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Remarks:
Amended claims in accordance with Rule 137(2) EPC.

(54) **Plug-Guiding attachment and electrical connector comprising the same**

(57) The present invention relates to a plug-guiding attachment (4) for rotatably orientating a plug element (2) with respect to a receptacle (8) of a mating plug element (3), the plug-guiding attachment (4) adapted to be positioned before the receptacle (8) in a plug-in direction (P) of the plug element (2). Further, the present invention relates to an electrical plug-in connector (1) comprising such a plug-guiding attachment (4) or being provided with a socket (14) for such a plug-guiding attachment (4). In order to facilitate a predetermined orientation of the plug element (2) with respect to the receptacle (8), the present invention provides that the plug-guiding attachment (4) has a passage (23) having an inner contour (24) defining a predetermined rotational orientation of the plug element (2) with respect to the plug-guiding attachment (4) about a rotation axis (R) of the plug element (2), the rotation axis (R) extending parallel to the plug-in direction (P).

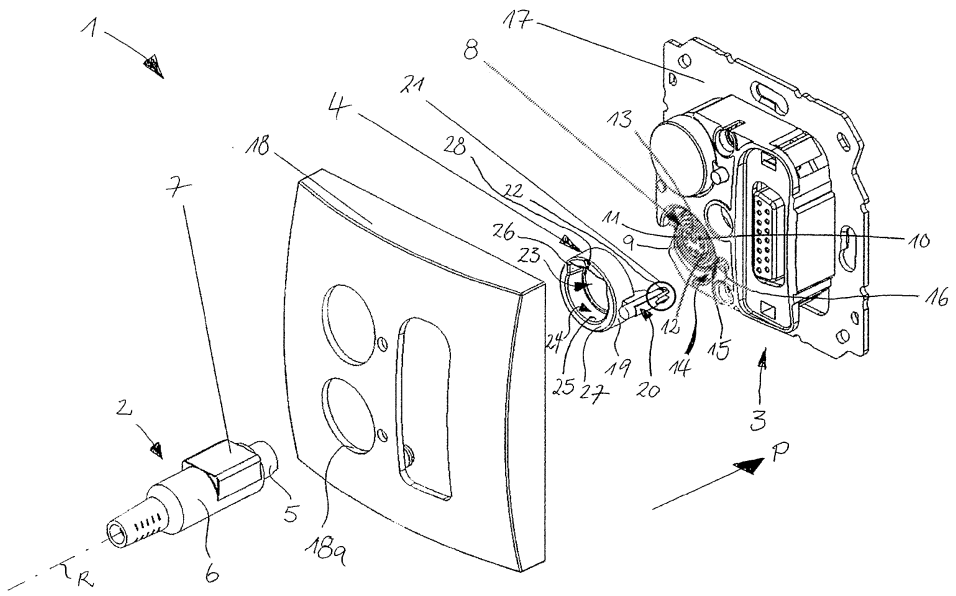

Fig. 1

EP 2 388 866 A1

Description

[0001] The present invention relates to a plug-guiding attachment for rotatably orientating a plug element with respect to a receptacle of a mating plug element, the plug-guiding attachment adapted to be positioned before the receptacle in a plug-in direction of the plug element.

[0002] Further, the present invention relates to an electrical plug-in connector comprising a receptacle for an electric plug element.

[0003] Moreover, the present invention relates to an electrical plug-in connector comprising a plug-guiding attachment positioned before a receptacle for a plug element in a plug-direction of the plug element.

[0004] Plug-guiding attachments, electrical plug-in connectors comprising receptacles for such attachments or comprising these attachments are known in the form of simple collars surrounding a receptacle (e.g. a mini-DIN plug receptacle) extending therefrom against the plug-in direction. These plug-guiding attachments laterally support a plug during its insertion into the receptacle.

[0005] However, especially with a configuration based on a rotational symmetry, e.g. circular plugs and respective circular receptacles, it may be difficult to correctly orientate the plug element with respect to the receptacle. This is especially the case with so called mini-DIN plugs for example. These plugs are only keyed and coded by their plug face and are rather small. Hence, a certain skill and sense is required to correctly insert these plugs into their receptacles. Their plugging is further complicated by receptacles which are located where they are hard to reach or to see. Thus, in particular elder or handicapped people may not be able to correctly insert the plug by their own and therefore may need assistance.

[0006] In view of the disadvantages of the prior art mentioned above, an object underlying the invention is to facilitate correctly orientating a plug element with respect to the receptacle.

[0007] This object is achieved according to the invention for the plug-guiding attachment mentioned in the beginning of the introduction in that the plug-guiding attachment comprises at least one fastening organ defining a predetermined orientation of the plug-guiding attachment with respect to the receptacle, and a passage having an inner contour defining a predetermined rotational orientation of the plug element with respect to the plug-guiding attachment about a rotation axis of the plug element, the rotation axis extending parallel to the plug-in direction.

[0008] For a plug-in connector mentioned in the beginning of the description, comprising a receptacle for an electric plug element, the object is achieved according to the present invention in that the receptacle is provided with a plug-guiding attachment socket complementing a plug-guiding attachment according to the present invention.

[0009] In respect to the electrical plug-in connector mentioned in the beginning of the description, comprising a plug-guiding attachment, the object is achieved in that the plug-guiding attachment provides a passage having an inner contour defining a predetermined rotational orientation of the plug element with respect to the plug-guiding attachment about a rotation axis of the plug element, the rotation axis extending parallel to the plug-in direction.

[0010] These solutions provide that not the plug face, but rather an outer circumference of the plug element may be used to find a predetermined, i.e. correct or proper orientation of the plug element with respect to the receptacle. The outer circumference may be more handy and sturdy than the plug face. This facilitates sensing a correct rotational orientation of the plug element with respect to the receptacle. The plug element may therefore be designed such that its outer contour is adapted to match with a pattern and moreover a coding provided by the plug-guiding attachment for finding a predetermined correct orientation and a clear assignment of the plug element with respect to the receptacle. The correct orientation and clear assignment assure that the plug element and the mating plug element are intermate-able and operable when fully mated. Still, plug elements having an outer contour which is not adapted to match the plug-guiding attachment may be compatible to the receptacle in that they may simply reach through the plug-guiding attachment without any rotational orientating engagement therewith.

[0011] The solutions according to the invention can be combined as desired and further improved by the following further embodiments that are advantageous on their own in each case:

[0012] According to a first possible further embodiment of a plug-guiding attachment according to the present invention, the inner contour can be designed to engage an electrically insulating outer housing body of the plug element. Hence, mechanical stresses on the conductive parts of the plug face may be reduced.

[0013] Mechanical stresses may further be reduced, when according to another possible embodiment of a plug-guiding attachment according to the present invention it is provided that an inner contour provides a pattern for the orientation of the plug element by being adapted to engage a handling section of the plug element. This facilitates coarsely orientating the plug element with respect to the receptacle before insertion because the handling section may comprise an indication for the correct orientation which may also be implemented on the plug-guiding attachment. During insertion, the pattern assures a precise alignment of the plug element in order to be precisely inserted into the receptacle. Further, the pattern may provide a coding of the plug element, i.e. that only a certain type of plug element and a respective plug-guiding attachment match.

[0014] Pre-orientating the plug element with respect to the receptacle may be further facilitated according to another possible embodiment of a plug-guiding attachment in that a depth of the passage measured parallel to the plug-in direction exceeds a length of contact pins

and/or a protective collar arranged around these contact pins. For example, mini-DIN plugs have such a metal collar arranged around their contact pins. This embodiment provides that when inserting the plug element into the receptacle, first the electrically insulating outer housing body of the plug element engages with the plug-guiding attachment and then the collar and the pins contact the receptacle. This helps to prevent someone trying to find a correct orientation of the plug element by poking and scrubbing with the plug face on the receptacle in a rotative manner.

[0015] Defining a correct orientation of the plug-guiding attachment with respect to the receptacle may be easily achieved, when according to another possible embodiment of the plug-guiding attachment it is provided that the fastening organ is arranged at an outer circumference of the plug-guiding attachment. Thereby, the fastening organ may provide a coding of the plug-guiding attachment with respect to a plug-guiding attachment socket. The arrangement of the fastening organ at the outer circumference may render the plug-guiding attachment asymmetric in a way that an unequivocal correct orientation of the plug-guiding attachment with respect to the socket is defined.

[0016] A plug-guiding attachment according to the present invention may easily be fixed to a plug-in connector when the fastening organ is provided with a latching element. This possible embodiment enables to easily fix the plug-guiding attachment without assistive equipment or auxiliary means.

[0017] According to another possible embodiment of a plug-guiding attachment according to the present invention, the fastening organ may comprise a latching pin. This latching pin may protrude from the outer circumference of the plug-guiding attachment. The latching pin may be complemented by a socket for the fastening organ.

[0018] A correct rotational orientation of the plug element with respect to the plug-guiding attachment may, according to another possible embodiment of a plug-guiding attachment, be easily provided in that the inner contour in a projection along the plug-in direction has at least one rounded section and at least one angular section. This renders the inner contour asymmetric and provides a distinct pattern and furthermore a coding of the plug element with respect to the plug-guiding attachment.

[0019] A plug-guiding attachment according to the present invention may be especially adapted to mini-DIN-sockets, when according to another possible embodiment it is provided that the plug-guiding attachment has the shape of an annular collar designed to fit around a mini-DIN-socket. Thereby, the plug-guiding attachment may extend the receptacle provided by the mini-DIN-socket.

[0020] A plug-guiding attachment according to the present invention may be easily manufactured if according to another further embodiment it is provided that it is formed of plastic in one piece.

[0021] An electrical plug-in connector according to the present invention, comprising a receptacle for an electric plug element, may be further improved in that a fastening organ socket is formed at an outer circumference of the plug-guiding attachment socket. Thereby, a correct orientation of the plug-attachment with respect to the plug-guiding attachment socket may be unequivocally defined.

[0022] An electrical plug-in connector according to the present invention may be especially suited for mini-DIN-sockets, when it is provided that the plug-guiding attachment socket surrounds a mini-DIN-socket.

[0023] The invention will be described in more detail by way of example hereinafter using advantageous embodiments and with reference to the drawings. The described embodiments are only possible configurations in which the individual features may however, as described above, be implemented independently of each other or may be omitted. Corresponding elements illustrated in the drawings are provided with the same reference signs. Parts of the description relating to the same elements illustrated in different drawings are omitted. In the drawings:

Fig. 1 is a schematic perspective exploded view of an electrical plug-in connector according to an embodiment of the present invention;

Fig. 2 is a schematic perspective view of the plug-in connector shown in Fig. 1 in an assembled state; and

Fig. 3 is a schematic perspective cross-sectional view along the cross-sectional line X-X in Fig. 2.

[0024] As shown in Fig. 1, an electrical plug-in connector 1 according to the present invention comprises a plug element 2, a mating plug element 3 and a plug-guiding attachment 4. The plug element 2 comprises a plug section 5 which protrudes from an outer housing body 6 in a plug-in direction P of the connector 1 and also of the plug element 2. The plug-section 5 may comprise a conductive collar in the form of a circular shielding metal skirt surrounding several contact pins as known for example from mini-DIN connectors having a 9.5 mm diameter. These connectors come in seven patterns and comprise a number of pins from three to nine. The seven patterns are well known in the state of the art as they are official standards, each having their distinct plug faces defined by their collar, notches and metallic additions.

[0025] The housing body 6 has an essentially circular cross-section in a middle part but is provided with a handle 7 in the vicinity of the plug-section, such that there the cross-section of the plug element has a circular and a cornered portion. The handle 7 is flattened at the top. Further, the housing body 6 is provided with a strain relief which is adapted to enclose a cable (not shown) attached to the plug element 2.

[0026] The flat zone of the handle 7 may provide a pattern for sensing a correct orientation of the plug element 2 with respect to the plug-guiding attachment 4 before insertion. Furthermore, during insertion the flattened zone may provide a guidance assuring that the correct rotational orientation is maintained. A rotation axis R of the plug element 2 runs through the center of the circular portion of the housing body and through the center of the plug-section 5.

[0027] The mating plug element 3 is provided with a receptacle 8 complementing the plug-section 5 of the plug element 2. The receptacle 8 has the form of a mini-DIN-socket having a plug face 9 with several contact pin sockets 10 for accommodating the contact pins (not yet shown) of the plug element 2. Further, the plug face 9 is provided with a notch 11 for accommodating a key provided in the plug-section 5.

[0028] The plug face 9 is surrounded by an essentially circular collar socket 12 formed as a receptacle for the collar, e.g. the circular shielding metal skirt of the plug-section 5. The collar socket is provided with a coding keyway 13 adapted to accommodate a collar key (not shown) formed at the collar of the plug-section 5.

[0029] The receptacle 8 is surrounded by a plug-guiding attachment socket 14 which opens towards the plug-in direction P. At an outer circumference 15 of the plug-guiding attachment socket 14, a fastening organ socket 16 is provided which also opens towards the plug-in direction P.

[0030] Further, the mating plug element is provided with a wall mounting plate 17 for mounting the mating plug element 3 to a wall and a face plate 18 for covering the mating plug element 3. The face plate 18 is provided with an aperture 18a through which the plug element 2 may be inserted into the receptacle 8.

[0031] The plug-guiding attachment 4 has an essentially circular outer contour 19 which could have any other suitable shape instead of being circular. At the outer contour 19, the plug-guiding attachment 4 is provided with a fastening organ 20 which at least sectionwise comprises or has the form of a latching pin 21. The fastening organ 20 protrudes from the outer contour 19 perpendicularly to the plug-in direction P and extends from the plug-in guiding attachment 4 in the plug-in direction P.

[0032] A passage 23 of the plug-guiding attachment 4 provides a lead-through for the plug element 2. The passage 23 has an inner contour 24. The inner contour 24 has a rounded section 25 and an angular, i.e. cornered section 26 which together are designed to complement the outer contour of the plug element in the area of the handle 7. Between the inner contour 24 and the outer contour 19, a rim 27 is formed, which faces towards the plug-in direction P and has an indication 28 indicating a correct rotational orientation of the plug element 2 with respect to the mating plug element 3.

[0033] Fig. 2 shows the plug-in connector 1 in an end-position E, where the mating plug element 3 is fully assembled, the plug-guiding attachment 4 sits within the plug-guiding attachment socket 14. The plug element 2 is plugged through the passage 23 into the receptacle 8, such that the collar of the plug-section 5 sits within the collar socket 12 and the contact pins sit within the contact pin sockets 10.

[0034] Fig. 3 shows the plug-in connector 1 in a near-end position N on the cross-section line X-X depicted in Fig. 2. In the near-end-position N, the plug element 2 is aligned with the plug-guiding attachment 4 such that a front edge 29 of the handle 7 is on the same level with the rim 27 in the plug-in direction P. This can especially be seen in detail A.

[0035] In the near-end position N, the collar 30 of the plug-section 5 is partly inserted into the collar socket 12 and contact pins 31 of the plug element 2 are not yet inserted into the contact pin sockets 10, i.e. their tips are positioned in the plug-in direction P just before the contact pin sockets 10. The arrangement of the contact pins 31 before entering the contact sockets 10 may best be seen in detail B.

[0036] In the near-end position N, the plug element 2 may still be turned around a rotational axis running parallel to the plug-in direction P. Hence, the front edge 29 at the outer housing 6 of the plug element 2 may be used to rotatably orientate the plug element 2 with respect to the plug-guiding attachment 4 and hence with respect to the receptacle 8. Thus, the plug-guiding attachment 4 provides that the plug-in connector 1 is not only guided as well as coded by the receptacle 8 and the plug-section 5, as usual, but further guided and coded by the inner contour 24 of the passage 23 and the outer contour of the housing body 6.

[0037] As an advantageous feature, when plugging the plug element 2, the outer body 6, in particular the edge 29, engages with the passage 23, before the contact pins 31 and/or the collar 30 reaches the plug face 9. This is achieved in that a depth d of the passage 23, i.e. a length of the passage 23 measured in the plug-in direction P, exceeds a length of the contact pins 31 and/or the collar 30 protruding from the front edge 29.

[0038] Further, the receptacle 8 is mounted to a printed circuit board 32. The plug-guiding attachment 4 helps to prevent that the plug element 2 reaches the receptacle 8 with a wrong orientation which could lead to mechanical stresses composed on the plug face 9 and transferred to the printed circuit board 32.

[0039] Deviations from the above described embodiments of a plug-in connector 1 according to the invention are possible within the inventive idea:

[0040] The plug element 2 and the mating plug element 3 may be designed as a plug socket as necessary. The plug-guiding attachment 4 may be integrally formed, i.e. manufactured as one piece with the mating plug element 3, e.g. as a part of the face plate 18 or as a form of extension of the receptacle 8.

[0041] The housing body 6, which is made of electrically insulating material, may have other cross-sectional shapes illustrated herein for providing a keyed and coded

plugging pattern. Accordingly, the inner contour 24 should be designed to complement the contour of the housing body 6 such that a correct orientation of the plug element 2 with respect to the receptacle 8 is provided.

[0042] The plug face 9 may be provided with as many contact pin sockets 10, notches 11 and collar sockets 12 in whatsoever form suitable for the desired application. The plug-guiding attachment socket 14 may be matched to the outer contour 19 of the plug-guiding attachment 4 in any way suitable for providing a correct orientation of the plug-guiding attachment 4 with respect to the receptacle 8. It is advantageous if the outer contour 19 is rendered asymmetric by a one-sided fastening organ 20 which thereby defines an unequivocal right way, i.e. correct orientation of the plug-guiding attachment 4 with respect to the socket 8.

[0043] The fastening socket 15 and the fastening organ 20 may have any complementary form which is advantageous for affixing the plug-guiding attachment 4. Hence, the fastening organ 20 may be designed or provided with a latching pin 21 and a latching element 22 as desired for locking the plug-guiding attachment 4 in a mounted position as shown in Fig. 3.

Claims

1. Plug-guiding attachment (4) for rotatably orientating a plug element (2) with respect to a receptacle (8) of a mating plug element (3), the plug-guiding attachment (4) adapted to be positioned before the receptacle (8) in a plug-in direction (P) of the plug element (2), **characterized in that** the plug-guiding attachment (4) comprises at least one fastening organ (20) defining a predetermined orientation of the plug-guiding attachment (4) with respect to the receptacle (8), and a passage (23) having an inner contour (24) defining a predetermined rotational orientation of the plug element (2) with respect to the plug-guiding attachment (4) about a rotation axis (R) of the plug element (2), the rotation axis extending parallel to the plug-in direction (P).

2. Plug-guiding attachment (4) according to claim 1, **characterized in that** the inner contour (24) is designed to engage an electrically insulating outer housing body (6) of the plug element (2).

3. Plug-guiding attachment (4) according to claim 1 or 2, **characterized in that** the inner contour (24) provides a pattern for the orientation of the plug element (2) by being adapted to engage with a handling section (7) of the plug element (2).

4. Plug-guiding attachment (4) according to one of claims 1 to 3, **characterized in that** a depth (d) of the passage (23) measured parallel to the plug-direction (P) exceeds a length of contact pins (31) and/or a protective collar (40) arranged around these contact pins (31).

5. Plug-guiding attachment (4) according to one of claims 1 to 4 above, **characterized in that** the fastening organ (20) is arranged at an outer circumference (19) of the plug-guiding attachment (4).

6. Plug-guiding attachment (4) according to one of claims 1 to 5 above, **characterized in that** the fastening organ (20) protrudes from the plug-guiding attachment (4) in the plug-in direction (P).

7. Plug-guiding attachment (4) according to one of claims 1 to 6 above, **characterized in that** the fastening organ (20) is provided with a latching element (22).

8. Plug-guiding attachment (4) according to one of claims 1 to 7 above, **characterized in that** the fastening organ (20) comprises a latching pin (21).

9. Plug-guiding attachment (4) according to one of claims 1 to 8 above, **characterized in that** the inner contour (24) in a projection along the plug-in direction (P) has at least one rounded section (25) and at least one angular section (26).

10. Plug-guiding attachment (4) according to one of claims 1 to 9 above, **characterized in that** the plug-guiding attachment (4) has the shape of an annular collar designed to fit around a mini-DIN-socket.

11. Plug-guiding attachment (4) according to one of claims 1 to 10 above, **characterized in that** the plug-guiding attachment (4) is formed of plastic in one piece.

12. Electrical plug-in connector (1) comprising a receptacle (8) for an electric plug element (2), **characterized in that** the receptacle (8) is provided with a plug-guiding attachment socket (14) complementing a plug-guiding attachment (4) according to one of claims 1 to 11 above.

13. Electrical plug-in connector (1) according to claim 12, **characterized in that** a fastening organ socket (16) is formed at an outer circumference of the plug-guiding attachment socket (14).

14. Electrical plug-in connector (1) according to claim 12 or 13, **characterized in that** the plug-guiding attachment socket (14) surrounds a mini-DIN-socket.

15. Electrical plug-in connector (1) comprising a plug-guiding attachment (4) positioned before a receptacle (8) for a plug element (2) in a plug-in direction (P) of the plug element (2), **characterized in that**

the plug-guiding attachment (4) provides a passage (23) having an inner contour (24) defining a predetermined rotational orientation of the plug element (2) with respect to the plug-guiding attachment (4) about a rotation axis (R) of the plug element (2), the rotation axis (R) extending parallel to the plug-in direction (P).

Amended claims in accordance with Rule 137(2) EPC.

1. Plug-guiding attachment (4) for rotatably orientating a plug element (2) with respect to a receptacle (8) of a mating plug element (3), the plug-guiding attachment (4) adapted to be positioned before the receptacle (8) in a plug-in direction (P) of the plug element (2), wherein the plug-guiding attachment (4) comprises at least one fastening organ (20) defining a predetermined orientation of the plug-guiding attachment (4) with respect to the receptacle (8), and a passage (23) having an inner contour (24) defining a predetermined rotational orientation of the plug element (2) with respect to the plug-guiding attachment (4) about a rotation axis (R) of the plug element (2), the rotation axis extending parallel to the plug-in direction (P), **characterized in that** the fastening organ (20) protrudes from the plug-guiding attachment (4) in the plug-in direction (P).

2. Plug-guiding attachment (4) according to claim 1, **characterized in that** the inner contour (24) is designed to engage an electrically insulating outer housing body (6) of the plug element (2).

3. Plug-guiding attachment (4) according to claim 1 or 2, **characterized in that** the inner contour (24) provides a pattern for the orientation of the plug element (2) by being adapted to engage with a handling section (7) of the plug element (2).

4. Plug-guiding attachment (4) according to one of claims 1 to 3, **characterized in that** a depth (d) of the passage (23) measured parallel to the plug-direction (P) exceeds a length of contact pins (31) and/or a protective collar (40) arranged around these contact pins (31).

5. Plug-guiding attachment (4) according to one of claims 1 to 4 above, **characterized in that** the fastening organ (20) is arranged at an outer circumference (19) of the plug-guiding attachment (4).

6. Plug-guiding attachment (4) according to one of claims 1 to 5 above, **characterized in that** the fastening organ (20) is provided with a latching element (22).

7. Plug-guiding attachment (4) according to one of claims 1 to 6 above, **characterized in that** the fastening organ (20) comprises a latching pin (21).

8. Plug-guiding attachment (4) according to one of claims 1 to 7 above, **characterized in that** the inner contour (24) in a projection along the plug-in direction (P) has at least one rounded section (25) and at least one angular section (26).

9. Plug-guiding attachment (4) according to one of claims 1 to 8 above, **characterized in that** the plug-guiding attachment (4) has the shape of an annular collar designed to fit around a mini-DIN-socket.

10. Plug-guiding attachment (4) according to one of claims 1 to 9 above, **characterized in that** the plug-guiding attachment (4) is formed of plastic in one piece.

11. Electrical plug-in connector (1) comprising a receptacle (8) for an electric plug element (2), **characterized in that** the receptacle (8) is provided with a plug-guiding attachment socket (14) complementing a plug-guiding attachment (4) according to one of claims 1 to 10 above.

12. Electrical plug-in connector (1) according to claim 11, **characterized in that** a fastening organ socket (16) is formed at an outer circumference of the plug-guiding attachment socket (14).

13. Electrical plug-in connector (1) according to claim 11 or 12, **characterized in that** the plug-guiding attachment socket (14) surrounds a mini-DIN-socket.

14. Electrical plug-in connector (1) comprising a plug-guiding attachment (4) positioned before a receptacle (8) for a plug element (2) in a plug-in direction (P) of the plug element (2) wherein the plug-guiding attachment (4) provides a passage (23) having an inner contour (24) defining a predetermined rotational orientation of the plug element (2) with respect to the plug-guiding attachment (4) about a rotation axis (R) of the plug element (2), the rotation axis (R) extending parallel to the plug-in direction (P), and wherein the plug-guiding attachment (4) comprises a fastening organ (20) defining a predetermined orientation of the plug-guiding attachment (4) with respect to the receptacle (8) **characterized in that** the fastening organ (20) protrudes from the plug-guiding attachment (4) in the plug-in direction (P).

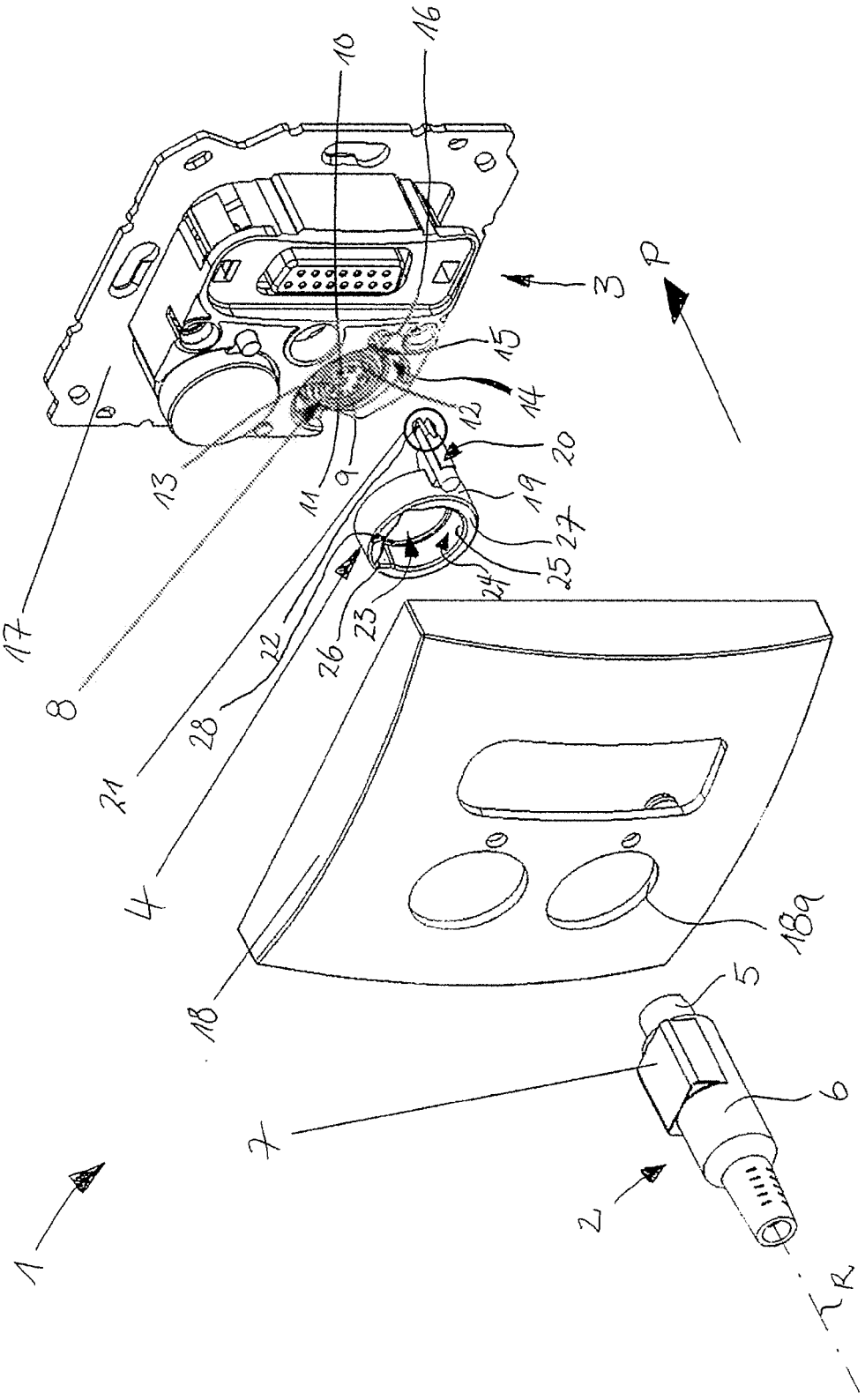
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Fig. 1

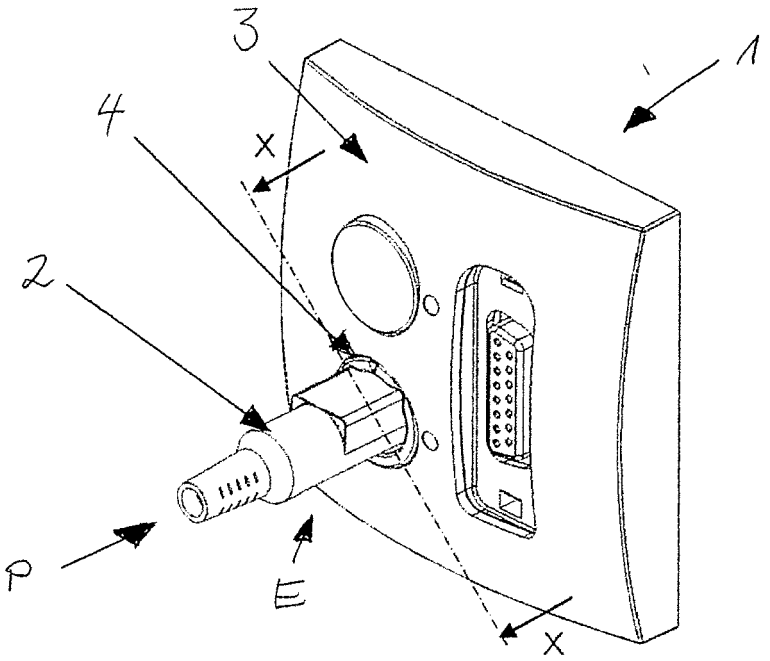

Fig. 2

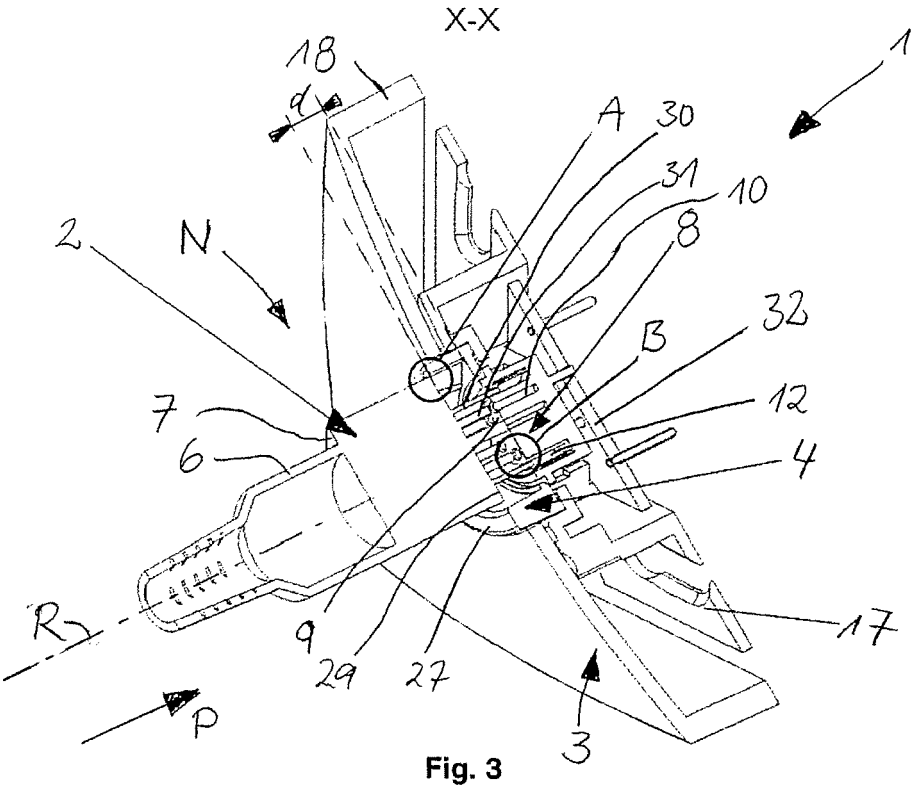

Fig. 3

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European Patent Office
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EUROPEAN SEARCH REPORT

Application Number
EP 10 16 3134

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X Y	US 6 632 107 B1 (VANBESIEN JOHAN [BE]) 14 October 2003 (2003-10-14) * column 4, line 15 - line 20; figures 2,6-8 * -----	1,5,6,9, 12,15 2-4,10	INV. H01R13/631 H01R13/645 H01R13/502 H01R13/629
Y A	EP 0 676 828 A2 (SUMITOMO WIRING SYSTEMS [JP]) 11 October 1995 (1995-10-11) * figures 1,2,3 * -----	2-4 1	H01R13/64
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TECHNICAL FIELDS SEARCHED (IPC)
H01R

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	25 August 2010	Vautrin, Florent

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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EPO FORM 1503 03.82 (P04C01)

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 10 16 3134

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
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25-08-2010

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