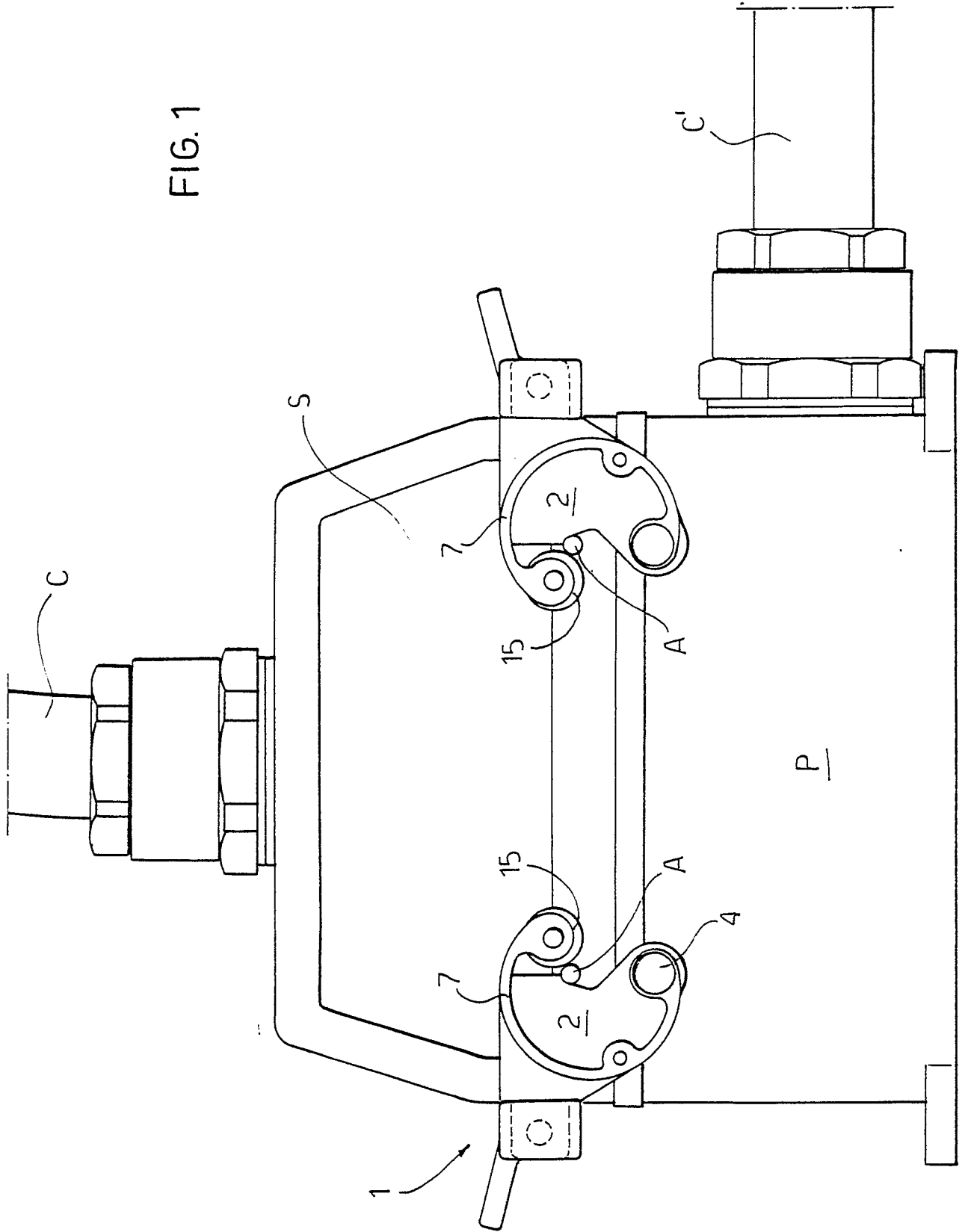
5. A lever according to any one of the preceding claims, characterized in that the springs (7) are in the shape of a flat semicircular ring.

6. A lever according to claim 5, characterized in that the spring (7) widens at its extremities into two ears having holes (8, 9).

7. A lever according to claims 5 or 6, characterized in that a semicircular projection is provided on the intermediate portion of the spring (7), having a hole 10 for fastening it to the plate (2).

8. A lever according to any one of the preceding claims, characterized in that the crosspiece (11) is equipped with a tab (12a) which can be used as a nameplate holder.

FIG. 1



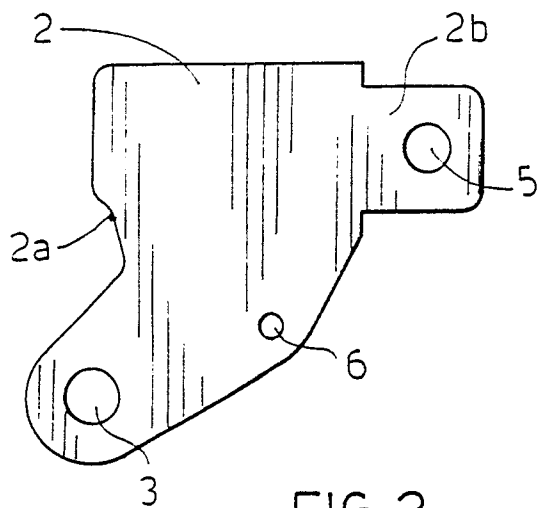


FIG. 2

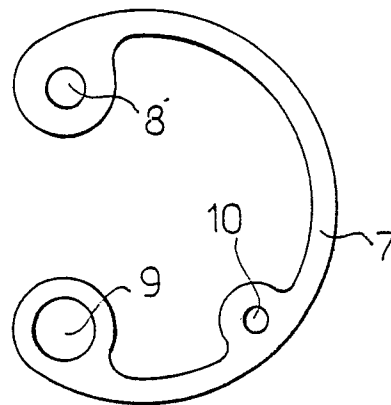


FIG. 3

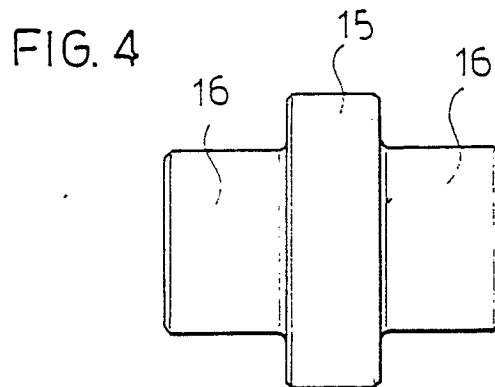


FIG. 4

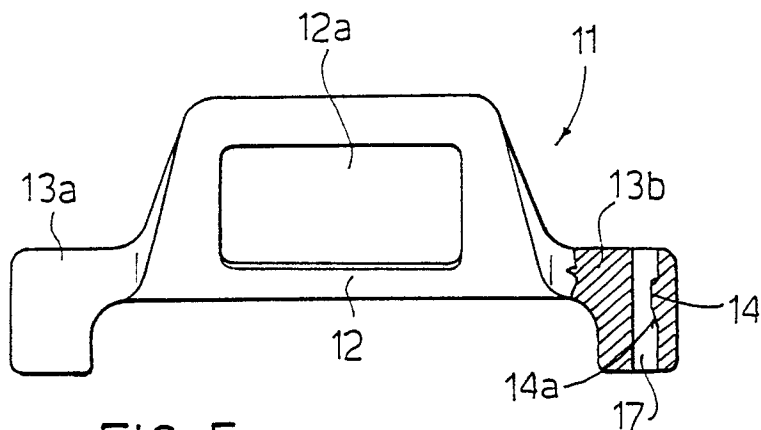


FIG. 5

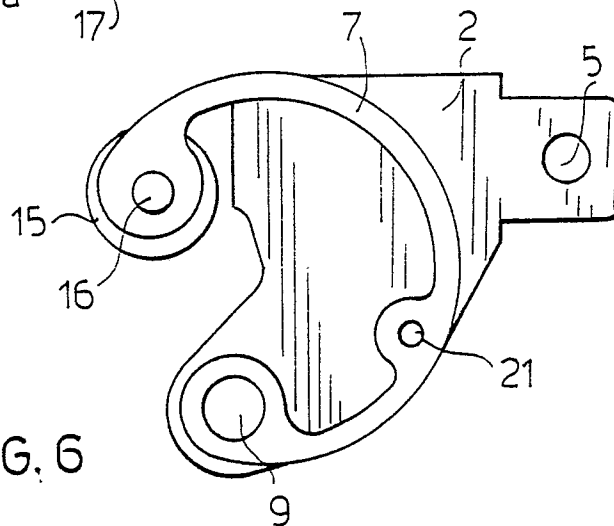


FIG. 6



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.5)
A	DE-A-2240450 (CONTACT) * page 2, line 24 - line 26 * * page 3, line 1 - line 10; figures 1, 2 * ---	1-4	H01R13/62
A	DE-A-3620719 (WIELAND) -----		
			TECHNICAL FIELDS SEARCHED (Int. Cl.5)
			H01R
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 11 AUGUST 1989	Examiner CERIBELLA G.
CATEGORY OF CITED DOCUMENTS		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	
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