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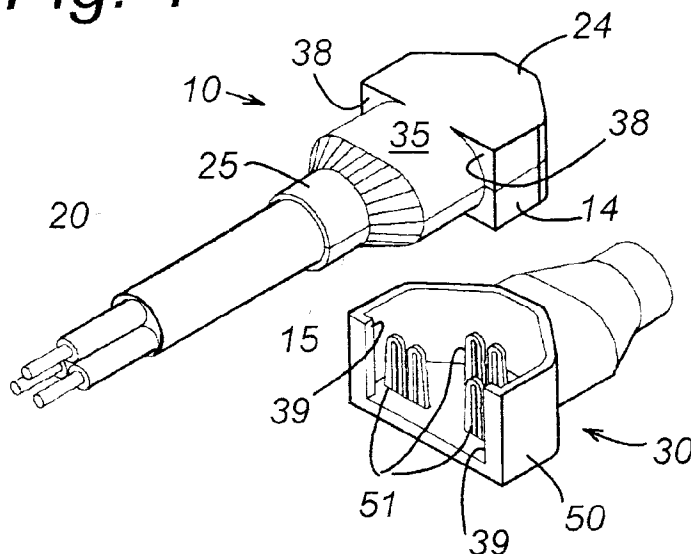
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(54) **Electrical connector assembly, extension connectors and system for the supply of electrical power**

(57) An electrical connector assembly in form of an extension connector (10) and a counter member (30), as well as coupling devices and a system for supplying electricity and comprising these members are intended for use in electrical heavy-current installations, especially in offices and private premises. The extension connector (10) of the connector assembly is formed as a cable termination completely closed in extension of the cable end. Channels (31, 32, 33) extend substantially perpendicular to the fixed conductor ends (21, 22, 23) of the cable end and can receive connecting means (51) on a counter member (30). Each connecting means

is provided with resilient contact members (51) adapted to receive a solid conductor end (21, 22, 23) of the cable end, and the counter member (30) comprises a hollow shell-shaped part (50) shaped so as to receive the cable termination (10) while the connecting means (51) slide into the channels (31, 32, 33). The coupling devices of the system comprise one or more extension connectors and mating counter members. The described system of connector members facilitate the cable termination and presents a flexible solution making it easy to install cables and to connect cables to various electrical appliances.

Fig. 1**EP 0 734 095 A1**

Description

The present invention relates to a connector assembly comprising an extension connector and an electric connector means for use in electric power installations in buildings, especially in offices and private premises, said connector assembly comprising a first part and a second part adapted to engage one another in a mechanically detachable and electrically interruptible manner, where said first part is adapted to be fastened to the outer jacket of a cable end and comprises traction relief means ensuring a reliable fixing of the jacket of the cable end in the first part, and where the conducting ends of the cable end jacket extend substantially parallel to and in a supported and fixed manner inside the first part, and where said second part comprises connecting means, such as prongs, receivable in mating openings in said first part.

The invention relates furthermore to an extension connector for a cable, especially for use in a connector assembly of the above type, as well as a mating counter-member and a coupling device for coupling two electrical articles together. Moreover, the invention relates to a system for supplying electric power. In this context "supply" means the distribution of electric power inside a building.

A large number of extension connectors are known which can be coupled to mains plugs as well as to plugs on electrical articles or apparatuses.

As it is well-known, cables and conductors must be terminated in a suitable manner in order to be connectable to electrical gadgets.

Usually the stripped conducting ends are mounted in an extension socket or receptacles in clamps connected to spring contacts. These spring contacts can receive plug prongs or pins, and all the parts are fixed in substantially the same plane by means of two halves which also enclose and insulate the conducting parts.

EP-A2-0,489,549 shows an electrical wire connector comprising a female insulating housing receiving a male insulating housing. The female housing has anchored therein a plurality of electrical terminals each having a wire receiving part comprising a pair of arms connected by a bight and defining a wire receiving slot between upper parts of the arms. The male housing has a row of wire receiving passageways each intersecting a slot in the male housing, said slot receiving the wire receiving part of a respective terminal, when the male housing has been fully inserted into the female housing. The known wire connector is intended for installation inside an apparatus, e.g. a TV set, wherein a technician may separate the wire connector in order to disconnect a circuit for replacement of a defect circuit. When the known wire connector is disconnected the male housing is no longer securely fastened to the cable wires. The male housing does not form a reliable cable termination suitable for use in electrical installations for the supply of electrical power in offices and private premises.

DE-A1-3 203 651 shows a connector and circuit board for terminating and connecting round cables as well as flat cable. GB-A-2 229 588 shows a cable plug for connection to cable conductors by inserting the isolated conductors through openings in a plug body, and afterwards pressing fastening means downwards from the top surface in order to force each conductor into a slot in a plate means connected with a prong.

GB-A-2 085 241 shows an electrical receptacle comprising an insulating receptacle body having first and second spaced prong receiving slots; first an second conductor wires, each having a bare unisolated portion and being substantially longer than any dimensions of said body; and means formed in said receptacle body for receiving and mounting the first and second conductor wire bare portions so each intersects a respective prong receiving slot to be directly engaged by an electrical plug prong received in a respective prong receiving slot.

GB-A-2 203 603 shows a plug having three prongs, a bottom part and a cover. The bottom part has three separate channels each receiving an insulated conductor. In each channel nails or projections in electrically conducting material pierce through the insulation of the conductors and ensure electrical contact.

Within the teletechnical field a large number of connectors are known, especially for termination of multiconducting flat cables. These cables use slotted connecting means of thin metal plate for receiving and optionally cutting through possibly non-stripped ends of the multiconducting cables, cf. for instance US-PS No. 3,007,131 and DE AS 2,038,559.

DE-A1-2,736,244 shows a multiconnector for a flat cable, and having a housing moulded in electrical insulating material comprising a multiplicity of through passing channels each receiving a terminal forming a wire receiving end.

EP-PS No. -A2-0,630,071 describes a wire connecting means of thin metal plate. The metal plate can be inserted in a connector housing shaped with slots allowing the insertion of conductors which can be pressed into resilient slots provided for this purpose in the wire connecting means. Furthermore, these connectors can be retained by means of a correspondingly shaped cover which simultaneously closes the connector housing.

The present invention does not relate to cable connectors for low-power cables, but to a connector assembly for heavy-power cables.

Heavy-power cables are usually terminated by a termination or an extension means. A large number of differing types of extension means are known, where the means have been shaped so as to comply with the standards applying, and where the means must be mounted in situ when the cable has been laid to the location marked for installation of an outlet socket. The meaning of "extension means" is in the present description a supply point, such as a receptacle or a wall outlet allowing supply of line current.

The object of the present invention is to provide a connector assembly, and especially a cable connector adapted to form a reliable, protecting, insulating heavy-current cable termination, which in a simple and reliable manner is connectable to an electrical article with a mating, i.e. complementary connector, and where the connector means furthermore is inexpensive to manufacture in high quantities and easy to mount on a cable end.

A connector assembly of the above type is according to the invention characterised in that the first part is formed as a cable termination and is completely closed in extension of the conductor ends, and that the openings are channels extending substantially perpendicular to the fixed conductor ends, said channels of the first part not per se comprising electrically conducting contact means, and where the second part forms a countermember with connecting means adapted to penetrate into the channels in the cable termination, and that each connecting means is provided with resilient contact members adapted to receive a solid conductor end, and where the countermember comprises a hollow shell-shaped part adapted to receive the cable termination while the connecting means slide into the channels.

The connector assembly according to the invention and accordingly the cable termination with countermember facilitate the cable termination and present a flexible solution making it easy to connect the cable to different electrical articles. In addition to the object already described, a termination is obtained which can be carried out by a highly automatic processing in a factory on predetermined lengths of cables, and which accordingly later on at the site allows a very quick and easy installation of the already terminated cable. As the associated countermember can be provided on various electrical articles replaceable when necessary, this type of installation is very flexible.

The cable termination comprises preferably a "head" of a specific shape, and the countermember comprises a shell surrounding a cavity adapted to receive the "head" of the cable termination, where the shell of the countermember is of a shape complementary to the specific shape of the head with the result that the specific shape of said head co-operates with the shape of the countermember and thereby provides a traction relief against traction in the cable away from said countermember.

The cable end is preferably freed of the outer cable jacket inside the first part.

The conductor ends are preferably stripped, and each channel is of a depth substantially preventing an unintended contact with the stripped conductors.

The cable is preferably of the type with solid conductors, and the solid conductor ends are stripped and placed in a supporting manner in notches adapted thereto, each bare solid conductor passing transversely through an associated channel. The cable can be round or flat.

The cable termination may comprise two semi-

shells of an insulating material, such as plastic, and together the two semi-shells form preferably "head" of the specific shape.

The invention relates also to coupling devices for coupling together two electric articles through assemblies according to claim 1 and for a cable laying system using electrical articles with connector assemblies according to the invention. The coupling device allows a coupling together of two electrical articles, such as two rows or arrays of outlet sockets for standard mains plugs with connector means according to the present invention and corresponding to a first and/or second part or a countermember.

The remaining sub-claims describe advantageous embodiments.

The invention is explained in greater detail below with reference to the accompanying drawings, in which

Figure 1 is an inclined view of a terminated cable with a preferred embodiment of a cable termination and the associated countermember according to the invention,

Figure 2 is an inclined view of one half of the termination of Figure 1,

Figure 3 is an inclined view of the second half of the termination of Figure 1,

Figure 4 is an inclined bottom view of the termination according to the invention,

Figure 5 is a top view of the half of Figure 2 with a cable with solid conductors inserted therein,

Figure 6 illustrates a bushing for a multiwire cable,

Figure 7 illustrates an embodiment of a connecting means,

Figure 8 illustrates an example of an embodiment of one half of a cable termination according to the invention and mounted with a flat cable,

Figure 9 is a top view of an example of an embodiment of a coupling device,

Figure 10 is a side view of an example of an embodiment of a double coupling device,

Figure 11 is an inclined front and top view of an example of an embodiment of a countermember incorporated in an electrical article, and

Figure 12 is an inclined rear and top view of a bottom part for the countermember of Figure 11.

The preferred embodiment shown in Figures 1 to 5

of a connector assembly according to the invention with a cable termination, below called a cable connector 10, is intended for a round three-conductor cable 20. This embodiment comprises two connector halves or semi-shells 14 and 24, which together form a closed connector body of insulating material enclosing the cable end. The connector body comprises a "head", which is hexagonal in the preferred embodiment, and which ends in a narrow neck 15, 25 via a wide neck or transition portion 35.

The "head"-forming portion of the connector halves 14 and 24 are provided with transverse supporting walls 16, 17, 18, 19, and 26, 27, 28, 29. These supporting walls both support and fix inserted cable ends 21, 22, 23, as well as reinforce the connector half 14, 24 and consequently the head.

As shown in Figure 5, the "head" is preferably shaped as a hexagonal polygon. The polygon is symmetrical around an axis coinciding with the central axis of the cable. The polygon comprises a long side coinciding with the supporting walls 19, 29 and being perpendicular to the cable conductors, and two short sides 11, 11a being perpendicular to said supporting walls 19, 29 and abutting the long side. Furthermore, the polygon comprises two inclining short sides 12, 12a, forming an obtuse angle with their respective short sides 11, 11a. The two inclining short sides 12, 12a are interconnected by a short side 13 parallel to the long side. The long side comprises the supporting walls 19, 29, and is used for the laying of the conductors 21, 22, 23 of the cable. These conductors are laid at a mutual distance side by side inside a broad neck 35 forming a transition between the "head" and the narrow neck 15, 25 sealingly surrounding the jacket of the cable 20. The importance of this particular type of head of the cable connector appears from the following description of the countermember.

A cable 20 with solid, stripped conductors 21, 22, 23 can be terminated by the stripped solid conductor ends 21, 22, 23 being placed in one connector half in notches or recesses 36 provided for this purpose in the supporting walls 16, 17, 18, 19, and in such a manner that the jacket-coated portion of the cable rests in the narrow neck 15. An inwardly pointed projection or cone 34 is preferably shaped on the inner side of the neck 15 in each semi-shell 14, 25, and this projection or cone is pressed into the jacket 20 of the cable when the two semi-shells 14, 24 have been assembled. In this manner a reliable retaining of the cable in the cable connector 10 is ensured.

The other connector half 24 is preferably provided with projections 37 on its supporting walls 26, 27, 28, 29, said projections assisting in fixing the conductor ends 21, 22, 23, when the other connector half 24 is placed atop of the first connector half 14.

As shown in the drawing and as explained above, the connector halves are preferably provided with supporting walls, but it is within the scope of the invention

to use supporting walls shaped in another manner for the cable ends. Thus one or both connector halves may be solid and merely provided with recesses for receiving the conductor ends, or said connector halves may be cast or filled with another carrying and electrically insulating filler.

When the cable ends 21, 22, 23 are fixed between the two connector halves 14, 24, said connector halves are assembled by a suitable method, such as by way of welding or gluing, or by way of a snap-engagement by means of snap means provided for this purpose on each connector half. The resulting shells form a tight, preferably non-reopenable engagement providing a non-removable unit completely preventing a person from unintentionally coming into contact with live parts, i.e. voltage carrying parts.

It is obvious that the described cable connector 10 requires a mating countermember. An inclined view of a preferred embodiment of a countermember 30 for the cable connector 10 is shown in Figure 1.

When the terminated cable end 10 is arranged in the countermember 30, no live parts are visible. The countermember 30 can be provided on electrical articles of almost any type which is to be connected to an electricity supply. A typical example of such an electrical article is a row or array of outlet sockets for conventional mains plugs.

The countermember 30 comprises a shell or frame 50 of an insulating material and shaped so as to be substantially complementary to the outer shape of the "head" on the cable connector 10.

Connecting means may be embedded in the shell 50 and are preferably in form of plate members punched out of a well conducting material, preferably of a resilient type shaped with upwardly bent contact members 51 which appear from Figure 1.

An example of a preferred embodiment of a connecting means is shown in Figure 7. An open slot 54 is provided between the upwardly bent contact members 51. This slot 54 is shaped with a width of a size mating the diameter of the solid conductor in the terminated cable in such a manner that the contact members tightly surrounds said conductor. Small recesses or notches 58 can be provided in the sides of the slots of the contact member, said recesses or notches assisting in maintaining the engagement of the conductor end and the connecting means. The connecting means are furthermore dimensioned so as to be allowed to pass through their respective channels or slot-shaped openings 31, 32, 33 of one connector half 14, 24.

When the "head" is pressed downwards into the shell 50 of the countermember 30, the fixed conductor ends 21, 22, 23 are pressed downwards into their respective slots in the end 51 of their respective connecting means.

The ends of the connecting means may furthermore be shaped with closed slots 55, which can assist in providing the connecting means 51 with a resilience, and

thereby allow the open slot 54 to receive the conductor end with ease.

Thus the connecting means can establish a contact to the cable ends 21, 22, 23 inside the cable connector when said cable connector is pressed downwards into the shell of the countermember.

The cable connector and the countermember are preferably shaped so as to form part of a mutually "locking" and traction relieving engagement. In other words, when the "head" of the terminated cable has entered an engagement with the shell of the countermember, said head cannot be pulled out of the engagement by a pull in the longitudinal direction of the cable, and the pull does not interfere with the contact between the conductor end and the connecting means.

In the illustrated preferred embodiment, the above is implemented by the countermember substantially surrounding the head by its shell 50. In addition, the countermember comprises stop walls 39 extending substantially perpendicular to the central axis of the cable and forming an abutment for shoulders 38 at the transition of the head to a neck, i.e. the long side or the supporting walls 19, 29. In this manner the countermember can absorb a pull in the cable away from the shell and thereby retain the head inside the shell. Furthermore, the connecting means 51 are relieved.

In the alternative embodiment shown in Figure 8, the cable connector 114 is shaped so as to receive a flat cable 120 with conductors 121, 122, 123. The only change relative to the embodiment of Figures 1 to 5 for a round cable is that the neck 125 has been substantially adapted to the outer shape of the flat cable in such a manner that said neck 125 substantially fits tightly around the outer surface of the flat cable 120 which is consequently fixed. Means, such as conical projections 137, can be provided for retaining the jacket of the cable, said projections being pressed into the cable jacket when the assembly is completely mounted on the cable end.

In the preferred embodiment, the cable connector is adapted to a three-conductor cable, but it is obvious that a similar connector can be adapted to heavy-current cables with two, four or five conductors.

The cable connector according to the invention was fundamentally developed for cables with solid conductors. Cables with multiwire conductors cannot be immediately terminated by means of the connector shown. In order to extend the field of application to multiwire cables, a particular bushing 40, cf. Figure 6, has therefore been developed. The bushing comprises a bore 41 capable of receiving the end of the multiwire conductor, as well as a neck 42 of a diameter corresponding to the diameter of a rigid solid conductor.

A coupling device, cf. Figure 9, has furthermore been developed for a cable-laying system using electrical articles with conductor assemblies according to the invention. This double connector is formed by two substantially identical "heads". These "heads" comprise

preferably two semishells, only one 214 being shown. Each semishell may be of a shape mating two semishells 14 symmetrically assembled and preferably cast in one piece. The double connector is on the inside provided with three conductors 221, 222, 223, which may be solid conducting wires of a conducting area corresponding to the cable being laid. The number of conductors provided and the number of conductors, which the "head" is adapted to receive, can, of course, also be two, four or five.

Figure 10 is a side view of a coupling device forming a double coupling device. A front view of the coupling device in Figure 10 can be identical with the coupling device shown in Figure 9. The particular feature of the device of Figure 10 is that when seen from the opposite side it is also substantially identical with the device of Figure 9. The resulting coupling device is particularly useful allowing connections thereto from both sides.

Furthermore, an alternative embodiment of the countermember shown in Figures 1 to 5 has been developed for such a cable-laying system. Figure 11 illustrates a portion of an electrical article with a countermember 330 adapted to be connected to an extension connector as shown in Figures 1 to 5 or 8. In this embodiment, the countermember comprises a top part, cf. Figure 11, and a bottom part, cf. Figure 12. U-shaped connecting means with prongs 351 are mounted in the bottom part. The connecting means comprise U-shaped springs 348 mounted in their respective chambers in the bottom part 332. Furthermore, each end of each U-shaped spring continues into a flat prong 351. This prong 351 extends substantially perpendicular to the plane of the U and perpendicular to the legs of the U in such a manner that each U-shaped spring comprises two prongs 351. The latter prongs 351 define therebetween a narrow slot 354 being resilient due to the spring effect of the spring 348 and consequently forming a prong being capable of receiving a conductor end. As it appears from Figure 11, the prongs 351 are substantially completely covered by the insulating material 360 of the top part. Furthermore, the ends of the prongs 351 of this embodiment can be provided with a cutting edge, which can cut through the insulating material 370, if any, around the shown conductors 321 and 323.

The conductors 321 and 323 have only been included in Figure 11 in order to illustrate their position inside the connector part when it is assembled with a connector part as shown in Figures 2 to 5 terminating a cable end because it surrounds the conductor ends. The embodiment shown in Figures 11 and 12 is preferred due to the requirements presented to the contact security of the installed sockets, where the conductors and the prong supply power when the system is operating. A particular advantage of the laying system according to the invention is that the installation can be performed while power is supplied because all optionally voltage carrying parts are protected against an unintentional touching by a person.

It is obvious to persons skilled in the art that the invention can be varied in numerous ways. An extension connector for a cable end can for instance be provided with terminals as a countermember in the embodiment shown in Figures 11 and 12 with partially insulated prongs. A double coupling device of the type shown in Figure 10 can for instance simultaneously be provided with one or more of the connectors shown in Figures 2 to 5 and one or more of the embodiments with prongs shown in Figures 11 and 12. It is furthermore within the scope of the invention to change the shape of the head. The head can for instance be of a circular shape instead of the polygon shape shown. Such other embodiments fall within the scope of protection of the claims.

Claims

1. An electrical connector assembly comprising an extension connector and an electric connector means for use in electric power installations, especially in offices and private premises, said connector assembly comprising a first part and a second part adapted to engage one another in a mechanically detachable and electrically interruptible manner, where said first part (10) is adapted to be fastened to the outer jacket (20) of a cable end and comprises traction relief means ensuring a reliable fixing of the jacket of the cable end in the first part, and where the conducting ends (21, 22, 23) of the cable end extend substantially parallel to and in a supported and fixed manner inside said first part (10), and where said second part (30) comprises connecting means (51), such as prongs, receivable in mating openings (31, 32, 33) in said first part (10), **characterised** in
 - that the first part is formed as a cable termination being completely closed in extension of the conductor ends,
 - that the openings (31, 32, 33) are channels (31, 32, 33) extending substantially perpendicular to the fixed conductor ends, said channels in the first part not per se comprising electrically conducting contact means,
 - that the second part forms a countermember with connecting means (51) adapted to penetrate into the channels (31, 32, 33) in the cable termination,
 - that each connecting means is provided with resilient contact members (21, 22, 23) adapted to receive a solid conductor end (21, 22, 23) of the cable end, and
 - that the countermember comprises a hollow shell-shaped part shaped to receive the cable termination while the connecting means slide into the channels.
2. A connector assembly as claimed in claim 1, **characterised** in
 - that the cable termination (14, 24) comprises a "head" of a specific shape, and that the countermember (30) comprises a shell (50) surrounding a cavity adapted to receive the "head" of the cable termination, the shell (50) of the countermember being of a shape complementary to the specific shape of the head,
 - and that the specific shape of the head co-operates with the shape of the shell (50) of the countermember and thereby provides the connecting means with a traction relief against a pull in the cable away from said countermember (30).
3. A connector assembly with a cable termination and a countermember as claimed in claim 2, **characterised** in
 - that the countermember with its shell (50) surrounds the head and comprises stop walls (57, 58) extending substantially perpendicular to the central axis of the cable and forming an abutment for shoulders (38) at the transition of the head into a neck (the long side, supporting walls (19, 29)), whereby said walls can absorb a pull in the cable away from the shell (50) of the countermember and thereby retain the head inside the shell and relieve the connecting means (51).
4. A connector assembly as claimed in claim 2 or 3, **characterised** in
 - that the head is substantially a polygon, such as a triangle, a quadrangle, a pentagon or a hexagon, the head comprising projecting shoulder parts (38) forming abutment surfaces which co-operate with countersurfaces (39) on the countermember.
5. A connector assembly as claimed in claim 4, **characterised** in
 - that the head is substantially a hexagonal polygon, which is symmetrical around an axis coinciding with the central axis of the cable, said polygon comprising a long side coinciding with the supporting walls (19, 29) perpendicular to the cable conductors, and two short sides (11, 11a) perpendicular to the supporting walls (19, 29) and abutting the long side, as well as two inclined short sides (12, 12a) forming an obtuse angle with their respective short sides (11, 11a), said two inclined sides (12, 12a) being interconnected by means of a short side (13) parallel to

said long side.

6. An extension connector for a cable, especially for use in an assembly as claimed in one or more of the preceding claims 1 to 5 and comprising two semishells of an insulating material, such as plastic, and adapted to be secured to the outer jacket (20) of a cable end, as well as traction relieving means ensuring a reliable fixing of the jacket of said cable end in the extension connector, and where the conducting ends (21, 22, 23) of the cable end extend substantially parallel to and in a supported and fixed manner inside said extension connector (10), and with openings (31, 32, 33) receiving the prongs of a counter member, **characterised in**

- that the extension connector is shaped as a cable termination being completely closed in extension of the conductor ends,
- and that the openings (31, 32, 33) are channels (31, 32, 33) extending substantially perpendicular to the fixed conductor ends, said channels in the extension connector not per se comprising electrically conducting contact means.

7. An extension connector as claimed in claim 6 and mounted on a cable with solid conductors, **characterised in**

- that each solid conductor end is stripped and placed in a supporting manner in a respective notch (36) provided for this purpose, whereby each of the at least two channels is passed by a respective length of bare solid conductor,
- and that each channel (31, 32, 33) is of a depth preventing an unintended contact with the stripped conductors (21, 22, 23).

8. An extension connector as claimed in claim 6 and mounted on a cable with multiwire conductors, **characterised in**

- that each multiwire conductor is terminated by means of a conducting bushing (40) with a neck (42) arranged in a supporting manner in a notch (36) provided for this purpose, the diameter of said neck corresponding to the diameter of a solid conductor, and where each neck passes transversely through each of the at least two channels,
- and that each channel (31, 32, 33) is of a depth preventing an unintended contact with the bushing (21, 22, 23).

9. A counter member for an extension connector as claimed in claim 6, 7 or 8, **characterised in**

- that the counter member comprises connecting

means (351) adapted to penetrate into the channels (31, 32, 33) in one half (14) of the extension connector (10),

- and that each connecting means (351) is provided with resilient contact members adapted to receive a solid conductor end (21, 22, 23) of a cable.

10. A counter member as claimed in claim 9, **characterised in**

- that the connecting means comprise U-shaped springs (348) mounted in their respective chambers in a bottom part (332),
- and that each end of each U-shaped spring continues into a flat prong (351) extending substantially perpendicular to the plane of the U and perpendicular to the legs of said U in such a manner that each U-shaped spring comprises two prongs (351), which therebetween define a narrow slot (354) capable of receiving a conductor end.

11. A coupling device for coupling together two electrical articles, each electrical article comprising a counter member according to claim 10, **characterised in**

- that it comprises a double member substantially shaped as two extension connectors according to claim 6 and formed by two semishells (314), where each semishell is shaped substantially as a "head" of a first part (14 or 24) formed integral with a "head" of yet another first part (14, or 24) and being symmetrical relative thereto, and where opposing channels (31, 32, 33) are interconnected by means of two, three, four or five solid wire conductors with or without insulation and embedded in the notches (36) provided for this purpose.

12. A coupling device as claimed in claim 11, **characterised in**

- that one end is formed by a counter member according to claim 9 or 10 and the second end is formed by an extension connector according to one of the claims 6 to 8 or a counter member according to claim 9 or 10.

13. A coupling device for coupling one or more cables to an extension connector according to claim 6, 7 or 8 and/or one or more electrical articles with a counter member according to claim 9 or 10, **characterised in**

- that it comprises two coupling devices according to claim 11 and/or claim 12 and arranged

such that they are placed back to back (Figure 10).

14. A system for laying electrical cables, **characterised**
in

5

- that cables and electrical articles are coupled together by means of extension connectors according to claims 6 to 8, countermembers according to claims 9 and 10, and coupling devices according to claims 11 to 13.

10

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50

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Fig. 1

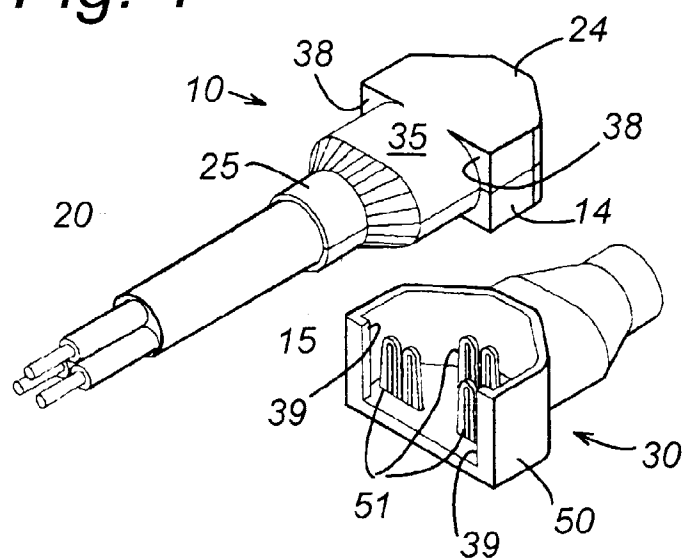


Fig. 4

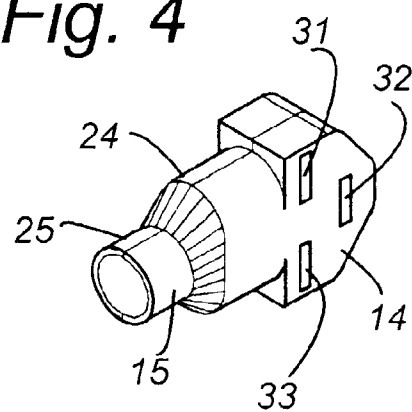


Fig. 7

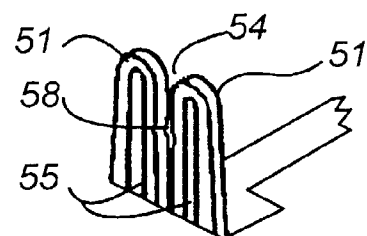


Fig. 2

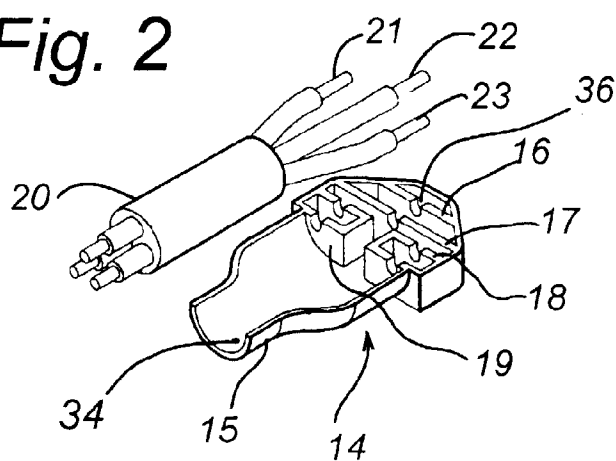


Fig. 3

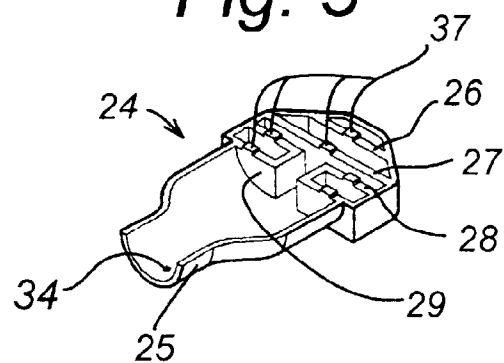


Fig. 5

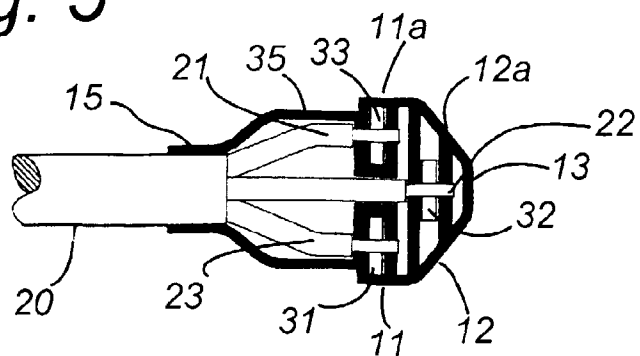
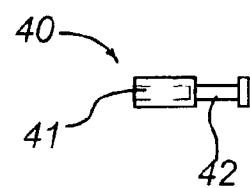


Fig. 6



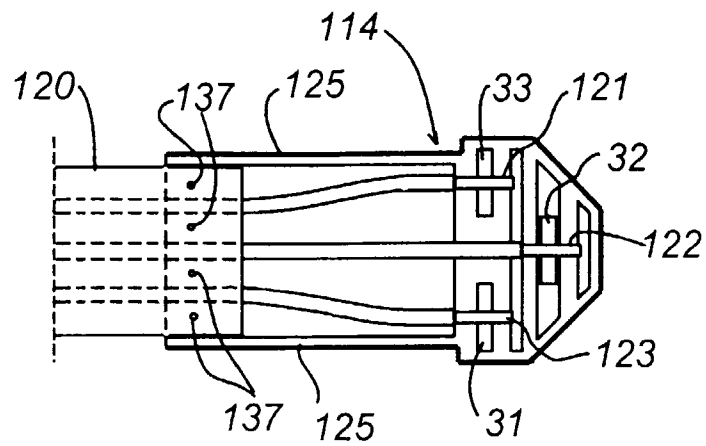


Fig. 8

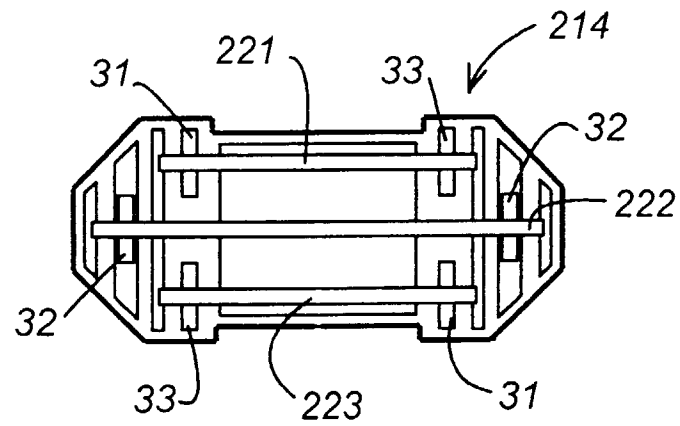


Fig. 9

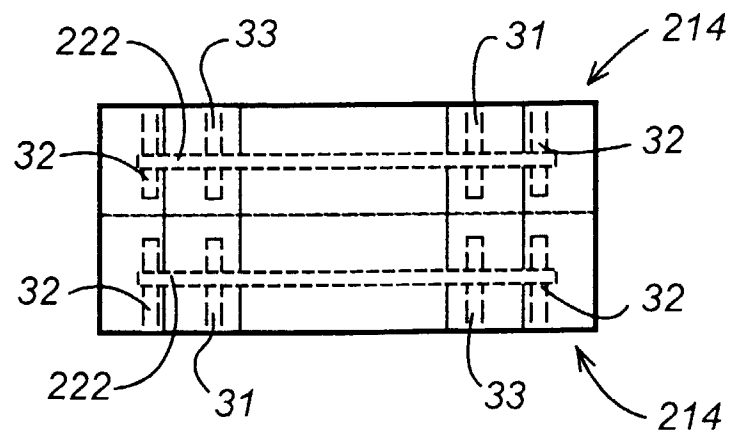


Fig. 10

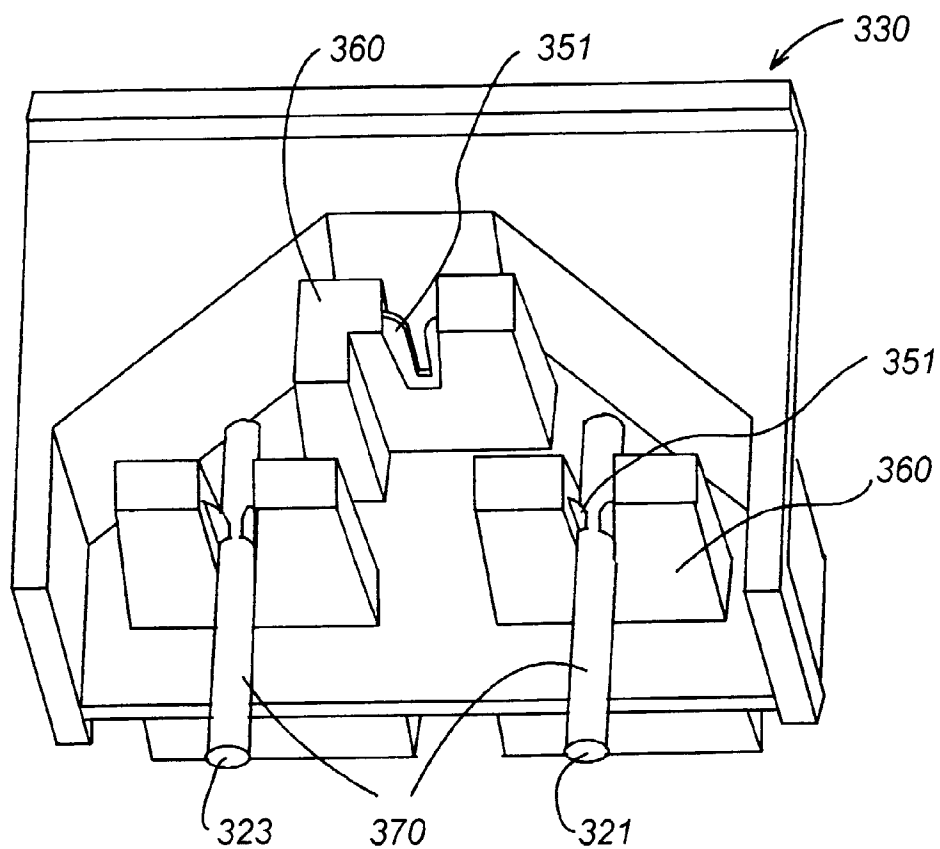


Fig. 11

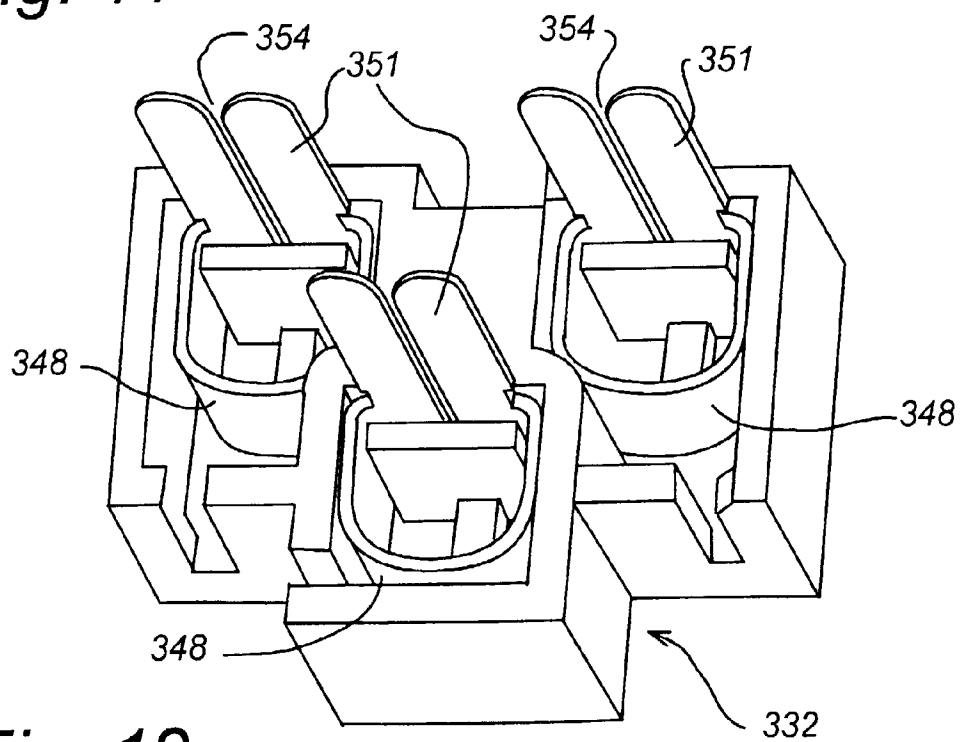


Fig. 12



European Patent
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EUROPEAN SEARCH REPORT

Application Number
EP 96 61 0008.3

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.6)
A	EP, A2, 489549 (AMP INCORPORATED), 10 June 1992 (10.06.92) * figures 10-15, abstract *	1-14	H01R 4/24 H01R 9/03
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A	DE, A1, 2736244 (AMP INC.), 16 February 1978 (16.02.78) * figures 1, 3, claim 1 *	1-14	
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A	DE, A1, 3203651 (MAIGLER, GEB. MAIGLER, BRIGITTA), 18 August 1983 (18.08.83) * figure 1, claim 1 *	1-14	
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A	GB, A, 2229588 (ARCHIBALD MCARTHUR RALSTON), 26 September 1990 (26.09.90) * figures 1, 5, 9, abstract *	1-14	TECHNICAL FIELDS SEARCHED (Int. Cl.6) H01R

The present search report has been drawn up for all claims			
Place of search STOCKHOLM		Date of completion of the search 11 June 1996	Examiner JACK HEDLUND
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			

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