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(54) **EXTENSION**

(57) Extension cable that has a body provided with at least two outlets having receptacles for receiving connection pins, and has electrical connection means in its interior, and a cable for connecting to the power supply, which has a connection pin at the end that exits said body, the body consisting of at least two parts, each part comprising at least one of said outlets and the parts being

connected by means for allowing parts to rotate relative to one another, wherein the connection interface between two parts is arranged in a plane perpendicular to the plane of the outlets of said two parts, the axis of the relative rotation between parts being perpendicular to the plane of the connection interface.

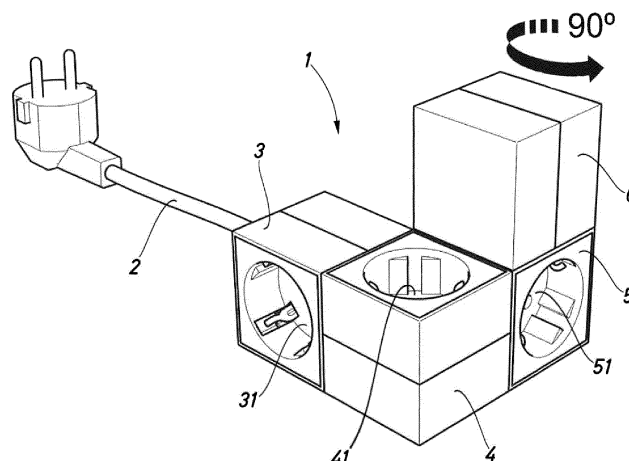


Fig.4

Description

[0001] The present invention relates to devices for connecting more than one apparatus to the electricity grid. More particularly, the present invention relates to an extension cable that comprises more than one outlet, the outlets being connected so as to be rotatable relative to one another.

[0002] The known extension cables typically comprise a body that consists of one or more parts and comprises the different outlets. Each outlet comprises a receptacle for the pins and receives current through a cable connected to the power supply. Said extension cables are widely used, both in households and in other applications, such as offices or any other places of work.

[0003] There exist extension cables of which the body consists of several parts that are rotatably interconnected. For example, US2014/0102870A1 discloses an extension cable consisting of several parts that each comprise an outlet and a receptacle that fits together with the outlet of an adjacent part. Arranged around the outlet is a surface on which the receptacle of the adjacent part is placed, thus defining a connection interface in a plane parallel to the plane of the outlet, in other words parallel to the plane in which the receptacles for the pins are located. In this document, rotations between parts cause changes in the dimensions of the extension cable, that is, the length and the width of the extension lead vary when a rotation between parts occurs. However, although the configurations obtained by rotating parts result in different dimensions, said configurations do not allow the orientation of the outlets to be changed, and so the versatility of the extension cable is limited, both in terms of options and design.

[0004] The object of the present invention is to remedy the above drawbacks of the known extension cables.

[0005] More particularly, the present invention discloses an extension cable that has a body provided with at least two outlets having receptacles for receiving connection pins, and has electrical connection means in its interior, and a cable for connecting to the power supply, which has a connection pin at the end that exits said body, the body consisting of at least two parts, each part comprising at least one of said outlets and the parts being connected by means for allowing parts to rotate relative to one another, characterised in that the connection interface between two parts is arranged in a plane perpendicular to the plane of the outlets of said two parts, the axis of the relative rotation between parts being perpendicular to the plane of the connection interface.

[0006] Owing to the features of the extension cable according to the present invention, configurations are possible in which the outlets have different orientations, and so the extension cable has greater versatility in terms of its usage and design. Rotations between parts may vary the dimensions of the extension lead and said rotations may produce changes to all dimensions of the extension lead, that is, length, width and height.

[0007] Except for the parts at the ends of the extension lead, each part is connected with a preceding part and a subsequent part while following the path of the electric cable. According to the invention, preferably, two adjacent parts which are connected to each other have only one connection interface between them.

[0008] Preferably, the connection interface between two parts comprises a groove in a first part and a recess in a second part, the recess in the second part fitting into the groove in the first part.

[0009] Even more preferably, said groove in the first part comprises a stop and said recess in the second part comprises an indentation in which the stop is accommodated, said indentation allowing the stop to move during the relative rotation between the first and second part.

[0010] Advantageously, the indentation extends around 90° of a circular arc plus the width of the stop, and so the parts rotate relative to one another by at most 90°. As a result, there is no need for a special connection between the parts of the outlet since it is sufficient to use a cable of which the length is slightly greater than the distance it covers between parts.

[0011] Optionally, each part comprises a lower portion and an upper portion, each portion of each part comprising a recess, the recess in the upper portion defining an opening together with the recess in the lower portion.

[0012] Advantageously, said recesses are semicircular, and the indentation is preferably in the shape of a circular trapezium.

[0013] Advantageously, the connection cable extends from part to part through said opening.

[0014] In one embodiment of the invention, the parts are parallelepiped and comprise the connection interface on one of their lateral faces.

[0015] Preferably, the extension cable according to the invention can comprise parts having connection interfaces on adjacent faces, or parts having connection interfaces on opposite faces. As a result, a greater variety of configurations is possible, e.g. configurations in which some parts of the outlet are raised and are not in contact with the ground.

[0016] To better understand the invention, drawings of an embodiment of the extension cable according to the present invention are appended as an illustrative yet non-limiting example.

Fig. 1 is a perspective view of an embodiment of an extension cable according to the present invention, comprising a body consisting of four parts and four outlets.

Fig. 2 to 5 are perspective views of the embodiment of Fig. 1, schematically showing different 90° rotations of the parts of the body.

Fig. 6 is a perspective view of the embodiment of Fig. 1, showing the parts of the body in an exploded view and schematically showing the cabling between

parts.

Fig. 7 is a perspective view of the third part of the body from Fig. 1.

Fig. 8 is a perspective view of the second part of the body from Fig. 1.

Fig. 9 is an exploded perspective view of the fourth part of the body from Fig. 1.

Fig. 10 an exploded perspective view of the third part of the body from Fig. 1.

Fig. 11 is a perspective view of a detail of the upper portions of the first part and second part.

Fig. 12 is a perspective view of a detail of the connection between two parts of the body from Fig. 1.

[0017] Fig. 1 shows an embodiment of an extension cable -1- according to the present invention, comprising a cable -2- for connecting to the power supply, and a body consisting of four parallelepiped parts -3-, -4-, -5-, -6- that are interconnected by means for allowing them to rotate relative to one another. Each of the parts -3-, -4-, -5-, -6- comprises an outlet -31-, -41-, -51-, -61- for receiving connection pins, which outlet has electrical connection means in its interior. In the embodiment shown in Fig. 1, the outlets -31-, -41-, -51-, -61- are arranged on the top faces of the parts -3-, -4-, -5-, -6-.

[0018] To aid clarity, the parts -3-, -4-, -5-, -6- will be referred to hereinafter as the first part -3-, second part -4-, third part -5- and fourth part -6-.

[0019] Since the connection interface between the parts -3-, -4-, -5-, -6- comprises means for allowing relative rotation between said parts, the user can vary the configuration of the body of the extension cable -1-. For example, it can be seen in Fig. 2 that the third part -5- and the fourth part -6- have been placed in a position perpendicular to that shown in Fig. 1 by the part -5- being rotated 90° relative to the part -4-. However, in the configuration in Fig. 1, the four parts -3-, -4-, -5-, -6- are arranged in a square, with each outlet -31-, -41-, -51-, -61- facing the same way.

[0020] The connection interface between the parts -3-, -4-, -5-, -6- is arranged in a plane perpendicular to the plane of the outlets -31-, -41-, -51-, -61-, in other words in a plane perpendicular to the plane in which the receptacles -31'-, -41'- for the pins are located. In the example shown, the connection interface is located on the lateral faces of the parallelepipeds of the parts -3-, -4-, -5-, -6-, the lateral faces being located in planes perpendicular to the plane of the receptacles -31'-, -41'- for the pins.

[0021] As can be seen, the first part -3- and the fourth part -6- are not directly interconnected, but rather the fourth part -6- is only connected to the third part -5-, which is connected to the second part -4-. The configuration in

Fig. 2 is possible since the third part -4- comprises connection interfaces on adjacent faces: the face of the third part -5- that is in contact with the fourth part -6- is adjacent to the face of the third part -5- that is in contact with the second part -4-.

[0022] Other examples of possible configurations can be obtained by rotating the parts -3-, -4-, -5-, -6- relative to one another: For example, the configuration in Fig. 3, which starts from the configuration in Fig. 2 and rotates the first part -3- 90° relative to the second part 4; the configuration in Fig. 4, which starts from the configuration in Fig. 3 and rotates the fourth part -6- 90° relative to the third part -5-; or the configuration in Fig. 5, which starts from the configuration in Fig. 4 and rotates the third part -5- 90° relative to the second part -4-. As can be seen, the extension cable 1 has outlets -31-, -41-, -51-, -61- arranged in different planes in each of the configurations shown and the height of the extension lead varies as a result of the different rotations between parts.

[0023] Fig. 6 shows the parts -3-, -4-, -5-, -6- that make up the body of the extension cable -1- individually and in exploded form. Each of the parts -3-, -4-, -5-, -6- comprises an upper portion -32-, -42-, -52-, -62- joined to a lower portion -32'-, -42'-, -52'-, -62'-. The upper portion -32-, -42-, -52-, -62- of each part -3-, -4-, -5-, -6- comprises a recess -33-, -43-, -53-, -63- and the lower portion -32'-, -42'-, -52'-, -62'- of each part -3-, -4-, -5-, -6- comprises another recess -33'-, -43'-, -53'-, -63'-. When the upper portion -32-, -42-, -52-, -62- of one part is joined to its corresponding lower portion -32'-, -42'-, -52'-, -62'-, the recesses -33-, -43-, -53-, -63- in the upper portion -32-, -42-, -52-, -62- define, together with the recesses -33'-, -43'-, -53'-, -63'- in the lower portion -32'-, -42'-, -52'-, -62'-, an opening -81-, -82- (see Fig. 7 and 8) for passing through the cable -2- for connecting to the power supply.

[0024] In the embodiment of the extension cable -1-, according to the present invention, shown in Fig. 6, it can be seen how the cable -2- extends part by part from the fourth part -6- to the first part -3-. In this manner, each part is connected with a precedent part and a subsequent part except for the parts -3-, -6- at the ends and it only exist one connection interface between two connected adjacent parts.

[0025] The cable -2- passes over the recesses -34-, -54-, -64- in the lower portions -32'-, -42'-, -52'-, -62'- of the parts -3-, -4-, -5-, -6-. When the upper portions -32-, -42-, -52-, -62- of the parts -3-, -4-, -5-, -6- are connected to the lower portions -32'-, -42'-, -52'-, -62'-, the opening -81-, -82- (see Fig. 7 and 8) allows the connection cable 2 to pass between the parts. In the embodiment shown, the maximum angle of relative rotation between parts is 90°, and so there is no need for any type of special connection to make rotation possible. It is sufficient for the length of the cable -2- to be slightly greater than the distance that said cable has to cover between parts -3-, -4-, -5-, -6-.

[0026] The parts -3-, -4-, -5-, -6- of the extension cable

-1- are connected by some parts being fitted together with others. Fig. 7 and 8 show each of the sections of the connection.

[0027] One of the sections of the connection is shown in Fig. 7, which shows the third part -5- with its upper portion -52- and its lower portion -52'- connected, resulting in a visible joint -52"- between the two parts -52-, -52'-. The recesses -53-, -54- define a circular opening -81-, which comprises an indentation -55- in the shape of a circular trapezium, the ends of which define limits -56-, -56'-.

[0028] The second of the sections of the connection is shown in Fig. 8, which shows the second part -4- with its upper portion -42- and its lower portion -42'- connected, resulting in a visible joint -42"- between the two parts -42-, -42'-. The recesses -43-, -44- are identical and semicircular, producing a circular opening -82- that is surrounded by a flange -45- which produces a groove (see Fig. 11).

[0029] The third part -5- and the fourth part -6- are shown in exploded form in Fig. 9 and 10, in which it can be seen that each of the parts -5-, -6- comprises an outlet -51-, -61- (see Fig. 1) that is formed by a female receptacle -51'-, -61'- for the pins, which is arranged on the upper portion -52-, -62- of the part -5-, -6-, and electrical connection mechanisms -51"-, -61"- on which a part -51'"-, -61'"- that also contains electrical connections is placed. The female receptacles -51'-, -61'- are fixed in place by means of a screw -7- having a tamper-proof head.

[0030] The parts -3-, -4-, -5-, -6- are interconnected by the interaction between said two types of opening -81-, -82- (see Fig. 7 and 8). To connect the parts -3-, -4-, -5-, -6-, they have to have different types of opening -81-, -82-.

[0031] As can be seen in Fig. 11, the flange -45- on the second part -4- has a groove -46-. The upper portions -32-, -42- of the parts -3-, -4- are connected by fitting the recess -33- in the upper portion -32- of the first part -3- into the groove -46- defined by the flange -45-. The groove -46- comprises a stop -47-, which is accommodated in indentation -35- in the shape of a circular trapezium and can move along said indentation until it encounters one of the limits -36- thereof (see reference numerals -56- and -56'- in Fig. 7).

[0032] Equally, the connection (not shown) between the lower portions -32-, -42- of the parts -3-, -4- is identical to that between the upper portions -32-, -42- of the parts -3-, -4-, the only difference being that the groove -46- does not have a stop -47- on the lower portion -32-.

[0033] Once the upper portions -32-, -42- and lower portions -32'-, -42'- are connected, the stop -47- can move between the limits -36- (the lower limit is not shown) of the indentation -35-, making it possible for one part to be rotated relative to the other.

[0034] Fig. 12 shows how the upper portions -52-, -62- of the third part -5- and the fourth part -6- are mounted onto the lower portions -52'-, -62'- of said parts, the first

part -3- and the second part -4- already being connected. It can be seen how the upper portion -62- of the fourth part -6- is placed such that the stop -57- arranged in the groove in the upper portion -52- of the third part -5- is arranged within the indentation -65- in the shape of a circular trapezium. Again, the stop -57- can move through the indentation -65-, allowing the part -5- to be rotated relative to the part -6-. The rotation is limited by the course of the indentation -65- since the stop -57- comes into contact with the limits -66- (see reference numerals -56- and -56'- in Fig. 7) of the indentation -65-.

[0035] The connection interface between parts is arranged in a plane perpendicular to the plane of the outlet, in other words perpendicular to the plane in which the receptacles for the pins are located. In this way, the outlet of each part can take on different orientations.

[0036] Once the parts are connected, the indentation -65-, which has a larger radius, defines a path for the stop -57-, which can move along said path between the limits -66- (only one shown) of the indentation -65-. In the embodiment of the present invention shown in the figures, the course of the indentation -65-, which has the larger radius, allows one part to be rotated 90° relative to the other. To this end, the indentation -65- has a length of 90° of a circular arc plus the width of the stop -57- at one of the ends of the indentation -65-.

[0037] Although the invention has been presented and described with reference to embodiments thereof, these should not be considered to limit the invention and therefore structural or other details thereof could be varied in many ways that would be obvious to persons skilled in the art after interpreting the subject matter disclosed in this description and in the claims and drawings. Therefore, all variants and equivalents are included within the scope of the present invention, provided they can be considered to fall within the widest scope of the following claims.

Claims

1. Extension cable that has a body provided with at least two outlets having receptacles for receiving connection pins, and has electrical connection means in its interior, and a cable for connecting to the power supply, which has a connection pin at the end that exits said body, the body consisting of at least two parts, each part comprising at least one of said outlets and the parts being connected by means for allowing parts to rotate relative to one another, **characterised in that** the connection interface between two parts is arranged in a plane perpendicular to the plane of the outlets of said two parts, the axis of the relative rotation between parts being perpendicular to the plane of the connection interface.
2. Extension cable according to claim 1, **characterised in that** the connection interface between two parts

comprises a groove in a first part and a recess in a second part, the recess in the second part fitting into the groove in the first part.

3. Extension cable according to claim 2, **characterised in that** said groove in the first part comprises a stop and said recess in the second part comprises an indentation in which the stop is accommodated, said indentation allowing the stop to move during the relative rotation between the first and second part. 5
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4. Extension cable according to claim 3, **characterised in that** the indentation extends around 90° of a circular arc plus the width of the stop. 15
5. Extension cable according to either claim 3 or claim 4, **characterised in that** each part comprises a lower portion and an upper portion, each portion of each part comprising a recess, the recess in the upper portion defining an opening together with the recess in the lower portion. 20
6. Extension cable according to claim 5, **characterised in that** said recesses are semicircular. 25
7. Extension cable according to claim 6, **characterised in that** the indentation is in the shape of a circular trapezium.
8. Extension cable according to any of claims 5 to 7, **characterised in that** the connection cable extends from part to part through said opening. 30
9. Extension cable according to any of the preceding claims, **characterised in that** the parts are parallel-piped and comprise the connection interface on one of their lateral faces. 35
10. Extension cable according to claim 9, **characterised in that** it comprises parts having connection interfaces on adjacent faces. 40
11. Extension cable according to claim 9, **characterised in that** it comprises parts having connection interfaces on opposite faces. 45

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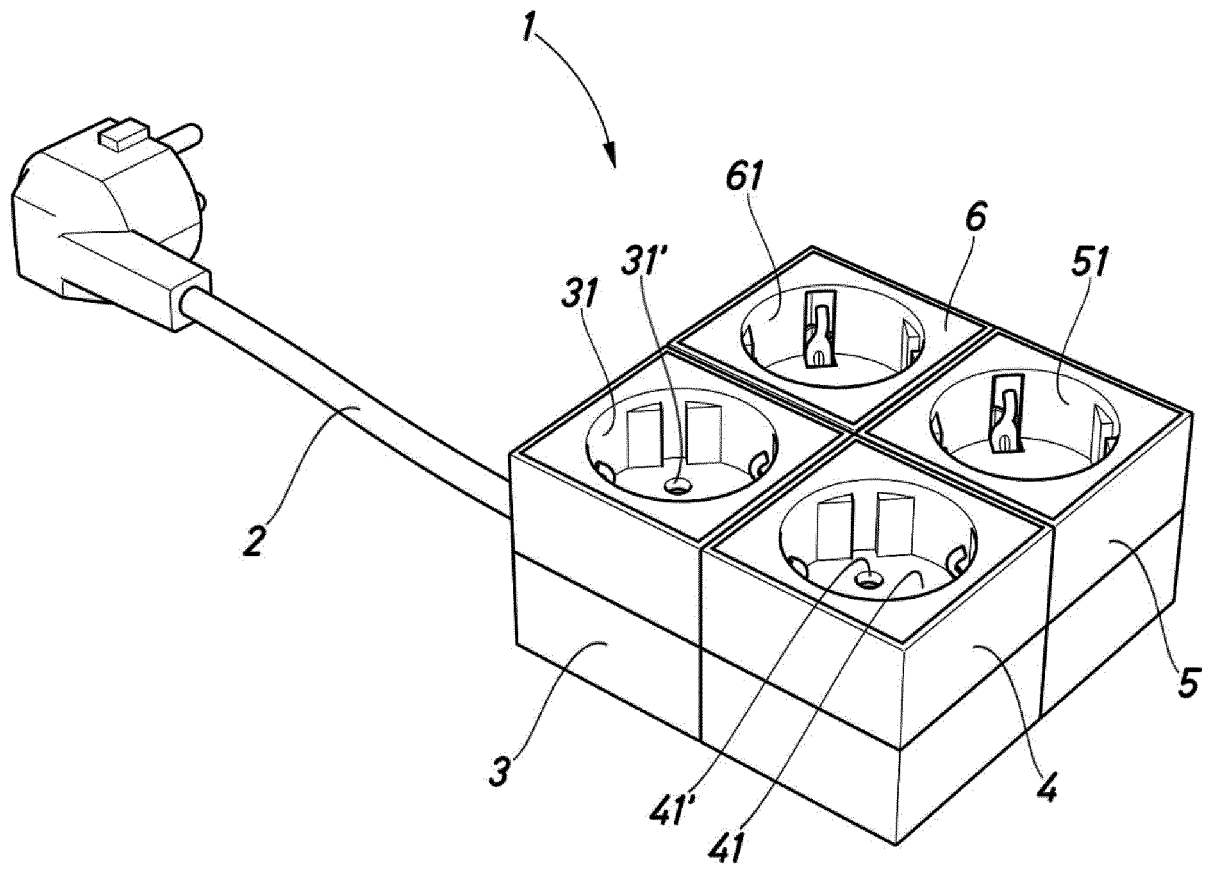


Fig.1

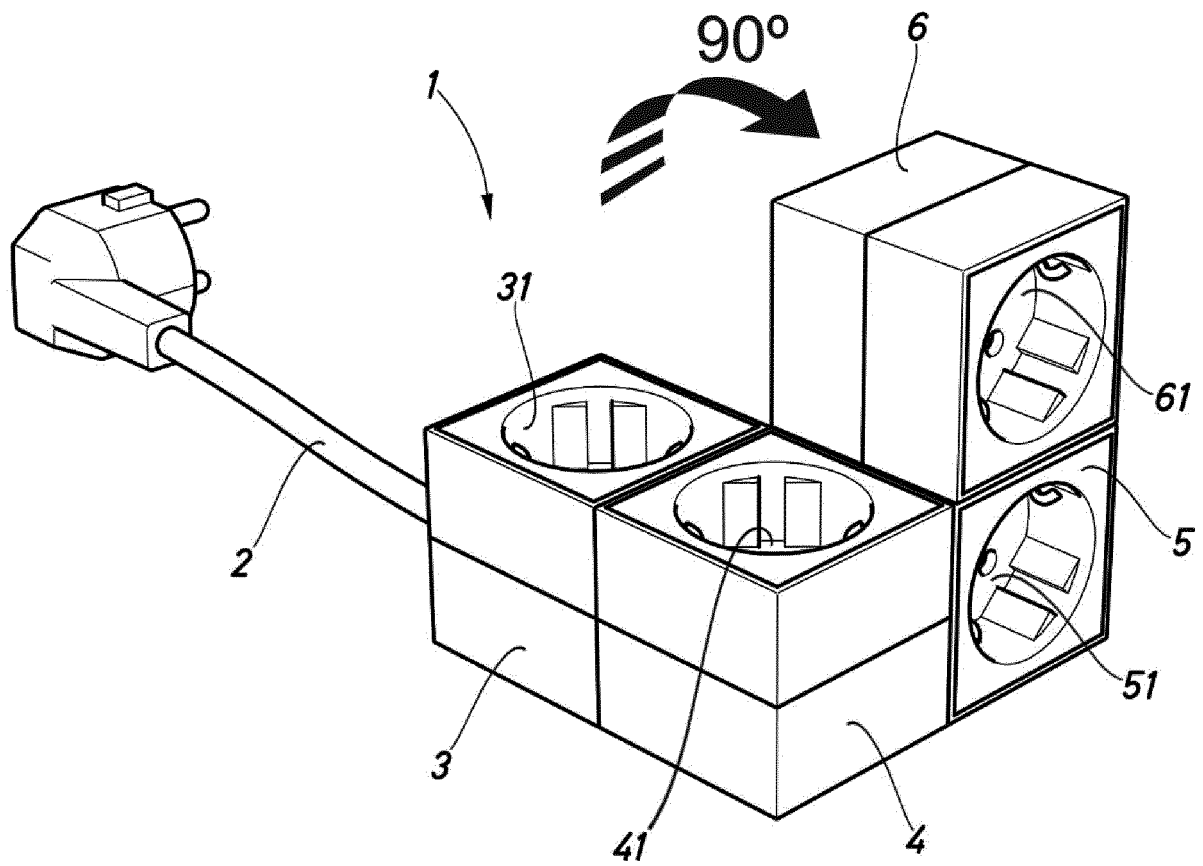


Fig.2

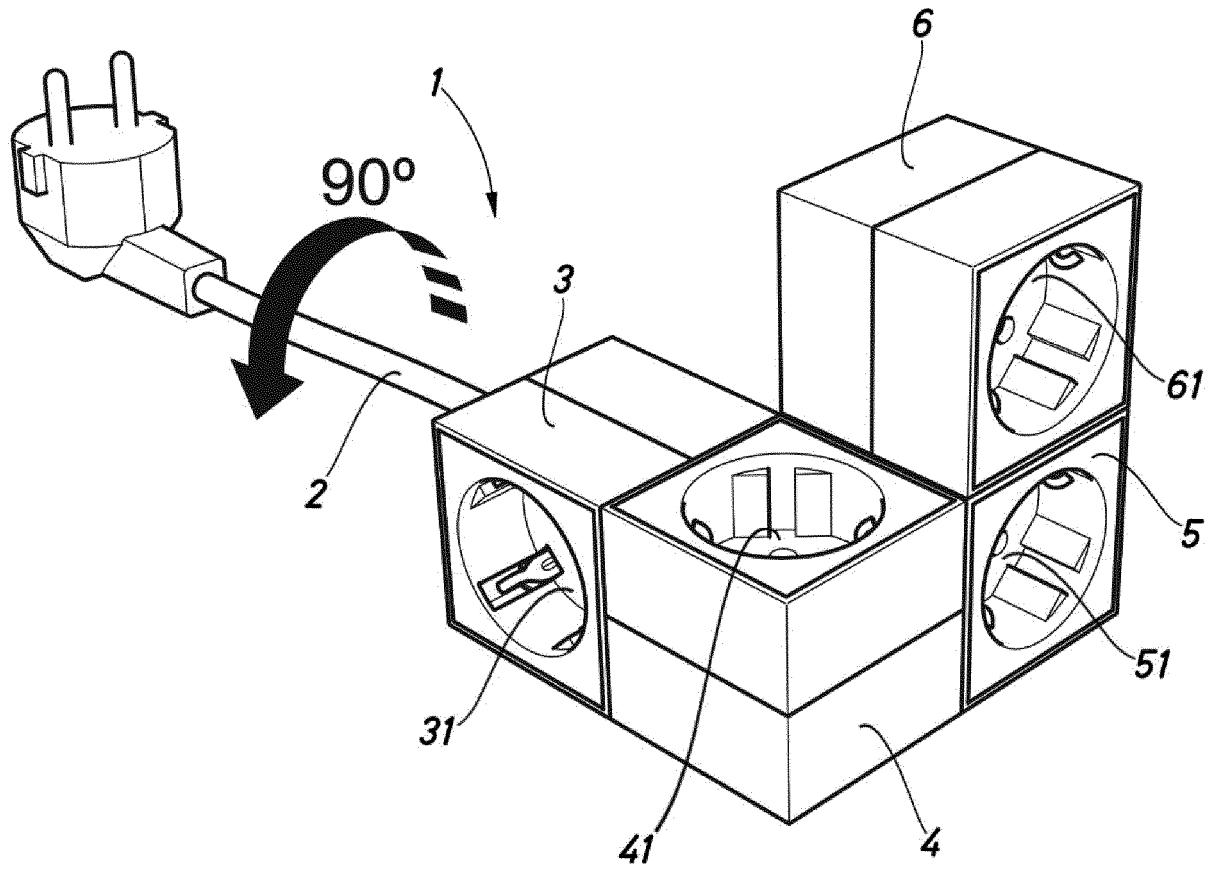


Fig.3

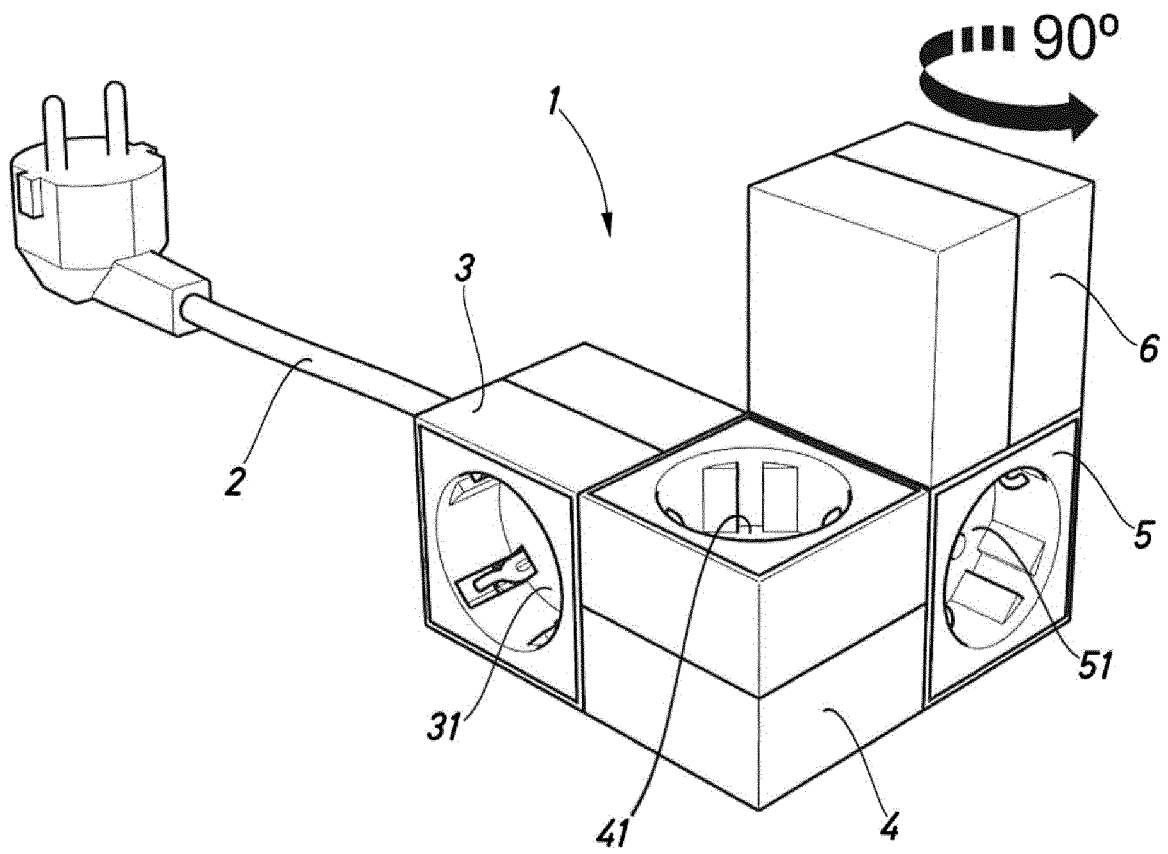


Fig.4

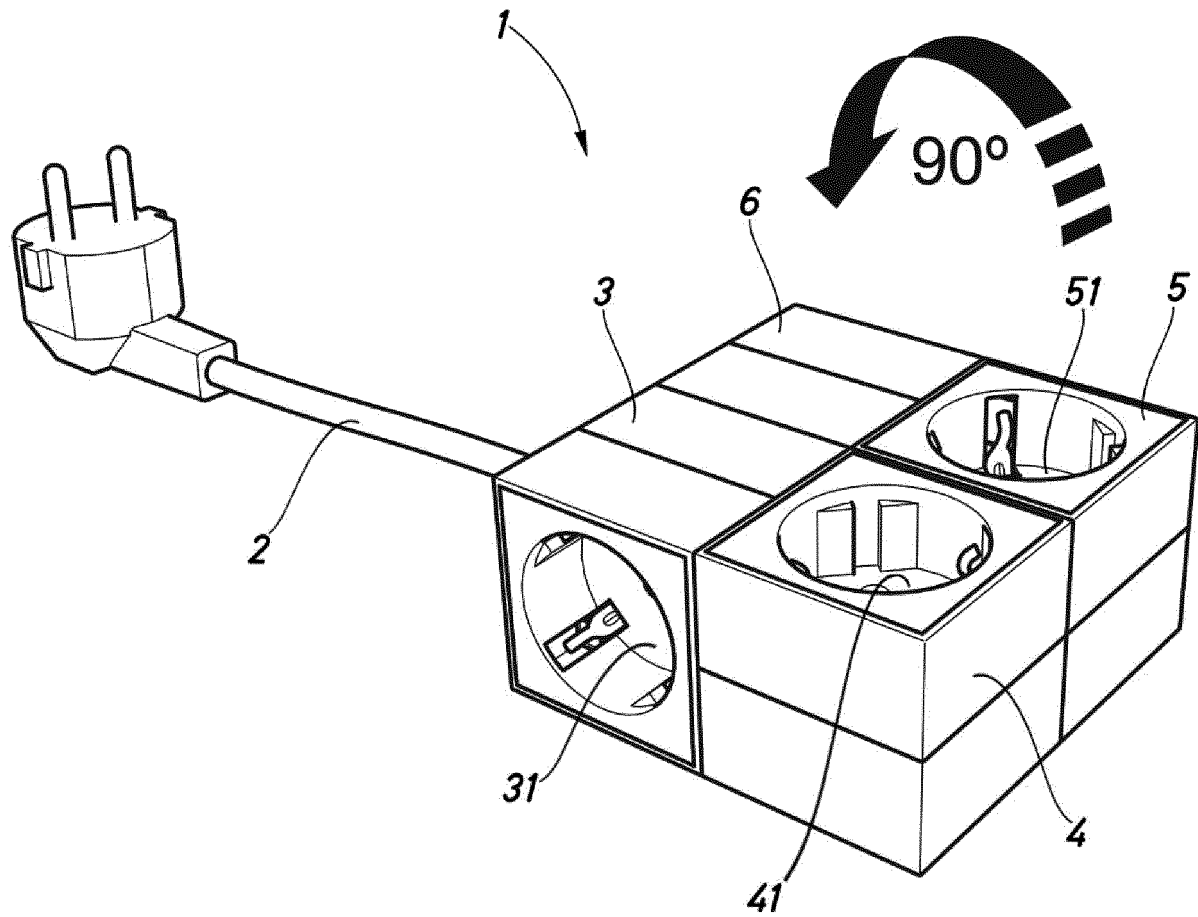


Fig.5

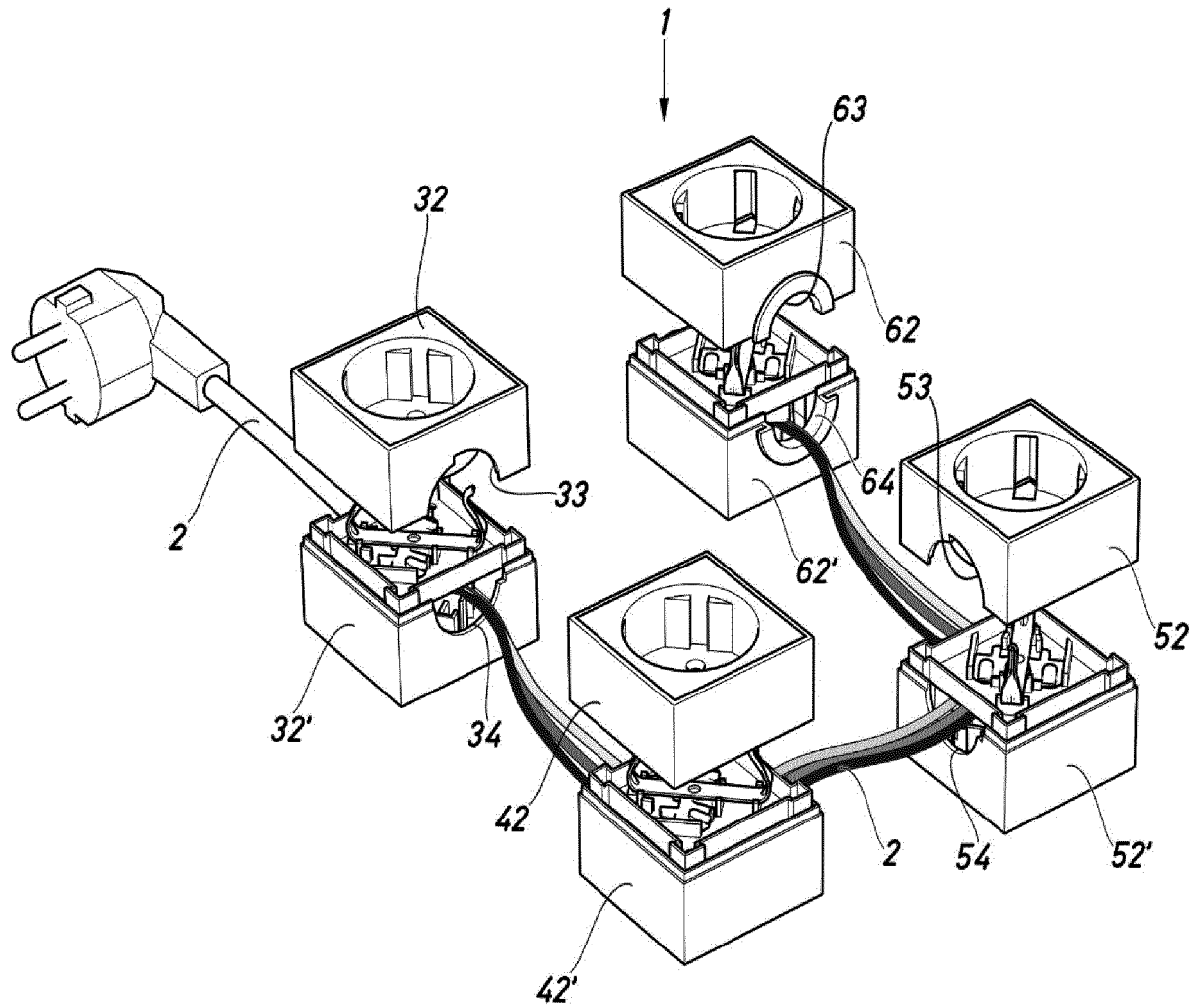


Fig.6

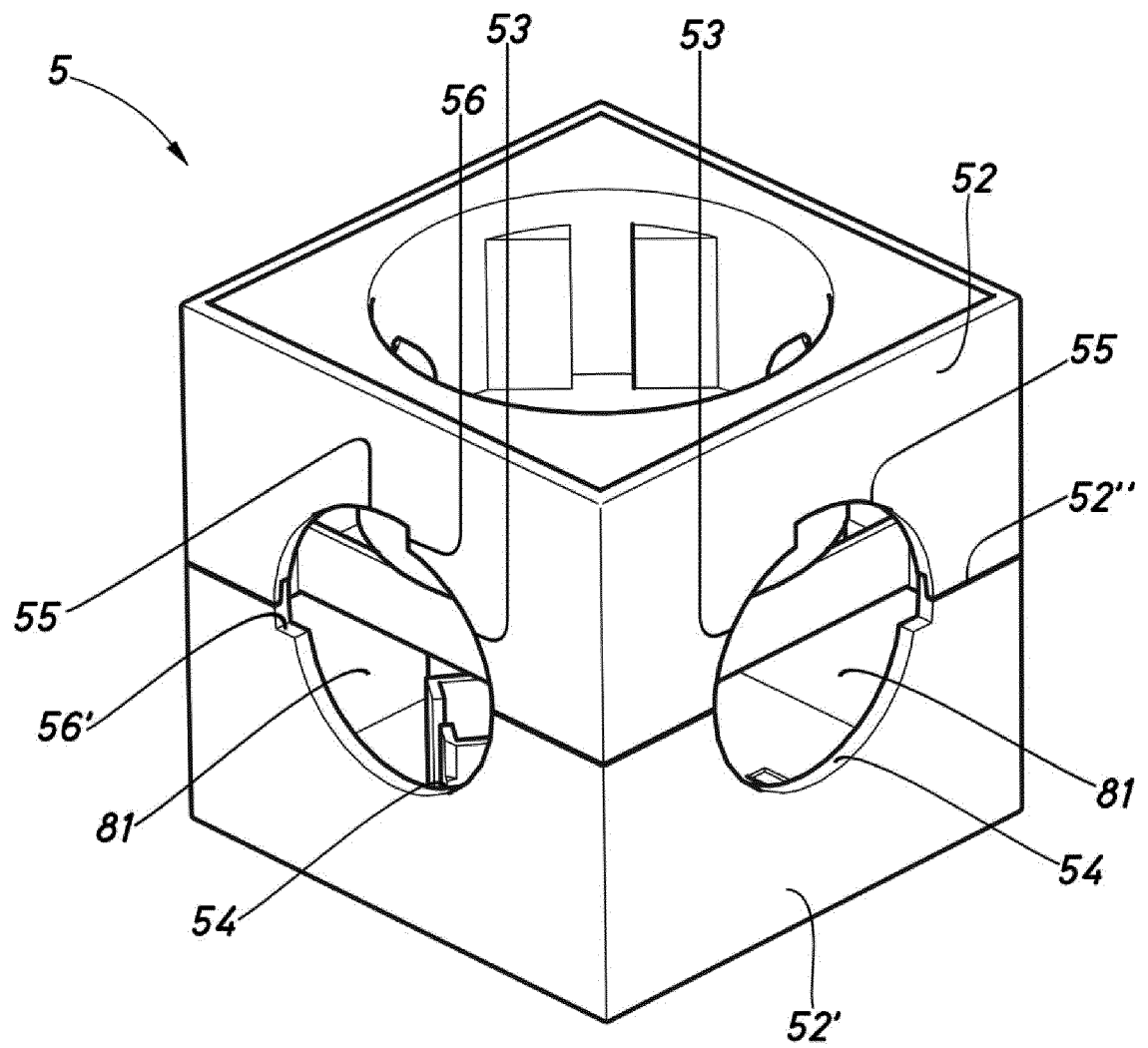


Fig.7

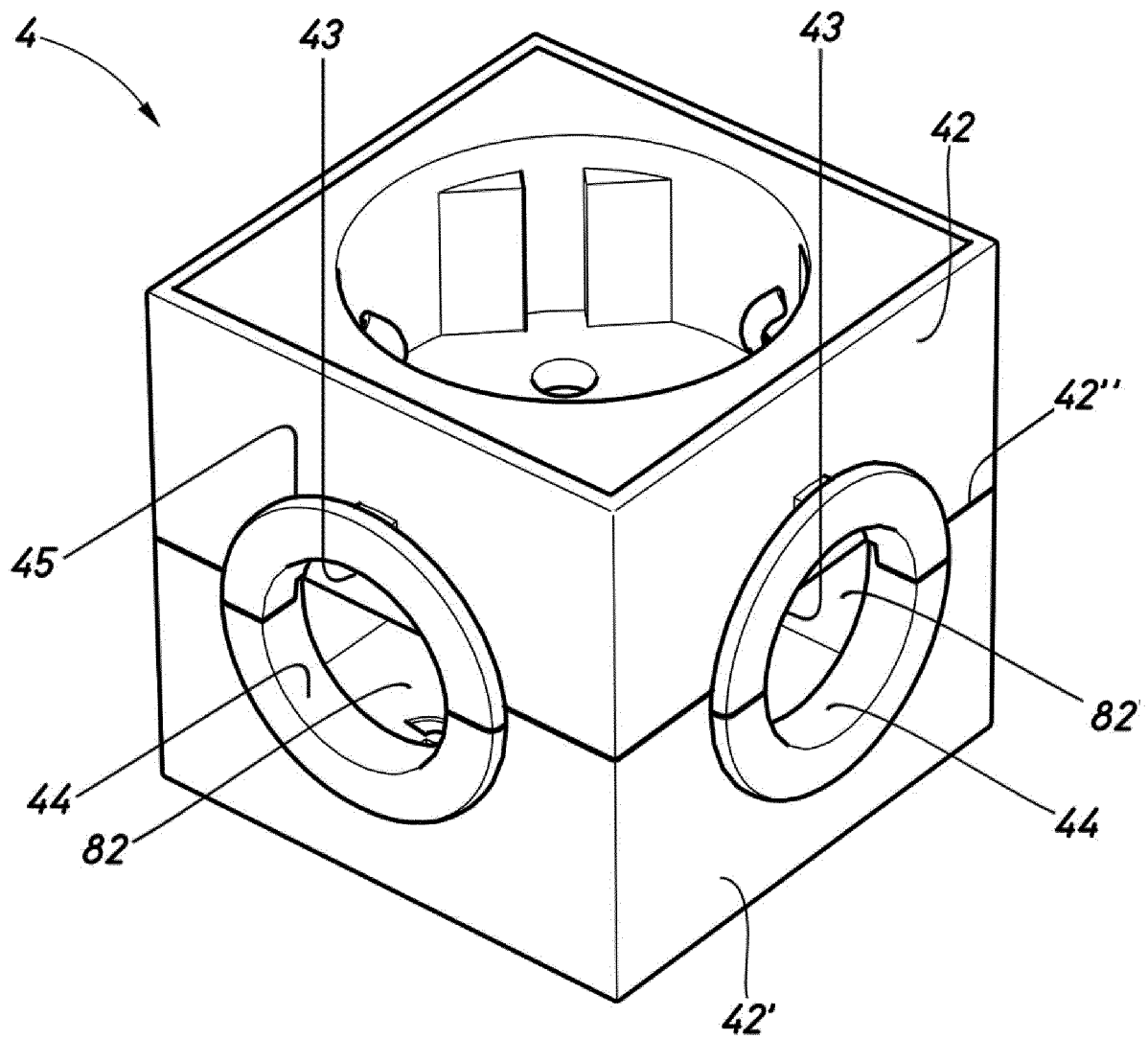


Fig.8

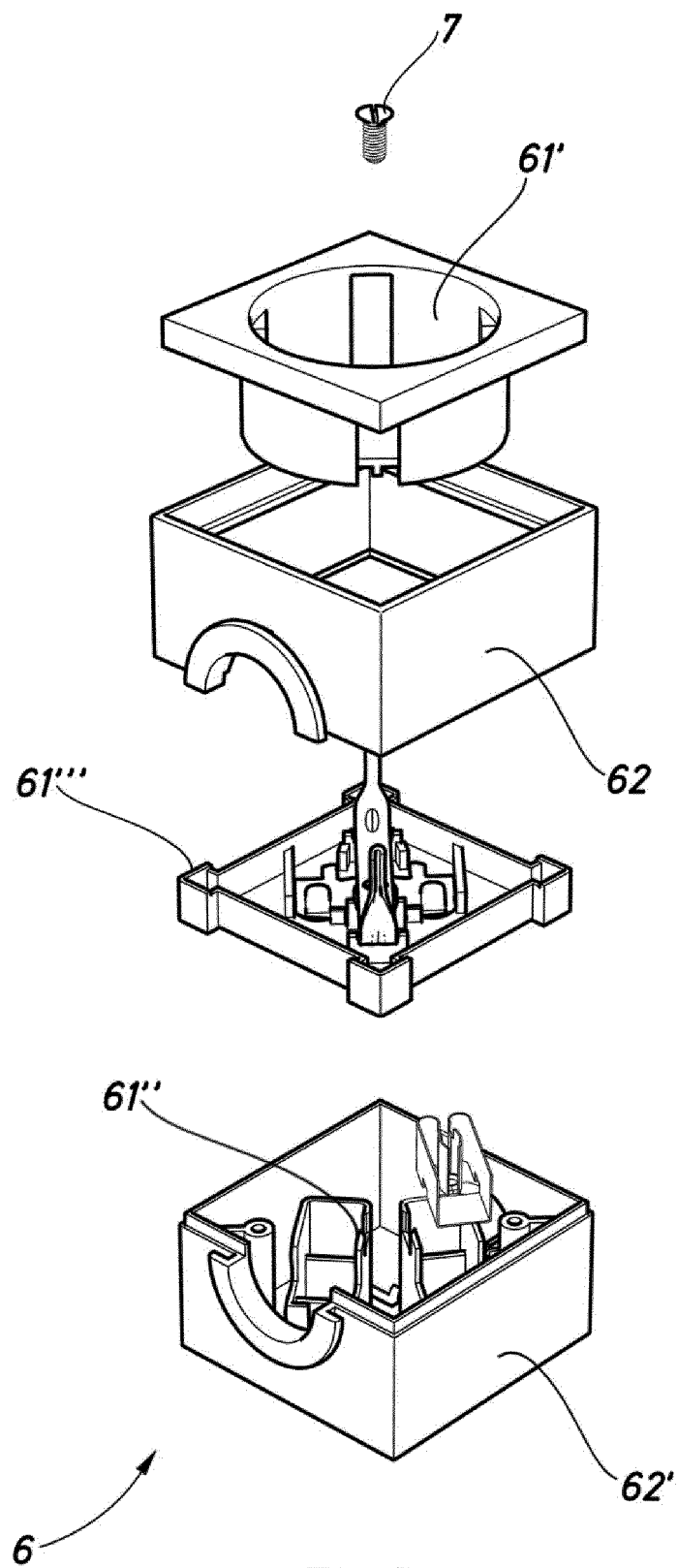


Fig.9

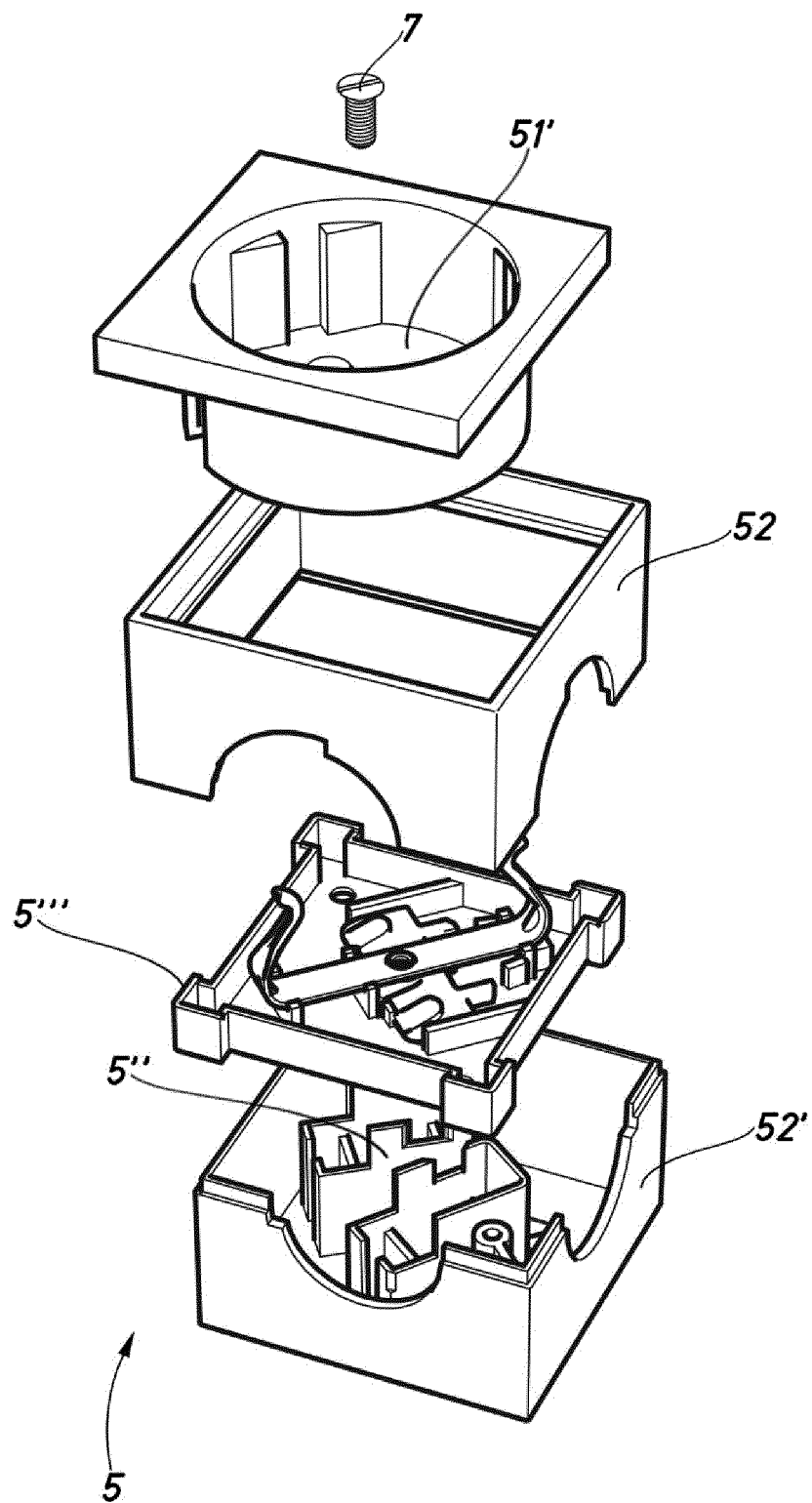


Fig.10

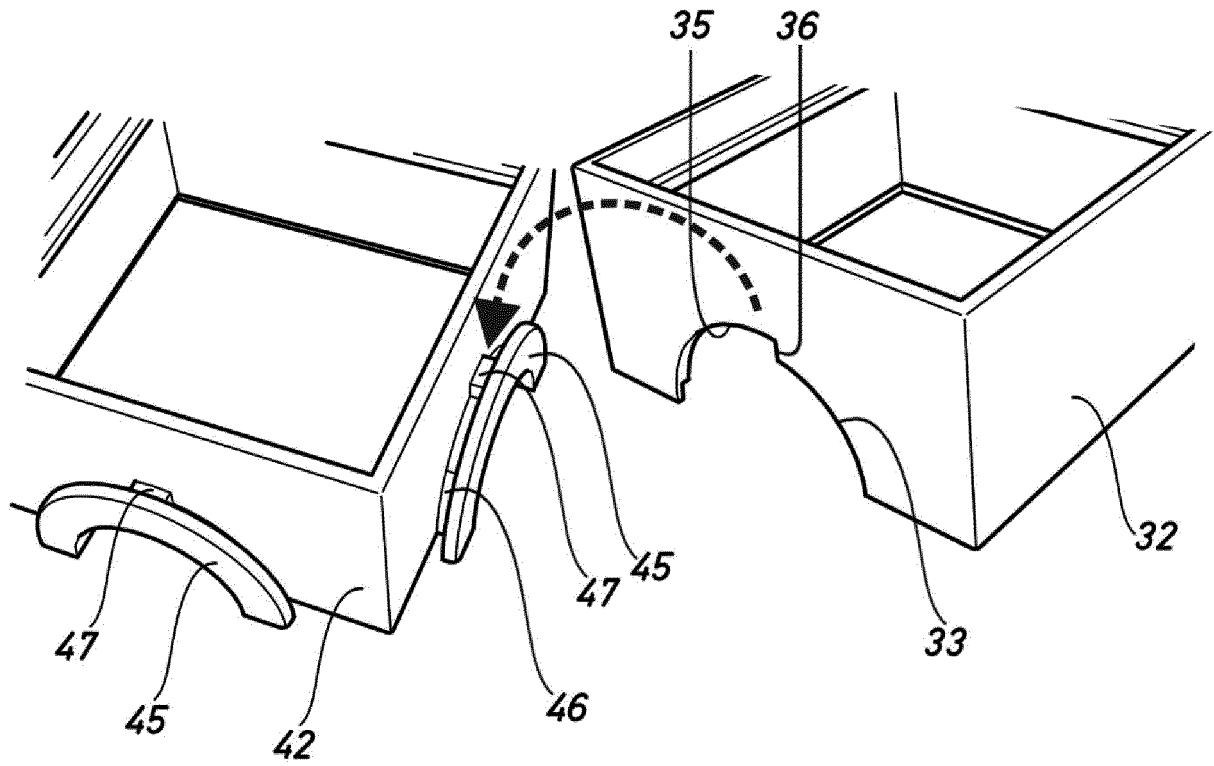


Fig.11

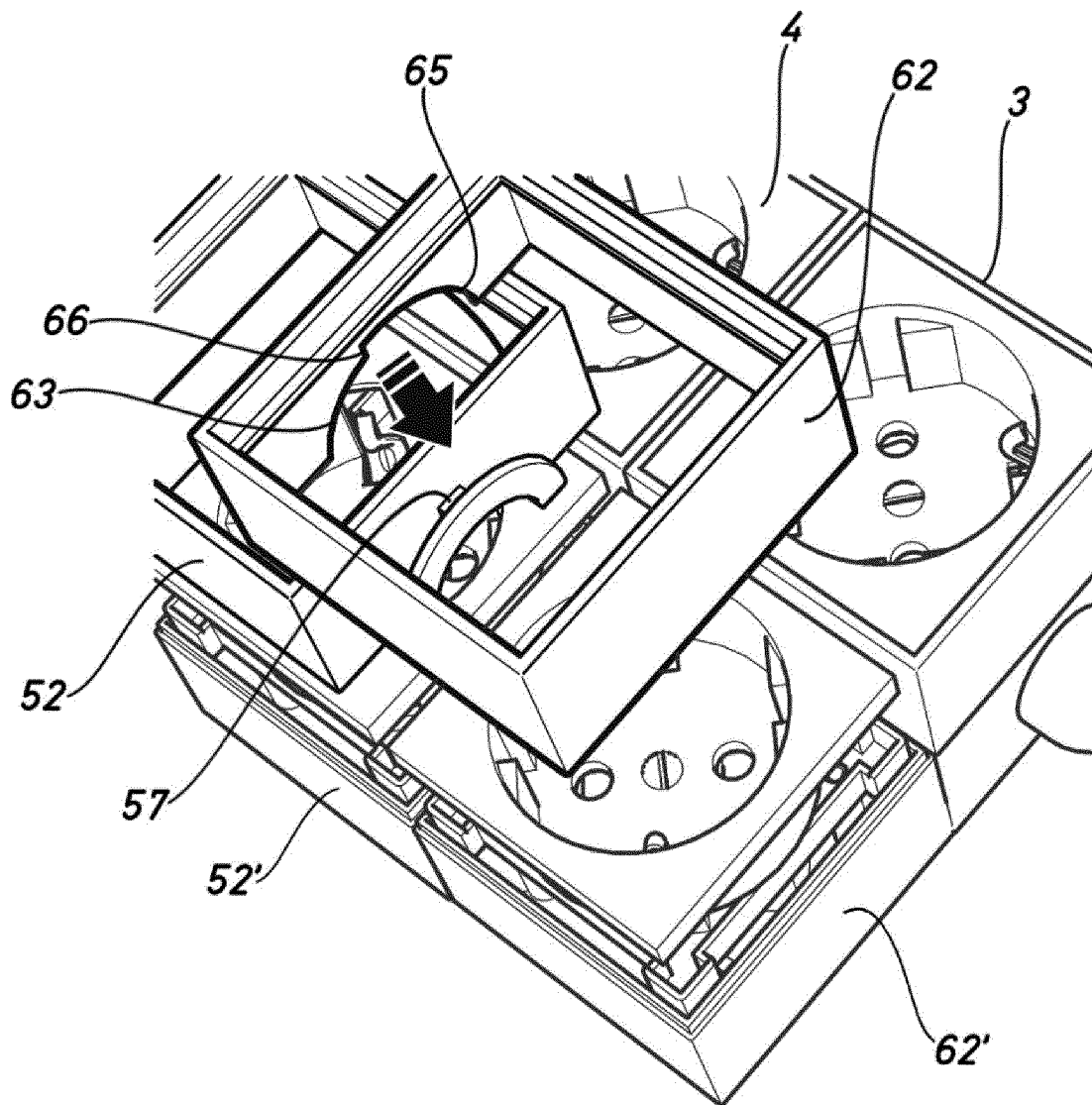


Fig.12

INTERNATIONAL SEARCH REPORT

International application No
PCT/ES2016/070724

A. CLASSIFICATION OF SUBJECT MATTER

INV. H01R25/00 H01R35/04
ADD. H01R13/514

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
H01R

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

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X	US 2008/305693 A1 (MEI TZU-CHIANG [TW] ET AL) 11 December 2008 (2008-12-11) abstract; figures 1-13 -----	1,9-11
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	-/-	

☒ Further documents are listed in the continuation of Box C.

☒ See patent family annex.

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Date of the actual completion of the international search

30 January 2017

Date of mailing of the international search report

07/02/2017

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INTERNATIONAL SEARCH REPORT

International application No
PCT/ES2016/070724

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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Form PCT/ISA/210 (continuation of second sheet) (April 2005)

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

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REFERENCES CITED IN THE DESCRIPTION

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