

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property
Organization
International Bureau

(10) International Publication Number

WO 2019/017859 A2

(43) International Publication Date
24 January 2019 (24.01.2019)

(51) International Patent Classification:

Not classified

SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

(21) International Application Number:

PCT/TR2017/050690

(22) International Filing Date:

22 December 2017 (22.12.2017)

(25) Filing Language:

Turkish

(26) Publication Language:

English

(30) Priority Data:

2017/05300 10 April 2017 (10.04.2017) TR

(84) **Designated States** (unless otherwise indicated, for every kind of regional protection available): ARIPO (BW, GH, GM, KE, LR, LS, MW, MZ, NA, RW, SD, SL, ST, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, RU, TJ, TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, KM, ML, MR, NE, SN, TD, TG).

Published:

- without international search report and to be republished upon receipt of that report (Rule 48.2(g))
- in black and white; the international application as filed contained color or greyscale and is available for download from PATENTSCOPE

(71) **Applicant:** NOVA ELEKTRIK SANAYI VE TICARET ANONIM SIRKETI [TR/TR]; Karayolları Mh. Cebeci Cd. No:146, Gaziosmanpasa/Istanbul (TR).

(72) **Inventor:** ATALAY, Suavi; Fenerbahçe Mh. Fener Kalamis Cd. No:90 Daire:4, İstanbul (TR).

(74) **Agent:** DESTEK PATENT, INC.; Lefkose Cad. NM Ofis Park B Blok No:36/5, Beşevler, 16110 Bursa (TR).

(81) **Designated States** (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BN, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DJ, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IR, IS, JO, JP, KE, KG, KH, KN, KP, KR, KW, KZ, LA, LC, LK, LR, LS, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PA, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SA,

(54) Title: CABLE CONNECTOR

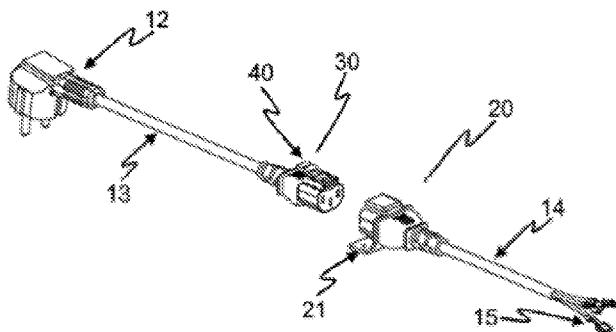


Fig.2

(57) **Abstract:** A cable connector (10) providing transmission of electric current from an electrical plug (12) to an electrical device (11) through an electric cable (13) and a supply cable (14) via electrical terminals (15) upon achieving a contact of female terminals (32) to male terminals (22) and it is characterized in that it consists of at least one locking mechanism (16) containing at least one female socket (20) whereon male terminals (22) are located, at least one male socket (30) whereon female terminals (32) are located and at least one tab (23) providing interlocking of a female socket (20) and a male socket (30) and at least one resilient hook (40) whereon a tab (23) is installed.

Cable Connector

5 The Related Art

The invention relates to a cable connector.

The invention particularly relates to an electrical cable connector with lock which prevents involuntary electric supply interruption and can easily be mounted or detached manually even
10 without viewing.

Background of the Invention

Today electrical devices are used in all fields. Electrical energy and power supply cables carrying
15 electricity are needed to operate electrical devices. Supply cables may have fixed connection to electrical devices like in most appliances or be removable like in computers. Removable supply cables may have a lock to secure the connection or be lockless.

Electrical connection in lockless connectors is usually carried out by connecting female terminals
20 on the supply cable to male terminals on the electrical device. Such connections do not have any lock mechanisms. Male and female terminals may become disconnected when electrical device is moved or any involuntary external force such as hit or bump exerted on the connection. Such disconnection may result in complete electric supply interruption or if the connection becomes loose, an electric arc may be generated. Such involuntary disconnections may result in electrical
25 device breakdown. Another impact of power supply interruption to electrical devices such as a fridge which is supposed to run permanently is that the electrical device going out of service without the user noticing it.

Supply connectors with lock have lock mechanisms which prevent involuntary disconnection of
30 female and male terminals. Involuntary disconnection of electrical connectors does not happen unless intervened by the user. This ensures electrical devices stay securely connected to the mains supply. In current art, while connection of connectors can be made easily, dismantling of the connector from the device has to be made visually and/or by use of tools. Since mains connection to the appliance is usually at hard-to-access areas on the device, detachment of the
35 connector may take time. In some applications, connection is even harder to detach and therefore connector may have to be damaged to detach it.

In emergency cases, when power supply has to be interrupted, looking for proper tools takes time or the connection may be damaged if proper tools are not used.

As a result, the need for an electric cable connector which prevents involuntary electric supply
5 interruption that allows easy mounting and detachment even without viewing and insufficiency of current solutions have necessitated a development in the related art.

Purpose of the Invention

10 The present invention relates to a cable connector meeting the needs mentioned above, eliminating probable drawbacks and providing some additional advantages over other current solutions.

15 Main purpose of the cable connector disclosed under this invention is to provide easy mounting and detachment of the connection manually even with no visibility of connectors, meanwhile preventing involuntary electric supply interruption. Mounting and detachment of power supply cable can be made without using any tools, even not seeing the connection area and completely manually that exhibits an important advantage of use. This feature becomes important in places where electric outlet is difficult to access: for instance, user wishes to mount or detach a power
20 connection easily where the power connection to the electrical device and the mains supply are accessible only by hand and not possible to see. Moreover, a lock mechanism located on the connector is designed to carry pull forces required for the safety of the connection which eliminates electrical device failures or risk of melted cable and fire due to electric arc.

25 For easier mounting and detachment, the locking element is designed in different color. This feature becomes important by increasing visibility to help the user, particularly in places where visibility is limited and/or the connection area is poorly lighted.

30 Another purpose of the invention is to mount and detach the connector without the need for any extra parts and/or tools. The cable connector consists of a female and a male socket. The female socket has male terminals on it whereas the male socket has female terminals on and electrical connection is realized by coupling of the male and the female terminals. Mechanical connection of these two parts of the assembly are realized by means of a tab located on the female socket and a resilient hook located on the male socket. The resilient hook goes into a guide channel on
35 the female socket by flexing down and up and sits into the tab located on the upper surface of the channel. No additional part is needed for fixing the resilient hook into the housing. Since it is restricted from all 4 directions as it sits in the housing, it is fixed securely in place and therefore,

no extra fixing component is needed. The top end of the resilient hook remains outside of the connection area after locking. When disconnection is required, this end extending beyond the locking area is manually pressed down and the lock is released.

5 In order to achieve the above mentioned purposes in best possible manner, a cable connector with a lock that prevents involuntary electricity supply interruption and allows easy mounting and detachment of the connection even without viewing is hereby developed. The developed cable connector consists of at least one female socket whereon male terminals are located, at least one male socket whereon female terminals are located, at least one resilient hook and at least one 10 tab forming together at least one locking mechanism that enables interlocking of female and male sockets.

15 The structural features and characteristics of the invention and the advantages can be understood better in detailed descriptions with the figures given below and with the references to the figures, and therefore, the assessment should be made taking into account the said figures and the detailed explanations.

Brief Description of the Drawings

20 In order to explain the structure and the advantages together with the additional components explicitly, the invention should be assessed with the figures that are explained hereinafter.

Figure - 1 is mounted view of the cable connector of the invention on the electrical device.

Figure - 2 is perspective view of the cable connector of the invention.

25 Figure - 3 is perspective view of the female socket on the cable connector of the invention disclosed hereunder.

Figure - 4 is exploded view of male socket on the cable connector of the invention disclosed hereunder.

Figure - 5 is cross-sectional view of the cable connector of the invention in non-connected status.

30 Figure - 6 is cross-sectional view of the cable connector of the invention in connected status.

Part References

10	Cable connector	33	Resilient hook housing
11	Electrical device	33a	Housing side surface
12	Electrical plug	33b	Housing rear surface

13	Electric cable	33c	Housing front surface
14	Supply cable	40	Resilient hook
15	Electrical terminal	40a	Hook motion axis
16	Locking mechanism	41	Unlocking point
20	Female socket	42	Tab cavity
21	Connection bracket	43	Cavity rear surface
22	Male terminal	44	Cavity front surface
23	Tab	45	Rear compression surface
23a	Tab front surface	46	Side compression surface
23b	Tab rear surface	47	Upper compression surface
24	Guide channel	48	Front compression surface
30	Male socket	49	Cavity side surface
31	Female terminal housing	+	Plus direction
32	Female terminal	-	Minus direction

Detailed Description of the Invention

5 The cable connector (10), which is the subject of the invention explained here, is designed in such a manner to prevent involuntary electric supply interruption and in the meantime allows easy manual mounting and detachment even without observing. In order to achieve this aim, the cable connector (10) in the broadest meaning, consists of at least one female socket (20) whereon male terminals (22) are located, at least one male socket (30) whereon female terminals (32) are 10 located and at least one locking mechanism (16) having at least one tab (23) and at least one resilient hook (40) inserted in the tab (23) to provide interlocking of the female socket (20) and the male socket (30)

Figures 1 and 2 show mounted view of the cable connector (10) on the electrical device (11) and perspective view of the cable connector (10) respectively. The female socket (20) is fixed on the 15 electrical device (11) mechanically by means of the connection bracket (21) and electrically by means of the electrical terminals (15). After connection to the electrical device (11), the female terminals (32) located on the male socket (30) and the male terminals (22) located on the female socket (20) are interconnected and electric current supplied from the electrical plug (12) is transmitted to the electrical device (11) through the electric cable (13), the supply cable (14) and 20 the electrical terminals (15). The female socket (20) is designed to be mounted on the electrical device (11) in fixed manner whereas the male socket (30) is designed to be removable. The male socket (30) supplies electricity from mains by means of the electrical plug (12) connected to it.

Electrical connection is provided by interconnection of the male socket (30) and the female socket (20).

Figure - 3 shows exploded view of the female socket (20) located on the cable connector (10) of the invention disclosed hereunder. The supply cable (14) connected to the female socket (20) has common electrical terminals (15) to provide connection to the electrical device (11). The said electrical terminals (15) can be in various sizes and forms in order to be compatible with the connections in the electrical device (11). The female socket (20) has a connection bracket (21) so as to fix it onto the electrical device (11). The tab (23) located on the female socket is structurally in triangle form. The tab front surface (23a) has a slope so as to fit into the tab cavity (42) in the locking mechanism (16). The tab rear surface (23b) is preferably designed in perpendicular form to prevent involuntary disconnection from the tab cavity (42) while in locked status. The guide channel (24) located on the female socket (20) is in the size and form to tightly surround the resilient hook (40) and the resilient hook housing (33). Thus, contact of the female terminals (32) to the male terminals (22) in a position other than intended is prevented and only proper contact is ensured at all times. The female socket (20) is connected to the male terminals (22) mechanically and electrically. The female socket (20), together with all its components is integrated using plastic moulding method to insulate both electrically and against other external effects.

Figure - 4 shows exploded view of the male socket (30) provided on the cable connector (10) in the invention disclosed hereunder. The locking mechanism (16) contains a resilient hook (40) located on the male socket (30) and a resilient hook housing (33). The resilient hook (40) consists of a tab cavity (42) where the tab (23) located on the female socket (20) can be inserted in, a cavity front surface (44) limiting backward movement of the tab cavity (42), a cavity rear surface (43) located on the opposite side and cavity side surfaces (49). Thanks to this structure, after the tab (23) is inserted in the resilient hook (40), disconnection of the male terminals (22) and the female terminals (32) due to involuntary movements is prevented. Deactivation of the locking mechanism (16), whenever desired, which disconnects the male socket (30) from the female socket (20) can be achieved by pressing the unlocking point (41) located on the resilient hook (40) that moves the resilient hook in plus direction (+) or minus direction (-). When a force is applied onto the unlocking point (41) in minus direction (-), the tab (23) is released from the tab cavity (42) and this enables disconnection of the male socket (30) from the female socket (20). When the force applied on the unlocking point in minus direction (-) is removed, the resilient hook (40) moves in plus direction (+) and takes its initial position.

All components, other than the resilient hook (40), forming the male socket (30) are integrated mechanically by means of plastic moulding method. The resilient hook (40) is produced separately

and mounted into the resilient hook housing (33) after plastic moulding process. The rear compression surface (45), the side compression surface (46), the upper compression surface (47) and the front compression surface (48) on the resilient hook (40) enables fixing of the resilient hook (40) into the resilient hook housing (33). The rear compression surface (45) on the resilient hook (40) rests against the housing rear surface (33b); the side compression surface (46) against the housing side surface (33a); the upper compression surface (47) and the front compression surface (48) against the housing front surface (33c); therefore the resilient hook (40) in the resilient hook gripper housing (33) is constricted in all four directions.

5 The resilient hook (40) and the tab (23) are designed in such manner to carry the pull forces required for safety between the male socket (30) and the female socket (20). Thus disconnection of the male terminals (22) from the female terminals (32) due to external forces that may be applied onto the cable connector (10) involuntarily is prevented.

10 The resilient hook (40) has preferably different colour than of the male socket (30) and the female socket (20). Particularly, in places where visibility is limited and/or the area the cable connector 15 located has little light, different colour of the resilient hook (40) increases noticeability and facilitates mounting and detaching of the cable connector (10).

Figure - 5 and Figure - 6 show cross section views of the cable connector (10) of the invention respectively in unconnected and connected situations. While the male terminals (32) and the female terminals (22) provide electrical connection, two components of the locking system (16), 20 namely, the tab (23) and the resilient hook (40) provide mechanical connection. The resilient hook (40) is made of a flexible plastic material and designed in such a way to flex easily in plus (+) and minus (-) directions on the hook motion axis (40a). During connection of the male socket (30) to the female socket (20), the tab front surface (23a) gets in touch with the resilient hook (40) and moves the resilient hook (40) in minus direction (-) with surface pressure and the tab (23) fully 25 enters in the tab cavity (42) as a result of axial motion, and the resilient hook (40) moves back in plus direction (+) under spring effect and traps the tab (23) in the tab cavity (42). During this procedure, the resilient hook housing (33) and the resilient hook (40) fit completely into the guide channel (24). Thus locking of the male socket (30) and the female socket (20) is achieved. After locking, the tab rear surface (23b) and the cavity front surface (44) are positioned across each 30 other and resist the extraction force.

A push force is applied onto the unlocking point (41) in minus direction (-) in order to deactivate the locking mechanism (16). The male socket (30) may disconnect from the female socket (20) after the cavity front surface (44) moves in minus direction (-) on the hook motion axis (40a) and goes below the tab rear surface (23b) level. Thus the male terminals (22) move out of the female

terminal housing (31) and become disconnected with the female terminals (32) and both electrical and mechanical disconnections are achieved.

CLAIMS

1. A cable connector (10) transmitting electric current from electrical plug (12) to an electrical device (11) through an electric cable (13) and a supply cable (14) via electrical terminals (15) by
5 enabling contact of female terminals (32) and male terminals (22) characterised by having

- at least one female socket (20) whereon the said male terminals (22) are located,
- at least one male socket (30) whereon the said female terminals (32) are located,
- a locking mechanism (16) wherein at least one tab (23) and at least one resilient hook (40) that the tab (23) is locked in that provides interlocking of the said female socket
10 (20) and the male socket (30) with each other,

2. A cable connector (10) according to claim 1 characterized in that it consists of a tab (23) located preferably on a female socket (20) and a resilient hook (40) located on a male socket (30).

15 3. A cable connector (10) according to claim 1 or 2 characterized in that it consists of at least one inclined tab front surface (23a) on the said tab (23).

4. A cable connector (10) according to claim 1 or 2 and it is characterized in that it consists of at least one tab rear surface (23b) formed on the said tab (23) preventing backward movement of the resilient hook (40) when mounted.

20 5. A cable connector (10) according to claim 1 or 2 characterized in that it consists of at least one resilient hook housing (33) formed on the said male socket (30) wherein the resilient hook (40) is seated.

25 6. A cable connector (10) according to claim 1, 2 or 5 and it is characterized in that it consists of at least one guide channel (24) formed on the said female socket (20) and a tab (23), wherein the resilient hook housing (33) is inserted.

7. A cable connector (10) according to claim 1 characterized in that it consists of at least one unlocking point (41) formed on the resilient hook (40) providing movement of the resilient hook (40) in plus (+) and minus directions (-) on hook motion axis (40a).

30 8. A cable connector (10) according to claim 1 or claim 7 characterized in that it consists of at least one tab cavity (42) formed on the said resilient hook (40) wherein the tab (23) is seated.

9. A cable connector (10) according to claim 8 characterized in that it consists of at least one cavity side surface (49) formed on the opposing sides of the said tab cavity (42) preventing lateral movements of the resilient hook (40) when the tab (23) is seated in the tab cavity (42).

5 10. A cable connector (10) according to claim 8 characterized in that it consists of a cavity rear surface (43) on the upper part of the said tab cavity (42) located in such a manner to allow complete seating of the tab (23) in the cavity.

10 11. A cable connector (10) according to claim 8 and characterized in that it consists of a cavity rear surface (43) on the upper part of the said tab cavity (42) that prevents backward movement of the resilient hook (40).

12. A cable connector (10) according to claim 5, characterized by having,

- at least one rear compression surface (45),
- at least one side compression surface (46),
- at least one upper compression surface (47),
- at least one front compression surface (48)

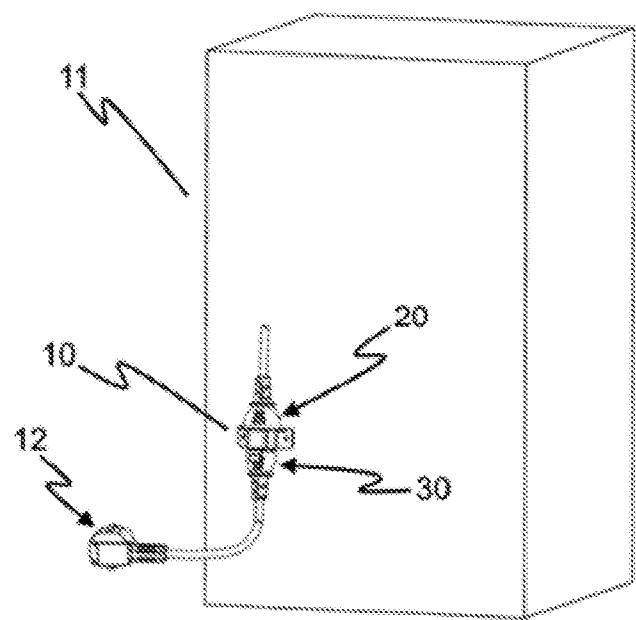
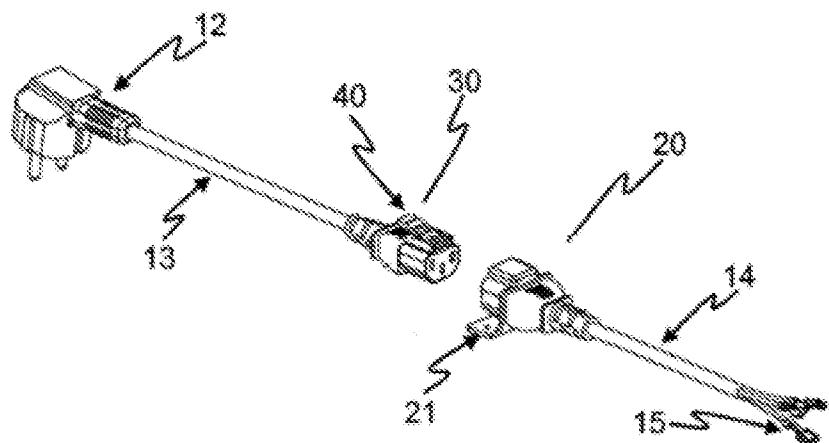
15 formed on the said resilient hook (40) that provide compression of the resilient hook (40) in the resilient hook housing (33).

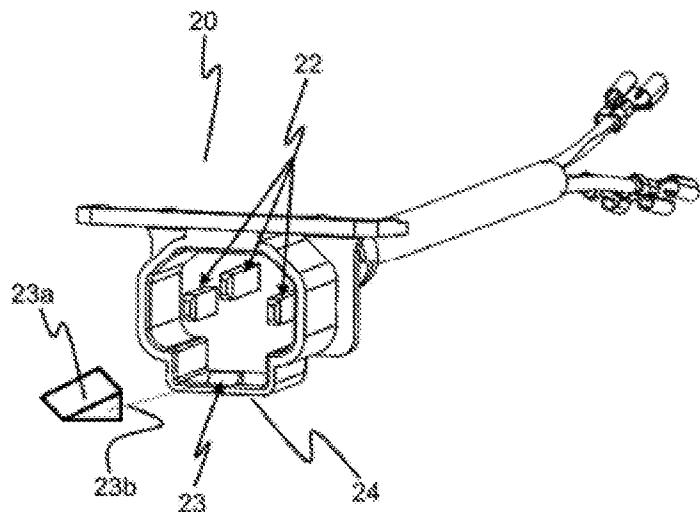
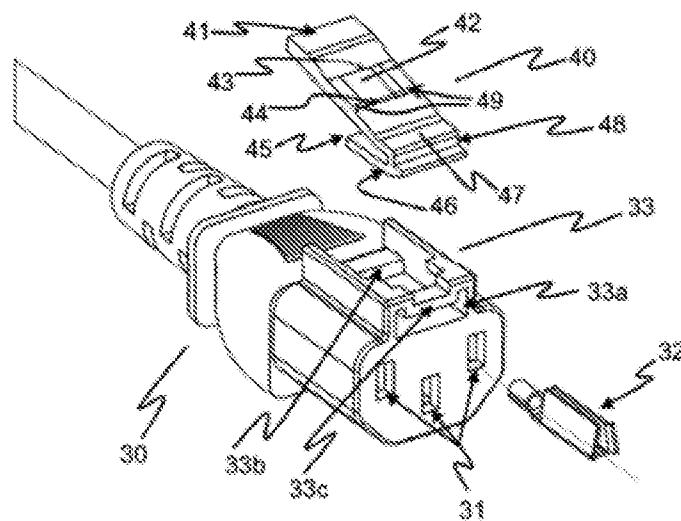
13. A cable connector (10) according to claim 5 or claim 12 characterized in that, formed on 20 the resilient hook housing (33) to compress resilient hook (40), it comprises:

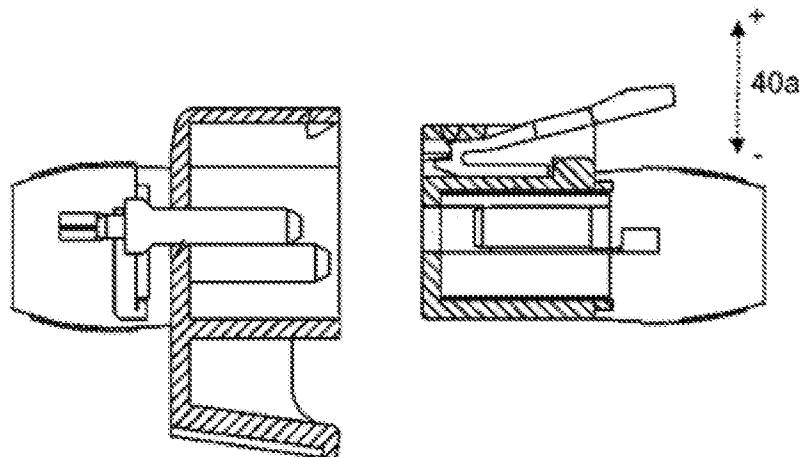
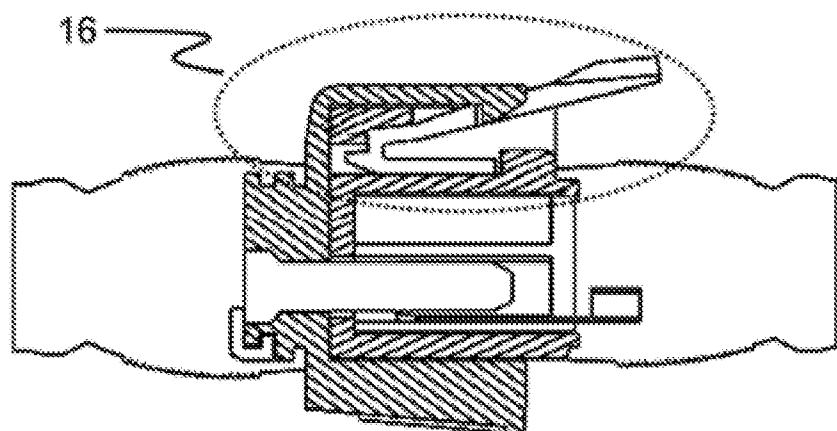
- at least one housing rear surface (33b), contacting rear compression surface (45) to provide rear compression
- at least one housing side surface (33a), contacting side compression surface (46) to provide side compression,
- at least one housing front surface (33c), contacting upper compression surface (47) and front compression surface (48) to provide front and upper compression,

25 30 14. A cable connector (10) according to claim 1 characterized in that it has same number of female terminal housings (31) as the number of female terminals (32) located on the said male socket (30) and placed in the same geometric axis as the male terminals (22) and thus providing transmission of electric current between terminals in such a manner to produce minimum electrical resistance.

15. A cable connector (10) according to claim 1 characterized in that it consists of at least one connection bracket (21) formed on the said female socket (20) to provide mounting onto the electrical device (11).
16. A cable connector (10) according to claim 1 characterized in that the said resilient hook (40) is preferably made in different colour from the male socket (30) and the female socket (20).
5
17. A cable connector (10) according to claim 1 characterized in that the said resilient hook (40) is made of a flexible material.

**Fig.1****Fig.2**

**Fig.3****Fig.4**

**Fig.5****Fig.6**