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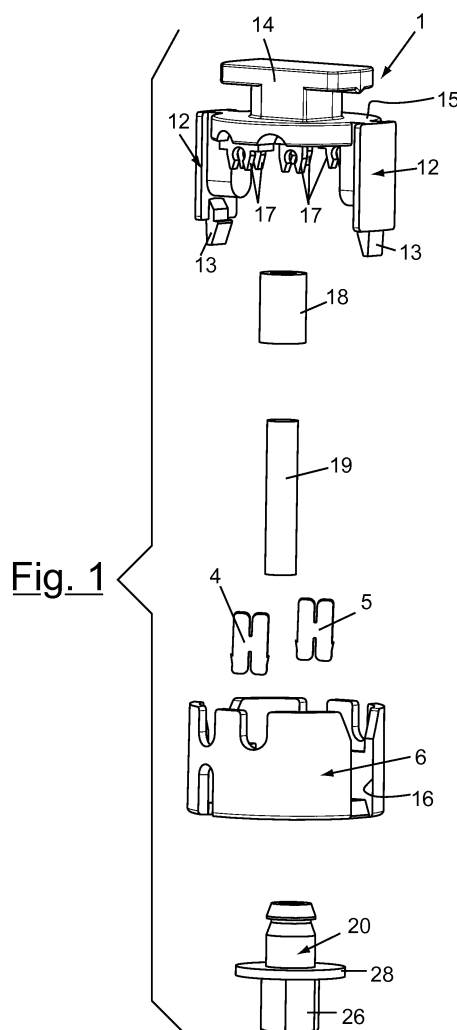
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(54) **Quick insulation displacement connection device for electrical connections**

(57) A quick insulation displacement connection device for electrical connections, comprising at least a first containment element (1), made of insulating material, adapted to support and maintain in position a pair of cables (10), and a second contact-carrier element (6), it too made of insulating material, which bears a series of conductor means (4, 5) adapted to make an electrical insulation displacement connection on each conductor of the pair of cables (10), in order to draw the signal to be sent over the conductors of the cables (11) of a shunt line; it is possible for the installer to obtain the pick-up of the signal from the pair of cables (10) by simply bringing the contact-carrier element (6) towards said containment element (1) and by rotating a tool several turns, tool such as a socket wrench (25), which operates on a threaded pin (19), placed at the centre of the contact-carrier element (6) and adapted to be engaged inside a nut screw (18) of the containment element (1).



Description

[0001] The present invention generally refers to the field of electrical connections, and in particular regards a quick insulation displacement connection device (IDC) for electrical connections.

[0002] More specifically, the function of the device according to the invention is that of drawing the electrical signal from a bus formed by a pair of conductors (twisted together or parallel), by means of the insulation displacement connection (IDC) principle.

[0003] Currently, various types of electrical connectors are employed, equipped with insulation displacement connections, in order to make the desired electrical connections of the respective terminals.

[0004] As is known, the quick insulation displacement connection devices substantially provide for the use of pairs of contact blades, in which each blade pair is housed inside a respective contact-carrier element of an electrical line.

[0005] Inside each blade pair, the connection terminal of a respective electric cable is inserted in order to draw its signal to be sent over a shunt electrical line.

[0006] The electrical contact is usually made by means of a pressure system, i.e. by pressing each electrical cable, equipped with related outer insulation sheath and respective inner conductor, between the blades of the contact-carrier element, such that the cutting edges of the blades remove the insulation sheath of the electrical cable from the inner conductor and contact the aforesaid conductor, establishing the desired electrical connection between the terminals.

[0007] In such a manner, the terminations of the electrical conductors can be simply joined together, without having to previously remove insulation sheath pieces of the electrical cable, in order to free the inner conductor.

[0008] The insulation displacement connectors can also be arranged in series within a single connection interface, so to make several electrical connections between respective cable terminations in a single operation.

[0009] Nevertheless, the known electrical connection devices of IDC type still lack of flexibility of use, above all if it is necessary to draw the electrical signal from a pair of conductors (twisted or parallel) positioned inside suitable housing raceways; this is typical of the buses for the transport of the electrical signal and/or electrical line made with twisted wire and equipped with ceramic insulators.

[0010] In these cases, in fact, it is extremely difficult to access respective electrical cable terminals, so to press them inside the contact-carrier element and thus ensure that the blades of the same make the electrical connection.

[0011] In the scope of the abovementioned needs, therefore, the object of the present invention is that of overcoming the mentioned drawbacks, and in particular that of making a quick insulation displacement connection device for electrical connections which allows mak-

ing, in a simple, quick and practical manner, the electrical terminations of the cables to be connected and in particular the pick-up of the bus signal housed inside a raceway.

[0012] Another object of the present invention is that of making a quick insulation displacement connection device for electrical connections which allows attaining considerable installation and wiring ease and speed and functionality of the connection, as well as effective installation arrangement for any technical installer, even one not particularly specialised.

[0013] Other object of the present invention is that of making a quick insulation displacement connection device for electrical connections which is extremely simple and quick to install and to wire.

[0014] Further object of the present invention is that of making a quick insulation displacement connection device for electrical connections which is easy and inexpensive to make.

[0015] These and other objects, according to the present invention, are achieved by making a quick insulation displacement connection device for electrical connections according to enclosed claim 1.

[0016] Other technical detail characteristics of the invention are described in the subsequent claims, dependent on claim 1.

[0017] Advantageously, the quick connection device, according to the present invention, is entirely integrated in the electrical and/or home automation systems, and allows making electrical connections on lines and/or buses in an advanced, simple, practical and extremely fast manner.

[0018] Essential characteristics of the invention are the modularity and flexibility of the device, which first of all allows prearranging the line and/or bus signal and deciding where to make the connections for the desired terminations.

[0019] Further characteristics and advantages of a quick insulation displacement connection device for electrical connections, according to the present invention, will be clearer from the following description, related to an exemplifying and nonlimiting embodiment of the device and referred to the attached drawings, wherein:

- Figure 1 shows an exploded view of a quick insulation displacement connection device for electrical connections, according to the present invention;
- Figure 2 shows a perspective view of a first upper element, which composes the quick insulation displacement connection device for electrical connections, according to the invention;
- Figure 3 shows a perspective view of a second lower element, which composes the quick insulation displacement connection device for electrical connections, according to the invention;
- Figure 4 shows an overall perspective view of a quick insulation displacement connection device for electrical connections, mounted according to the present

invention;

- Figure 5 shows a perspective view of a drawing mode of the signal from a bus, employing the quick insulation displacement connection device for electrical connections, according to the invention.

[0020] With reference to the mentioned figures, the quick insulation displacement connection device for electrical connections, which is the object of the present invention, permits drawing the signal from a pair of electrical cables 10 (twisted or parallel and protected by an outer insulation sheath), such as those of a bus, for example SCS, by means of pairs of metal blade 4 and 5, according to the principle of insulation displacement connection (IDC).

[0021] In particular, the aforesaid device comprises a first shaped containment element 1 (so-called "holder"), made of an insulating material, adapted to guide, maintain and prearrange the bus cables 10 for electrical connection, and a second contact-carrier element 6, it too made of insulating material, which bears on the bottom the pairs of metal contact blades 4, 5, enclosed within insulating walls 21 and adapted to make the electrical insulation displacement connection on each conductor of the bus cables 10, in order to draw the signal to be sent over the conductors 11 of a generic shunt electrical line.

[0022] In particular, the containment element 1 comprises a head 14, preferably T-shaped, which is mounted on a central circular body 15, provided with two lateral flanges 12, which terminate with respective elongated surfaces 13, adapted to be fit-inserted within respective seats 16 of the contact-carrier element 6.

[0023] Below the body 15, retaining and maintenance elements 17 of the bus cables 10 are positioned, and in substantially central position, a nut screw 18 is positioned which is adapted to receive a central pin 19, with suitable thread and pitch for the nut screw 18, pin 19 mounted on the shaped support 20 and passing through the centre of the contact-carrier element 6.

[0024] The threaded pin 19 is adapted to be engaged in the in the nut screw 18, in a manner such that, upon completed mounting of the containment element 1 on the contact-carrier element 6, the gradual insertion of the pin 19 inside the nut screw 18 causes the piercing of the insulation of the bus cables 10 by the metal blades 4, 5, which are inserted inside the seats of the retaining elements 17, so to achieve the electrical contact with the inner conductors of the bus cables 10.

[0025] In practice, as shown in detail in figures 2, 3 and 4, as the threaded pin 19 is rotated inside the nut screw 18, the circular portion 28 of the support 20 operates on the bottom of the contact-carrier element 6, so to bring the contact-carrier element 6 close to the containment element 1 and the metal blades 4, 5 close to the cable pair 10, until the same blades 4, 5, abutting against the retaining and guide elements 17 of the bus cables 10, have a sufficient force for making the electrical insulation

displacement contact, and they contact the inner electrical conductors of the same bus cables 10.

[0026] As shown in detail in the enclosed figure 5, the device is advantageously usable for electrical connections to make inside the shaped raceways 22, by pre-installing the containment element 1 inside the upper portion 23 of the raceway 22, in order to support the cables 10 of the bus signal and maintain them in position.

[0027] In such a manner, in fact, the head 14 of the containment element 1 is translatable inside the lower shaped seat 24 of the portion 23 of the raceway 22, while the contact-carrier element 6 is manoeuvrable by the installer by means of a standard tool, such as a socket wrench 25, which permits operating, by means of a bush 27, on the shaped lower portion 26 of the pin 20.

[0028] In practice, the installer can obtain the pick-up of the signal of the bus cables 10, by means of the cables 11, by simply bringing the contact-carrier element 6 close to the containment element 1, by means of the socket wrench 25, and by rotating the wrench 25 at least several turns, without having to manually butt or connect the electrical conductors.

[0029] In this manner, by appropriately arranging the containment elements 1 at pre-established distances along the raceway 22, it is possible to draw the signal from the bus cables 10 in various predetermined and pre-selected points, in order to make the desired wiring (for example, for the installation of lamps in various light sockets of a setting).

[0030] Finally, it is emphasized how the connection device according to the invention can be analogously employed for applications on raceways (as in the above-described and illustrated example), where intake lines of the signal and/or bus are placed which are usable for the supply and transport of digital signals, as with analogue signal electrical lines, which employ twisted cables and/or ceramic isolators.

[0031] From the above description, the characteristics of the quick insulation displacement connection device for electrical connections - the object of the present invention - are clear, as are its advantages.

[0032] In particular, such advantages regard the following aspects:

- reduced installation times of the entire wiring, with respect to the prior art;
- reduction of the overall cost of the installed cables, with respect to the prior art;
- ease and speed of installation;
- use of relatively unspecialised personnel, due to the fact that the installation operations are substantially easier with respect to the prior art;
- increase of the average value of the system;
- relatively limited overall cost related to the components used, maintenance and labour employed with respect to traditional connection systems, executable accessory functions being equal, by virtue of the attained advantages.

[0033] Finally, it is clear that numerous variants can be made to the quick connection device in question, without departing from the novelty principles inherent in the inventive idea, as it is clear that, in the practical actuation of the invention, the materials, shapes and sizes of the illustrated details can be of any type according to requirements, and the same can be substituted with other technically equivalent elements.

Claims

1. Quick insulation displacement connection device for electrical connections, of the type comprising at least a first containment element (1), made of insulating material, adapted to support and maintain in position at least one pair of cables (10), and at least a second contact-carrier element (6), it too made of insulating material, which bears conductor means (4, 5) adapted to make the electrical insulation displacement connection on the conductors of said pair of cables (10), in order to draw the signal to be sent over the conductors (11) of at least one shunt line, **characterised in that** said device also comprises means (18, 19, 20) adapted to cause a translation of said contact-carrier element (6) towards said containment element (1), so to make the electrical contact through said conductor means (4, 5) on the electrical conductors of said cable pair (10), said translation being obtained by means of at least one tool (25) which operates on said translation means (18, 19, 20).
2. Quick connection device as in claim 1, **characterised in that** said pair of cables (10) comprise twisted or parallel conductors.
3. Quick connection device as in claim 1, **characterised in that** said pair of cables (10) is adapted for the transmission of a bus signal.
4. Quick connection device as in claim 1, **characterised in that** said conductor means (4, 5) include pairs of metal blades, adapted to make the electrical insulation displacement connection on each conductor of said pair of cables (10), in order to draw the electrical signal to be sent on the conductors (11) of at least one shunt electrical line.
5. Quick connection device as in claim 1, **characterised in that** said first containment element (1) can be positioned and translated inside at least one seat (24) of the profile (23) of shaped raceways (22).
6. Quick connection device as in claim 1, **characterised in that** said translation means (18, 19, 20) include at least one support (20), having at least one portion (26) shaped so to be coupled to said tool (25), of at least one threaded pin (19), adapted to be engaged inside at least one nut screw (18) associated with the body (15) of said containment element (1), said support (20) comprising at least one portion (28), which is placed in contact with said contact-carrier element (6), permitting the translation of said contact-carrier element (6) towards said containment element (1), following the operation of the said tool (25) on said shaped portion (26) of said support (20).
7. Quick connection device as in claim 1, **characterised in that** said containment element (1) comprises a head (14) which is mounted on a central body (15), provided with lateral flanges (12), which terminate with respective elongated surfaces (13), adapted to be inserted within respective seats (16) of the contact-carrier element (6).
8. Quick connection device as in claim 7, **characterised in that** below said central body (15), elements (17) are positioned for retaining and maintaining in position said pair of cables (10), elements (17) having respective seats adapted to be coupled to the profile of said metal blades (4, 5) upon insulation piercing and upon the metal blades (4, 5) establishing electrical contact with the inner conductors of said pair of cables (10).
9. Quick connection device as in claim 5, **characterised in that** inside said seat (24) of the raceway (22), a series of containment elements (1) are suitably arranged at pre-established distances, so to be able to draw the signal from said pair of cables (10) in predeterminable points, in order to make the desired wiring.
10. Quick connection device as in claim 1, **characterised in that** it can be employed both for buses, usable for the supply and/or transport of digital signals, and for analogue signal electrical lines, which employ twisted cables and/or ceramic isolators.

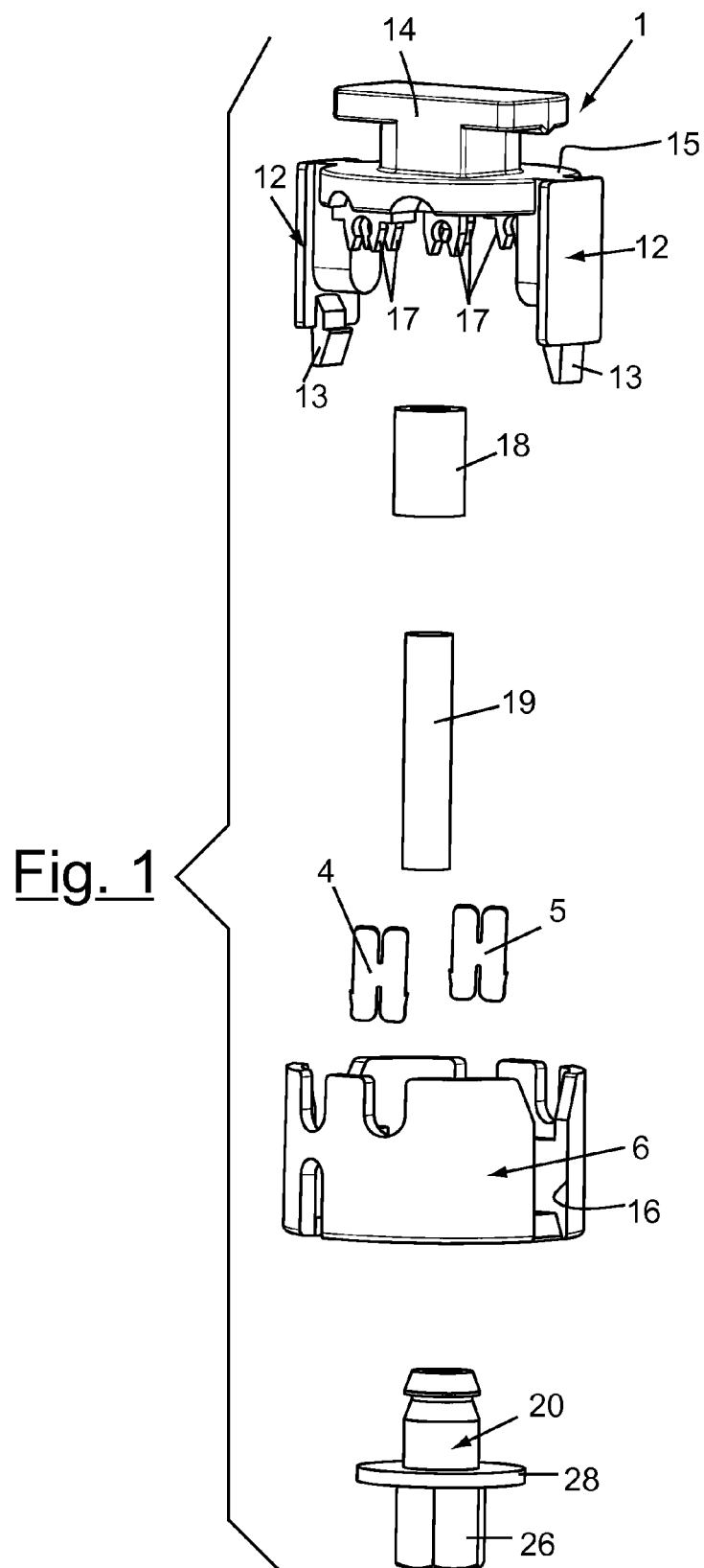


Fig. 2

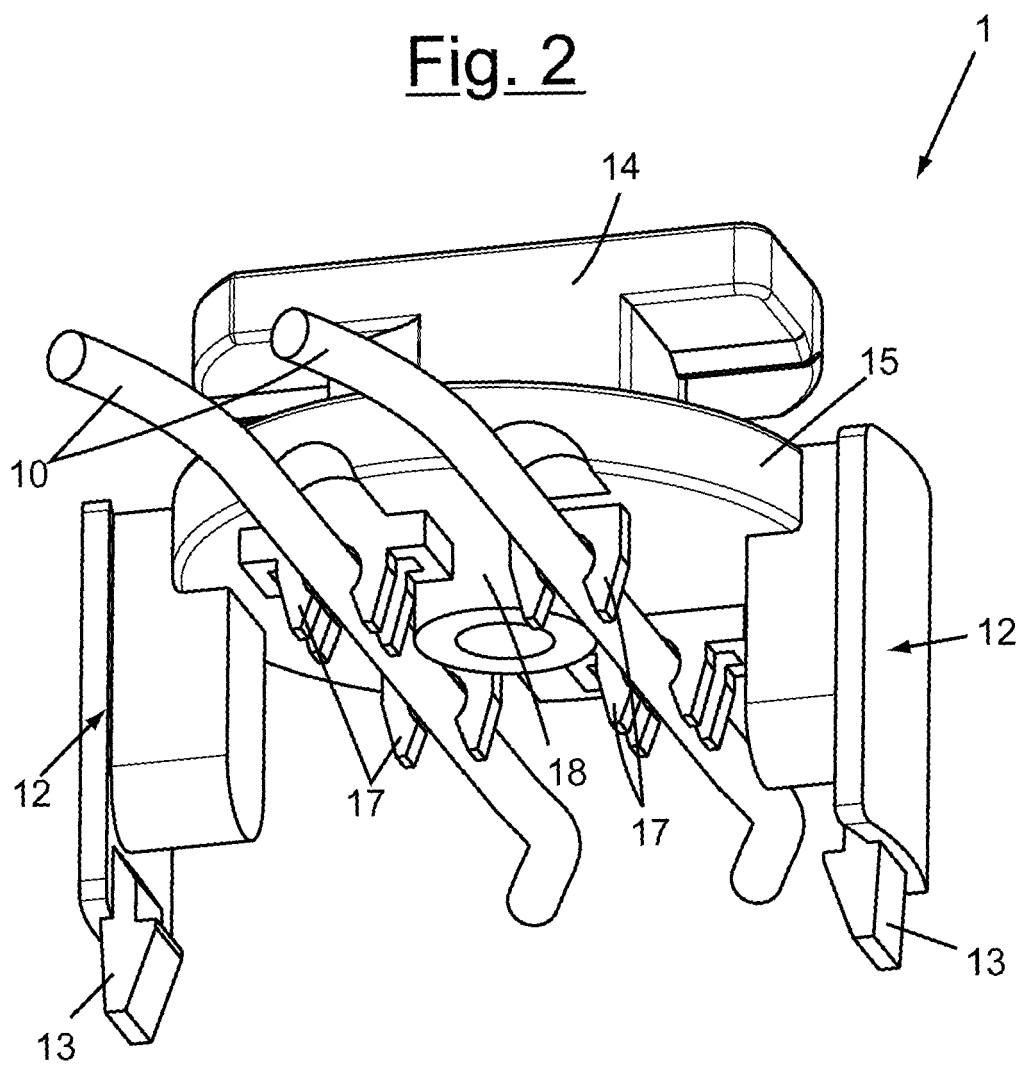


Fig. 3

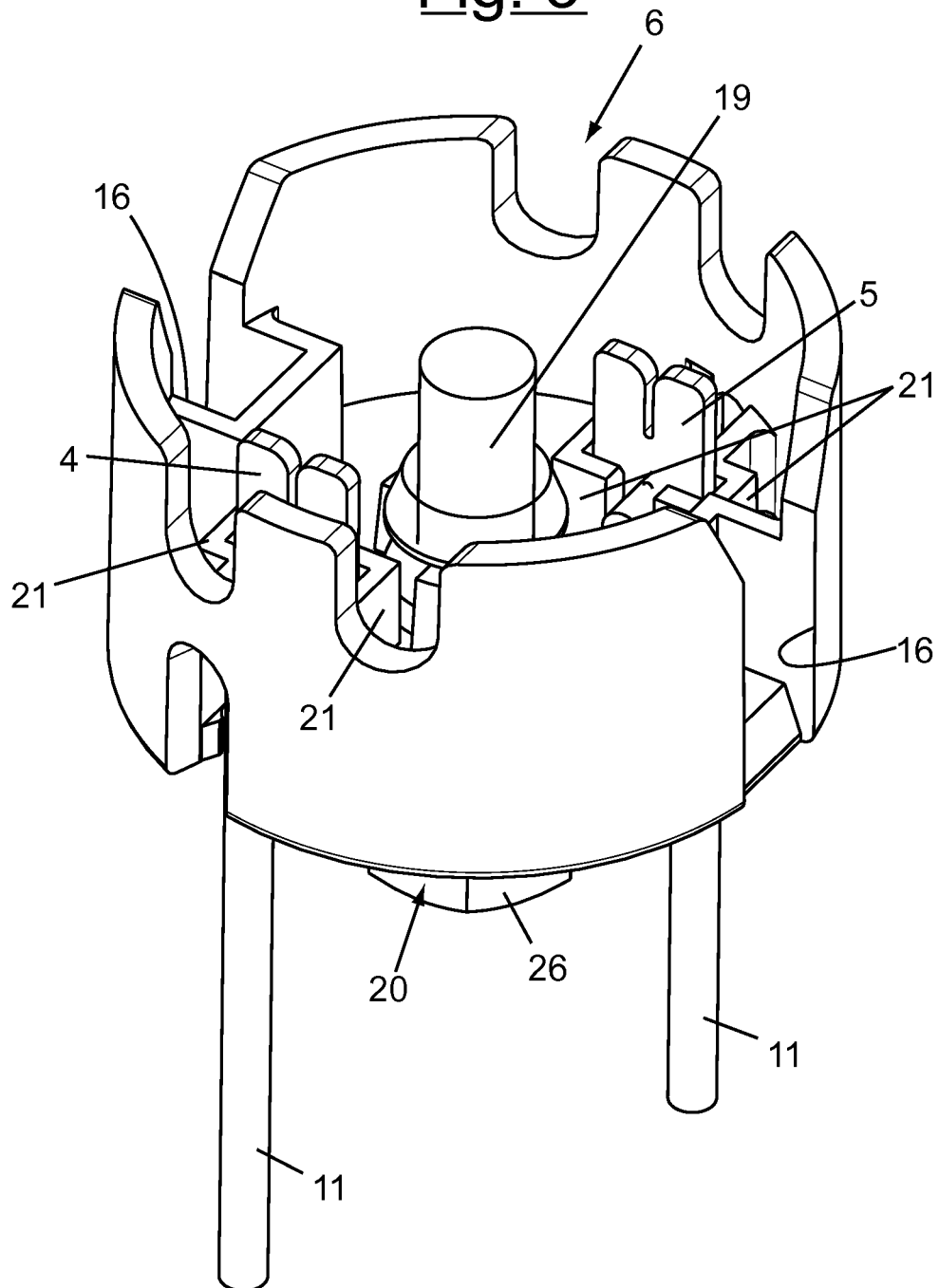


Fig. 4

