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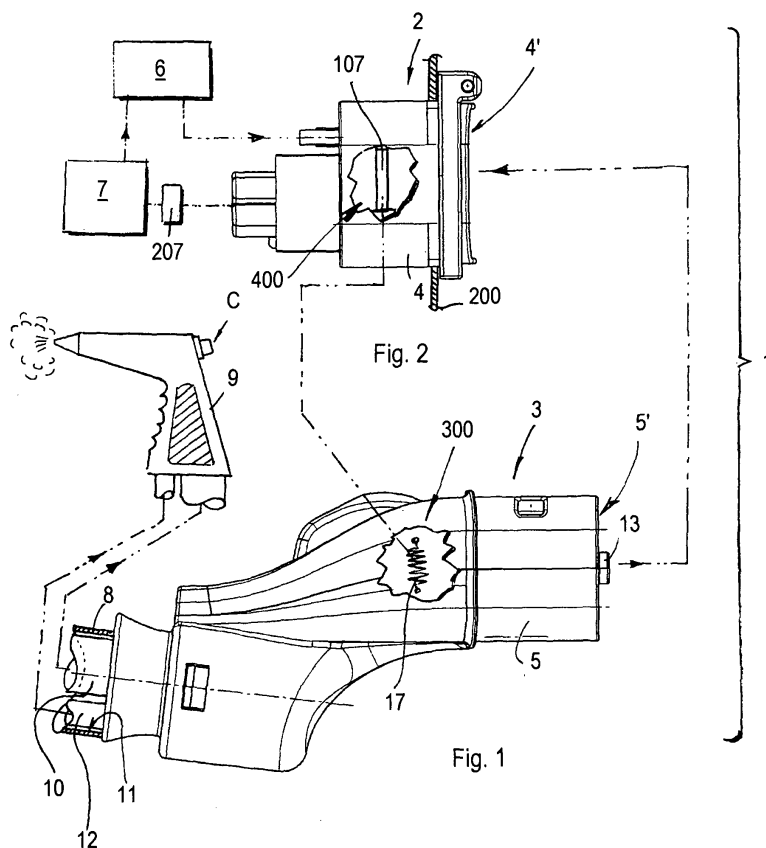
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(54) Safety electric joint

(57) The safe electric joint (1) comprises a first element (2) and a second element (3) that can be coupled to said first element (2) which is provided with recognition

means (300) for recognising said second element (3), said second element (3) being provided with detection means (400) which can be recognised by said recognition means (300).



EP 1 717 909 A2

Description

[0001] The invention refers to a safe electric joint, more specifically, a joint suitable for connecting a source of electric energy and an apparatus running on electricity like, for instance, a simple electric household appliance or something more complex which, due to how it works, also requires the supply of a fluid coming from the relative supply source.

[0002] An example of a complex appliance could be a vacuum cleaner which, besides its vacuuming action, can also remove dirt from surfaces utilising blasts of steam.

[0003] In this field, electric household appliances and industrial machines are known, used to clean surfaces, which are provided with a sucking device quite similar to those of a vacuum cleaner, and a device for the production of steam, the latter used together with the sucking device to have a more effective cleaning action.

[0004] Both the sucking and steam producing devices are installed inside a body of the electric household appliance or machine, which are provided with a flexible hose that takes the sucking and steaming action outside the electric household appliance or machine; handgrips at the ends of the hoses are fitted which are provided with a connection for connecting various cleaning accessories as well as the controls to actuate both the sucking device and the steam production device, as required.

[0005] For this reason, inside each hose is one duct for the passage of vacuumed air, a second duct for letting steam through and a third duct for the wires that transmit the commands from the handgrips to the suck and steam producing devices.

[0006] The sucking devices comprise a motor unit that turns a fan which creates a vacuuming action that is conveyed outside the hoses, going through the first duct.

[0007] The steam producing devices comprise a boiler connected to a water tank provided with heating elements and which, when the command is given, heat the water until it is transformed into steam: this steam is then conveyed outside through the second ducts in the shape of blasts sent through the end nozzles placed on the handgrips.

[0008] Steam producing devices can have different powers depending on the use for which they are intended for (domestic or industrial) and on the type of electric household appliance they are mounted on.

[0009] Fluid supply systems or vacuuming systems for user apparatus installed in buildings are also known, supplying the fluid or vacuum required to a user connection point obtained in a wall.

[0010] Both in electric household appliances or machines and user connecting points in buildings, there are connections between them and the hose that transports the fluids or vacuum to the areas where it is needed and that comprise a plug and a socket, one of which is fitted on the electric household appliance or machine or user point and the other on the connection end of the hose.

[0011] As a rule the socket is fitted on the body of the

electric household appliance or machine or user connecting point while the plug, fitted on the end of the hose, opposite the handgrip, and it is suitable for plugging into the socket.

[0012] There are electric contacts inside the plug and socket that mate when the plug is put into the socket, electricly connecting the controls on the handgrip and the suck and steam producing devices installed inside the body of the electric household appliance or machine or in the building's system; as a rule, in both the socket and plug there are parts of the ends of the duct that conveys the steam or other fluid and which, like the electric contacts, are designed to mate accurately when the plug is put into the socket.

[0013] Either the socket or plug is fitted with devices that prevent electricity and fluid being supplied when the plug is not plugged in, and the reason for this is to avoid a foreign body, like a pointed piece of metal, from accidentally touching the electric contacts when the plug is not in the socket; electricity is unable to discharge on the foreign object which someone - who is not an expert on electricity - could take hold of, resulting in a serious electrocution hazard.

[0014] The above mentioned devices include one or more micro-switches connected to the electric energy source upstream from the electric contacts of either the plug or socket, but which have end push buttons that have to be pressed to allow electricity to flow through; the micro-switches are placed normally inside the socket with the end push buttons facing outside, so that when the plug is plugged into the socket, the end push buttons are pressed by a part of the plug and the micro-switches enable electricity to flow between the electric household appliance or machine or user connecting point and the handgrip on the hose; on the other hand, when the plug is taken out, the end contact push buttons are released and the flow of electricity is interrupted automatically by the micro-switches.

[0015] The known joints do have some drawbacks: the first one is that basically micro-switches are fragile and the end push buttons are subject to damage, due to the continuous plugging in and unplugging.

[0016] Furthermore, with prolonged use, the electric contacts of the end push buttons oxidise, causing them to stick in the pressed position, leaving free passage to the flow of current from the source to the socket even when the plug has been taken out.

[0017] A further drawback is that the electric contacts are unable to modify the power of the fluid supply source, in our case steam, for the specific type of use.

[0018] The technical aim of the invention is to improve the state of technology.

[0019] One object of the invention is to make a safe electric joint that permits to control the flow of electricity between a plug of an electric household appliance or machine or user connection point and a plug which can be put in the socket and to which the appliance is connected, that will interrupt the source of electric energy

when the plug is not plugged into the socket.

[0020] Another object of the invention is to have a safe electric joint that makes it possible to recognise what type of appliance is connected to the electric energy supply source and fluid supply source so their powers can be adapted to the type of appliance connected.

[0021] According to one aspect of the invention, a safe electric joint is provided that comprises: a first element provided with first electricity conductor means and a second element provided with second electricity conductor means that can be coupled to said first element characterised in that said first element comprises recognition means for recognising a detection means.

[0022] According to another aspect of the invention, a safe electric joint is provided that comprises: a first element provided with first electricity conductor means and a second element provided with second electricity conductor means which can be coupled to said first element characterised in that said second element comprises detection means suitable for being recognised by recognition means.

[0023] Further characteristics and advantages will appear more evident from the detailed description of a preferred, but not exclusive, embodiment of a safe electric joint, illustrated by way of non limiting example in the accompanying drawings, wherein :

Figure 1 is a schematic side view of a second element of a safe electric joint;

Figure 2 is a schematic side view of a first element of a safe electric joint;

Figure 3 is a front view of the second element of Figure 1;

Figure 4 is a front view of the first element of Figure 2;

Figure 5 is a perspective view of a first element in a second embodiment;

Figure 6 is a view in perspective of a second element in a second embodiment.

[0024] With reference to the Figures, 1 designates a safe electric joint.

[0025] The safe electric joint 1 comprises a first element 2 and a second element 3 that can be mated.

[0026] According to one embodiment of the invention, the first element 2 and the second element 3 are provided with respective first electricity conductor means 310 and second electricity conductor means 320 of electric energy which can be mated.

[0027] The first electricity conductor means 310 comprises a socket 4 and the second electricity conductor means 320 comprises a plug 5 that can be plugged into the socket 4.

[0028] The socket 4 can be mounted in an electric household appliance, for instance a machine for cleaning surfaces, or can be fixed on the wall of a building; in either cases, the socket 4 is connected, in the case illustrated in Figure 1, both with the source means 6 that produces steam, for example a boiler, and with the source means

7 that supplies electricity.

[0029] The steam source means 6 and the electricity source means 7 can be mounted, as already mentioned, inside an electric household appliance that can, for example, be used to clean, or in a proper seat obtained in a wall 200 of a building; both are suitable to supply respectively electricity and steam on request; for this purpose, the electricity source means 7 is also connected to the steam source means 6, so as to supply them with the electricity required to actuate the water heating devices that are usually provided in the steam source means 6.

[0030] The plug 5 is fitted at one end of hose 8, normally of a flexible type, which, at the opposite end, can be provided alternatively with a handgrip 9 featuring controls for the emission of steam, or a standard joining (not illustrated) for connecting an apparatus that uses steam like, for instance, an iron.

[0031] As can be seen in Figure 1, the hose 8 is internally provided with a duct 10 for the passage of steam and with a portion 11 inside which an electricity supply wire 12 or a wire that transmits electric pulses sent from "C" controls located on the handgrip 9 to the source means 7, passes; correspondingly, the plug 5, as can be seen in Figure 3, has a shank 13 which protrudes from a front area of it, and to which the duct 10 runs, and a set of second pin-shaped male electric contacts 14.

[0032] The socket 4 has a front portion 4' suitable to be faced to a front portion 5' of the plug 5 which has an opening 15 suitable for hermetically receive the shank 13 and which is connected to the steam source means 6, and a set of first female electric contacts 16, connected to the electricity source means 7 and which will mate with the second electric pin-shaped contacts 14 when the plug 5 is plugged into the socket 4; a memory means 107, whose function is described further on, are placed between the first female electric contacts 16 and the source means 7.

[0033] The socket 4 is provided with recognition means 300 for recognising the plug 5 and, for this purpose, the plug 5 is provided with detection means 400 that can be recognised by the recognition means 300.

[0034] The latter include a first numbers and a circular arrangement of first female electric contacts 16, which are mounted on the socket 4, as illustrated as an example in Figure 4.

[0035] The detection means 400 includes second numbers of the pin-shaped male electric contacts 14, normally less than the first numbers of female contacts 16, and which are such that they form various and different combinations of distribution, even if arranged in a circular fashion like the first one of the female contacts 16, all stored in a memory means 107 and which are part of the recognition means 300; each combination of second numbers identifies an user apparatus which is different from others: hence, each user apparatus has its own hose 8 provided with a specific plug 5.

[0036] Each combination of second numbers and fash-

ion of the second pin-shaped male electric contacts 14 is recognised by the memory means 107 and makes it possible, by mating with the first female electric contacts 16 of the socket 4, to recognise both when a plug 5 is plugged into it, i.e. an user apparatus is connected to it, and what kind of user apparatus it is and, as a result, to transmit a suitable pulse to the electricity source means 7 to start it and to select the power that the electricity source means 7 has to supply to the steam source means 6, in order to supply the user apparatus recognised and connected to them.

[0037] When the recognition means 300 fails to recognise the detection means 400, i.e. if a certain combination of second numbers or fashions of second male electric contacts 14 is not among the combinations of numbers and/or fashions stored into the memory means 107, or if accidentally a foreign body comes into contact with the female electric contacts 16 when the plug 5 is not plugged into the socket 4, the electricity source means 7 cannot be activated and the first female electric contacts 16 are not powered; consequently they cannot be a hazard source for the users, even if the plug 5 is not plugged into the socket 4 and, consequently, there is free access to the first female electric contacts 16.

[0038] According to a second possible embodiment of the safe electric joint 1, the detection means 400 of the plugs 5 includes a resistance means 17, each of which has its own nominal value that distinguishes it from the other nominal values: each nominal value distinguishes a different user apparatus and is stored into the memory means 107.

[0039] When the plug 5 is plugged into the socket 4, if the nominal value of the resistance means 17 corresponds to one of the values stored into the memory means 107, the electricity source means 7 receives an activation pulse and feeds electricity to the steam source means 6, if requested, and to the first female electric contacts 16; this can occur jointly or separately if an user apparatus does not require the production of steam but only an electric supplying.

[0040] If a foreign body comes into contact with the female electric contacts 16 when the plug 5 is not plugged into the socket 4 or if the plug 5 is plugged into it, which has no resistance means or which has resistance means whose nominal value is not stored into the memory means 107, no activation pulse is sent to the electricity source means 7 that consequently remains inactive, maintaining a condition of safety where no electricity is sent to the first female electric contacts 16.

[0041] It is also contemplated that a timer 207 is placed between the electricity source means 7 and the socket 4, in order to delay for a predetermined and predeterminable time the sending of a pulse to the source means 7 when the plug 5 is plugged into the socket 4 and the recognition means 300 recognises the detection means 400: this delay is useful so the user has enough time to make good an imperfect or difficult mating between the socket 4 and the plug 5.

[0042] If requested by specific uses, both the socket 4 and the plug 5 are provided with an additional female electric contact 116 as well as an additional pin-shaped male electric contact 114, an additional opening 115 and an additional shank 113, the latter two being matchable and both suitable for the passage of a pressurised fluid like, for example, air.

[0043] The additional shank 113 and the opening 115 are suitable to allow the passage, between the socket 4 and the plug 5, of a pressurised fluid that does not conduct electricity but transmits a signal sent by a control on an user apparatus connected to the plug 5 and sent to a pressure transducer connected to the socket 4, located upstream from a supply apparatus, for example, to actuate certain functions in an electric household appliance or in a system located in a building, without there being electricity on the control that the user touches.

[0044] According to the second embodiment of the safe electric joint 1, illustrated in Figures 5 and 6, openings 117 and 118 are contemplated respectively, for example in the lower portion of the plug 5 and of the the socket 4, that can be hermetically mated and which can take other, corresponding conveyor ducts (not illustrated) for carrying fluids which go through these.

[0045] It is necessary to specify that fluids other than steam can flow between the socket 4 and the plug 5, through openings 117 and 115, like compressed air for instance and, for this reason, they can be used also in industrial buildings where it is fitting to have a high number of connection points for connecting appliances and tools used in industrial activities.

[0046] Furthermore it is to be specified that the first female contacts 16 and the second male electric contacts 14 can be interchanged, i.e. with the former mounted on the plug 5 and the latter on the socket 4 without the need to modify the structure or operation of the safe electric joint 1.

Claims

1. Safe electric joint (1) comprising: a first element (2) provided with first electricity conductor means (310) and a second element (3) provided with second electricity conductor means (320) that can be coupled to said first element (2) **characterised in that** said first element (2) comprises recognition means (300) for recognising a detection means (400).
2. Safe electric joint (1) comprising: a first element (2) provided with first electricity conductor means (310) and a second element (3) provided with second electricity conductor means (320) that can be mated to said first element (2) **characterised in that** said second element (3) comprises detection means (400) arranged for being recognised by a recognition means (300).

3. Safe electric joint (1) according to claim 1 or 2, wherein said recognition means (300) are arranged to recognise said detection means (400).
4. Safe electric joint (1) according to claim 1 or 2, wherein said first element (2) and said second element (3) are further provided with a first fluid passage means (13, 15), which can be mated in a coupled configuration of said first element (2) and second element (3). 5 10
5. Safe electric joint (1) according to any one of the claims from 1 to 4, wherein said first electricity conductor means (310) and said second electricity conductor means (320) can be mated, at least one of said first electricity conductor means (310) and second electricity conductor means (320) being supplied by electricity source means (7), said source means (7) being activated when said recognising means (300) recognise said detection means (400). 15 20
6. Safe electric joint (1) according to claim 5, wherein said first element (2) is connected to said source means (7) and said second element (3) is connected to an user apparatus (9) supplied with electricity. 25
7. Safe electric joint (1) according to any one of the claims from 1 to 6, wherein said recognising means (300) comprise memory means (107) where said detection means (400) are stored. 30
8. Safe electric joint (1) according to any one of the claims from 1 to 7, wherein said detection means (400) comprises position combinations of said second electricity conductor means (320). 35
9. Safe electric joint (1) according to any one of the claims from 1 to 7, wherein said detection means (400) comprise combinations of numbers of said second electricity conductor means (320). 40
10. Safe electric joint (1) according to claim 8, wherein each combination of said combinations identifies an user apparatus (9) supplied with electricity. 45
11. Safe electric joint (1) according to any one of the claims from 5 to 9, wherein said first electricity conductor means (310) and said second electricity conductor means (320) comprise first contacts (16) and second contacts (14) respectively, which can be mated in a coupled configuration of said second element (3) with said first element (2). 50
12. Safe electric joint (1) according to any one of the claims from 1 to 8, wherein said detection means (400) includes resistance means (17) which has predetermined nominal values. 55
13. Safe electric joint (1) according to claim 12, wherein each predetermined value of said predetermined values identifies an user apparatus (9) supplied with electricity.
14. Safe electric joint (1) according to any one of the claims from 1 to 13, wherein said first element (2) comprises a socket (4) and said second element (3) comprises a plug (5) that can be plugged into said socket (4).
15. Safe electric joint (1) according to claim 11, wherein said first contacts (16) comprise a first number of female electric contacts (16) mounted on said socket (4).
16. Safe electric joint (1) according to claim 11 or 15, wherein said second contacts (14) comprise second numbers of male electric contacts (14), others than said first number, mounted on said plug (5).
17. Safe electric joint (1) according to claim 15 or 16, wherein said second numbers are less or equal to said first numbers.
18. Safe electric joint (1), according to any one of the claims from 15 to 17, wherein said first numbers of female electric contacts are mounted on a first face (4') of said socket (4), arranged according to a first predefined planar fashion and said second numbers of male electric contacts are mounted on a second face (5') of said plug (5) that will mate with said first face (4'), and they are arranged in planar fashions, each identifying an user apparatus (9) different from other user apparatuses.
19. Safe electric joint (1) according to claim 18, wherein said first fashion is circular and has a first radius.
20. Safe electric joint (1) according to claim 18, wherein said first fashions comprises first rows and first columns.
21. Safe electric joint (1) according to any one of the claims from 16 to 19, wherein said second fashions comprise at least one circular fashion that has a second radius equal to said first radius.
22. Safe electric joint (1) according to any one of the claims from 16 to 18 and according to claim 20, wherein said second fashions comprise at least one fashion comprising second rows and second columns aligned to said first rows and said first columns respectively.
23. Safe electric joint (1) according to claim 5, wherein timer means (207) are placed between said first element (2) and said source means (7), to delay the

actuation of said source means (7).

24. Safe electric joint (1) according to claim 1 or 2, wherein said first element (2) and second element (3) are further provided with second fluid passage means (113, 115), which can be mated in a coupled configuration of said first element (2) and second element (3), to transmit control signals between an user apparatus and a supply apparatus connected respectively to said second element (3) and first element (2).
25. Appliance **characterized in that** it comprises a safe electric joint (1) according to any one of the claims from 1 to 24.
26. System **characterized in that** it comprises a safe electric joint (1) according to any one of the claims from 1 to 24.

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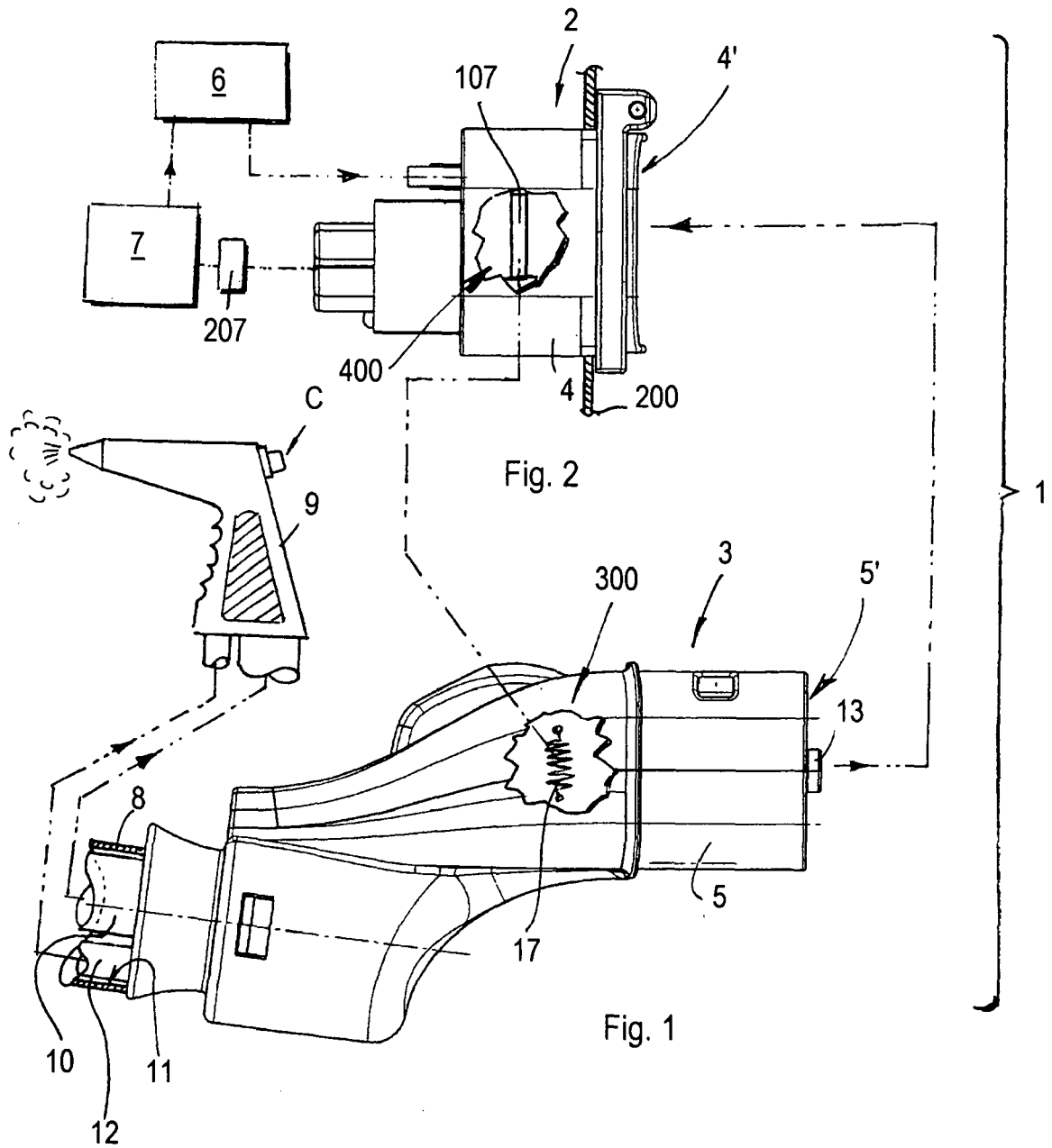
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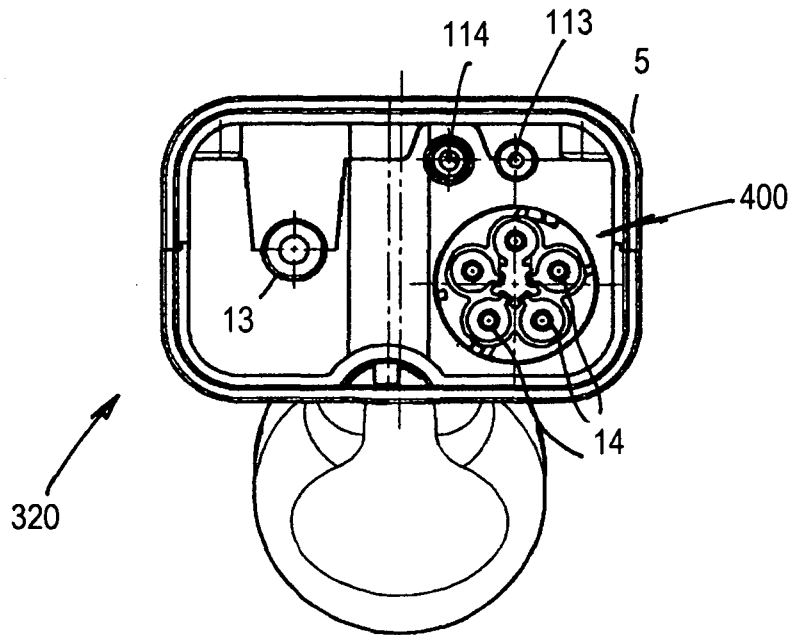


Fig. 3

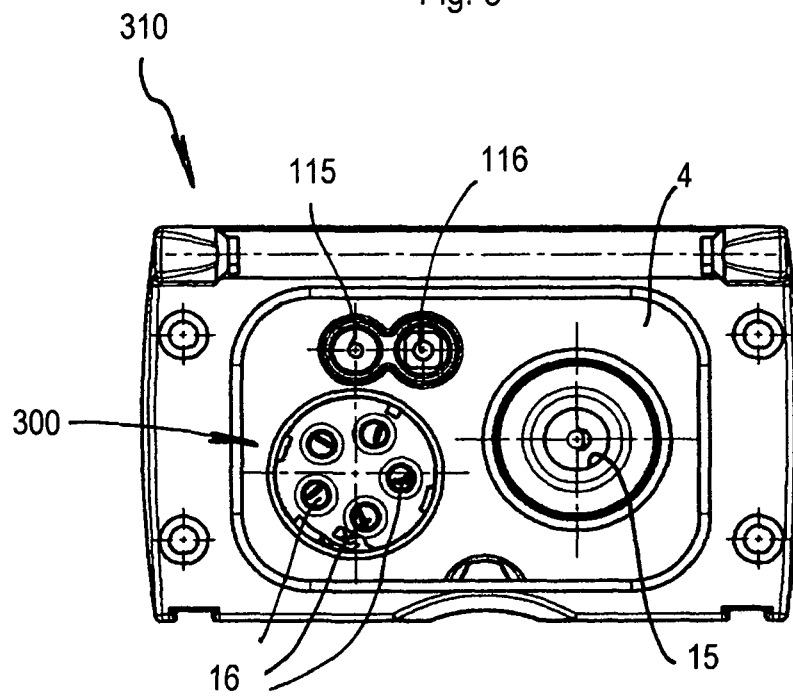


Fig. 4

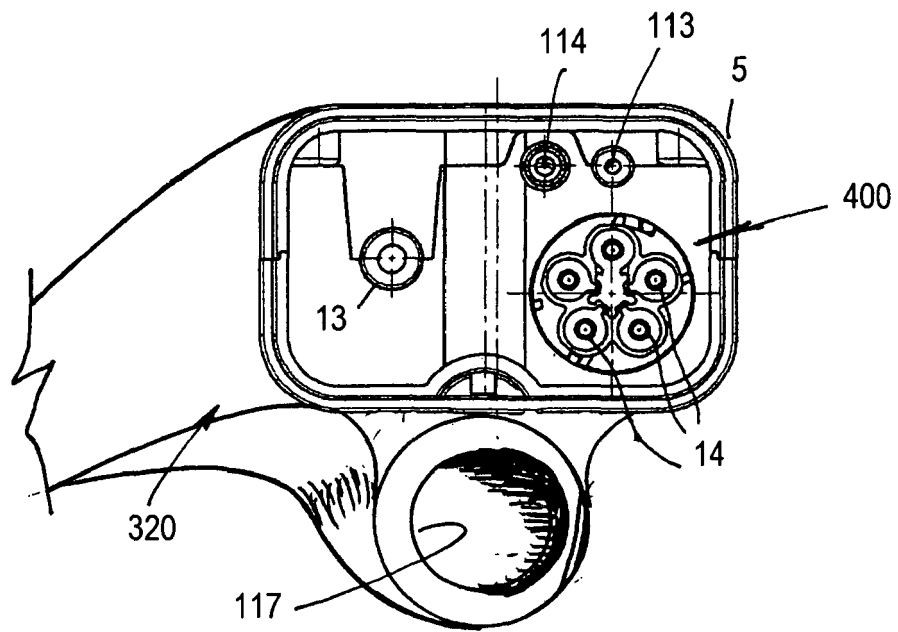


Fig. 5

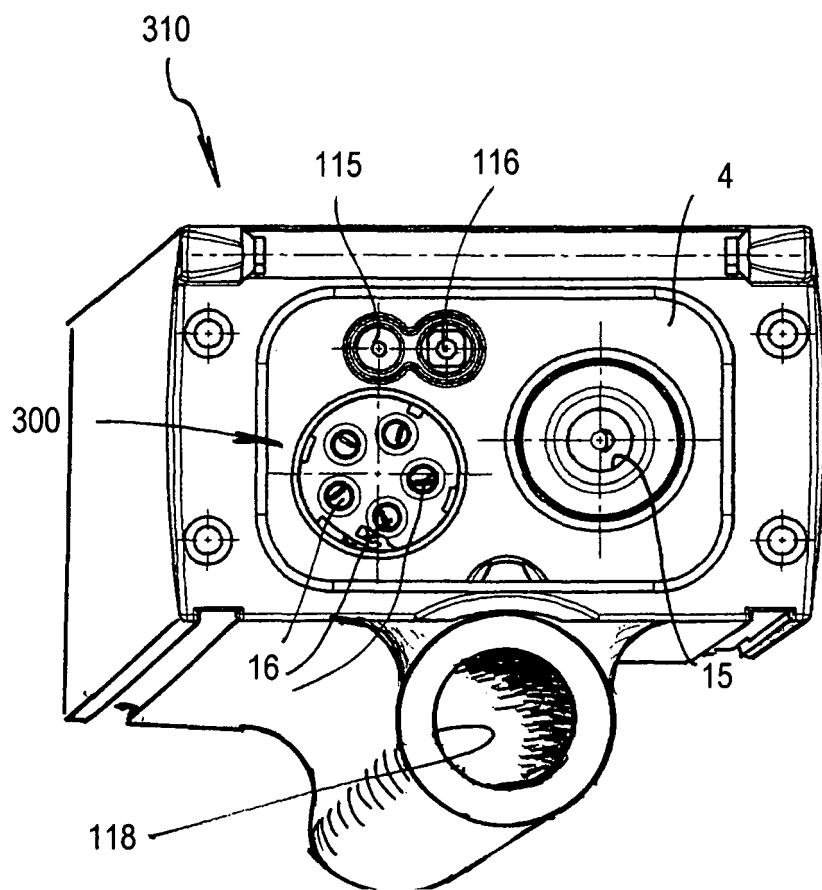


Fig. 6