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(54) **INDUSTRIAL PLUG WITH PHASE INVERTER DEVICE**

(57) An industrial plug with phase inverter device including a core which is inserted in a casing and supports a plurality of pins; a rotor that is mounted on the core and supports at least two movable pins and is arrangeable in two preset positions: an initial position and a final position; the initial and final positions corresponding to a rotation through 180° of the rotor so that the position of the mov-

able pins is reversed; the plug includes a means for highlighting the reaching of one of the preset positions of the rotor and therefore of the movable pins. The phase inverter device highlights uniquely and objectively the reaching of the correct position on the part of the pins, once they have been reversed.

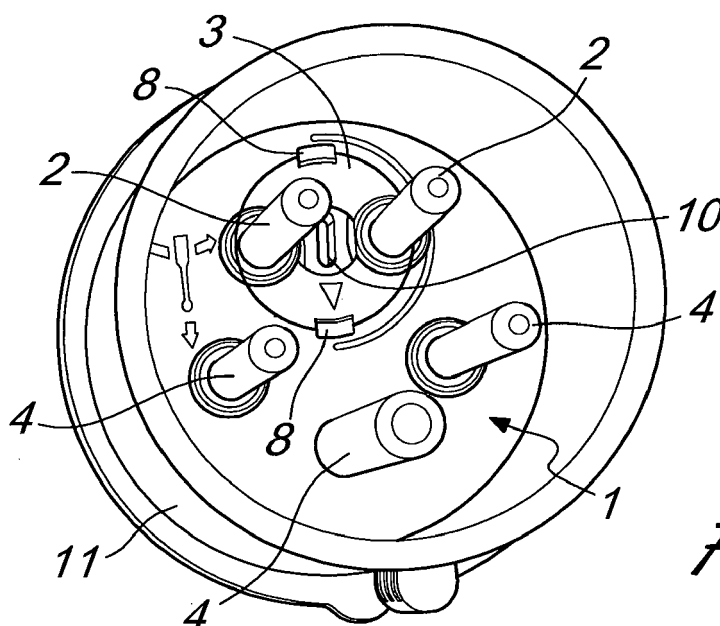


Fig. 1

Description

[0001] The present invention relates to an industrial plug with phase inverter device.

[0002] An industrial electric plug includes a series of pins arranged inside a container which, in combination with the similar container of the associated outlet, is designed to protect them from any possible infiltration of water.

[0003] A 400 V three-phase plug can have four contacts (three phases and ground) or five contacts (three phases, neutral and ground).

[0004] The present invention relates in particular to industrial plugs adapted to power three-phase devices and in particular three-phase motors.

[0005] Three-phase motors often move systems the operation of which depends on the direction of rotation of the motor.

[0006] The wiring sequence of the phases of the motor determines this direction of rotation.

[0007] The problem therefore arises of reversing the wiring sequence of the phases without having to open the plug to remove the power supply cables of two phases and reverse their placement.

[0008] Devices for providing phase reversal are known which are constituted by an adapter meant to be connected to the power supply plug of the three-phase motor.

[0009] Phase inverter devices are also known which are constituted by a rotating member which supports two pins, the position of which can be reversed by rotating the rotating member.

[0010] Inverter devices of the type described above have the drawback of not highlighting in an assured manner the reaching of the correct position of the pins once they have been inverted and the correct position of the pins is entrusted to the attention of the user.

[0011] Figures 2 and 3 are views of a four-contact pin, of a known type, which is provided with a phase inverter of the type described above.

[0012] Figure 2 shows a correct position of the movable pins, while Figure 3 shows an incorrect position of the pins 200, caused by an insufficient rotation of the rotating member.

[0013] Figures 4 and 5 are views of a five-contact pin, of a known type, which is provided with a phase inverter of the type described above.

[0014] Figure 4 shows a correct position of the movable pins, while Figure 5 shows an incorrect position of the pins, caused by an insufficient rotation of the rotating member.

[0015] DE4431451 discloses an electrical multi-phase plug with terminal pins mounted on a circular base plate. The plug has a phase inverter for exchanging two plug pins so that the order of the phases can be reversed. The phase reverser is locked by means radial lugs engaging cutouts.

[0016] EP0841726 discloses a connector having a pair of phase reversal pins supported by a rotatable insert

incorporated in the foot, allowing the position of the phase pins relative to the base pins to be reversed by rotation through 180 degrees. The position of the rotatable insert relative to the foot is secured by a spring arm in two defined angular positions, by cooperation of locking noses with locking openings provided in the foot.

[0017] AT410269 discloses a multipolar plug device having a phase-reversing socket with contact pins rotatably mounted on the plug base. The socket is locked by means of a latching cam.

[0018] DE4431451, EP0841726 and AT410269 show devices for locking the rotating member constituting the phase inverter into a set position, however the devices are arranged inside the plug body and they are not visible from the outside.

[0019] The aim of the present invention is to provide an industrial plug with phase inverter device that overcomes the drawbacks of the cited background art.

[0020] Within the scope of this aim, a particular object of the invention is to provide an industrial plug which incorporates a phase inverter device that highlights uniquely and objectively the reaching of the correct position on the part of the pins once they have been reversed.

[0021] Another object of the invention is to provide an industrial plug with a phase inverter device provided with visible locking members.

[0022] A further object of the present invention is to provide a plug that can be easily and economically manufactured.

[0023] This aim, these objects and others which will become better apparent hereinafter are achieved by an industrial plug with phase inverter device comprising a core inserted in a casing and supporting a plurality of pins; a rotor mounted on said core and supporting at least two movable pins; said rotor being arrangeable in two preset positions: an initial position and a final position; said initial and final positions corresponding to a rotation through 180° of said rotor so that the position of said movable pins is reversed; said plug being characterized in that it comprises a means for highlighting the reaching of one of said preset positions of said rotor and of said movable pins.

[0024] Further characteristics and advantages will become better apparent from the description of preferred but not exclusive embodiments of the invention, illustrated by way of nonlimiting example in the accompanying drawings, wherein:

Figure 1 is a perspective view of the front part of an industrial plug with phase inverter device, according to the present invention;

Figure 2 is a front view of a four-contact three-phase plug, according to the prior art, shown in the correct operating position;

Figure 3 is a front view of the four-contact three-phase plug of the preceding figure, shown in the incorrect operating position;

Figure 4 is a front view of a five-contact three-phase

plug according to the prior art, shown in the correct operating position;

Figure 5 is a front view of the five-contact three-phase plug of the preceding figure, shown in the incorrect operating position;

Figure 6 is a perspective view of the core of the industrial plug according to the present invention;

Figure 7 is another perspective view of the core of the industrial plug according to the present invention;

Figure 8 is an enlarged-scale perspective view of the rotor of the core of the industrial plug according to the present invention;

Figure 9 is a perspective view of the opposite side, with respect to Figure 6, of the core of the industrial plug according to the present invention;

Figure 10 is an enlarged-scale perspective view of the core of the industrial plug according to the present invention, showing in detail the seats of the rotor locking teeth.

[0025] With reference to the cited figures, the industrial plug with phase inverter device, according to the invention, has a core 1 that is inserted in a casing 11 and supports a plurality of pins, designated by the reference numerals 2 and 4.

[0026] The pins include fixed pins 4, which are mounted in a fixed position on the core 1, and two movable pins 2, which are mounted on a movable member 3 that is adapted to allow to reverse the position of the movable pins 2 with respect to each other.

[0027] The movable member is constituted by a rotor 3 which is mounted in a sandwich-like arrangement in the core 1 in which the remaining fixed pins 4 are inserted in fixed positions.

[0028] The rotor 3 can rotate freely through 180° about its own axis between two preset positions: an initial position and a final position, which are determined by stop members 5 and 51 which are formed on the inner side of the core 1.

[0029] The initial and final positions of the rotor 3 are the only two positions in which the pins 2 can be arranged in order to ensure the correct operation of the plug. The initial and final positions correspond to a rotation through 180° of the rotor 3 so that the position of the movable pins is reversed.

[0030] The locking of the rotor 3 in the initial and final positions is ensured by a locking slider 6, which is mounted within the rotor 3 and can slide freely along a diametrical axis of the rotor 3.

[0031] The correct position of the locking slider 6 is ensured by a compression spring 7, which is coaxial to the axis of the rotor 3.

[0032] Locking in the two preset positions is ensured by two locking teeth 8, which engage adapted seats 9 which are provided partly on the rotor 3 and partly on the core 1.

[0033] Advantageously, the locking teeth 8 and the locking slider 6 are of a different color with respect to the

other parts of the rotor, so that they are clearly visible, as described further on.

[0034] The locking teeth 8 are in fact completely visible by the operator only and exclusively when the rotor 3, and therefore the pins 2, are in one of the two preset initial or final positions, thus indicating to the operator the correctness of the phase reversal maneuver.

[0035] Also, when the locking teeth 8 enter the seats 9 they produce a sound, a click, which also is useful to indicate to the operator the correctness of the phase reversal maneuver.

[0036] The release of the system for rotating through 180° the pins 2 is performed by the operator by acting by means of a screwdriver engaging an adapted notch 10 formed in the locking slider 6, with which it pushes along its own axis the locking slider 6 itself, loading the compression spring 7, and rotates the rotor 3 through 180° from the initial position to the final position or vice versa.

[0037] The core 1 complete with the rotor 3 is advantageously mounted in a snap manner in the plug casing 11.

[0038] In practice it has been found that the invention achieves the intended aim and objects, an industrial plug with a phase inverter device being provided which is constituted by a rotating element that allows to reverse the position of two pins, giving assurance to the operator that the maneuver has been performed correctly by virtue of visual and acoustic means.

[0039] Also, the device is provided with retention members which allow to position the rotor in two preset positions in which the pins are positioned correctly and safely.

[0040] The materials used, as well as the dimensions, may of course be any according to the requirements and the state of the art.

Claims

1. An industrial plug with phase inverter device comprising a core inserted in a casing and supporting a plurality of pins; a rotor mounted on said core and supporting at least two movable pins; said rotor being arrangeable in two preset positions: an initial position and a final position; said initial and final positions corresponding to a rotation through 180° of said rotor so that the position of said movable pins is reversed; said plug being **characterized in that** it comprises a means for highlighting the reaching of one of said preset positions of said rotor and of said movable pins.
2. The industrial plug according to claim 1, **characterized in that** it comprises retention members which are formed on said core and act on said rotor, stopping it in said preset positions.
3. The industrial plug according to claim 1, **character-**

ized in that it comprises a locking slider, which is mounted slidably in said rotor along an axis which is parallel to the rotation axis of said rotor, and is adapted to lock said rotor alternately in one of said preset positions; said slider being movable in contrast with a spring that is adapted to push said slider into the locking position.

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4. The industrial plug according to claim 1, **characterized in that** it comprises two locking teeth which are adapted to lock said rotor in said preset positions; said locking teeth being arranged in two seats which are provided partly on said rotor and partly on said core.

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5. The industrial plug according to claims 3 and 4, **characterized in that** said locking teeth and said locking slider are of a different color than the other parts of the rotor so that they are clearly visible.

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6. The industrial plug according to claim 4, **characterized in that** said locking teeth are completely visible by the operator only and exclusively when said rotor is at one of said preset initial or final positions, thus reporting to the operator the correctness of the phase reversal maneuver.

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7. The industrial plug according to claims 3 and 4, **characterized in that** when said locking teeth enter said seats in one of said preset positions, they produce a sound that is useful to report to the operator the correctness of the phase reversal maneuver.

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8. The industrial plug according to claim 3, **characterized in that** it comprises a notch formed on said locking slider; said rotor being able to rotate from one preset position to the other by acting by means of a screwdriver that is arranged in said notch and pushes along its own axis said locking slider, loading said spring.

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9. The industrial plug according to claim 1, **characterized in that** said core complete with said rotor is mounted by snap action in said casing.

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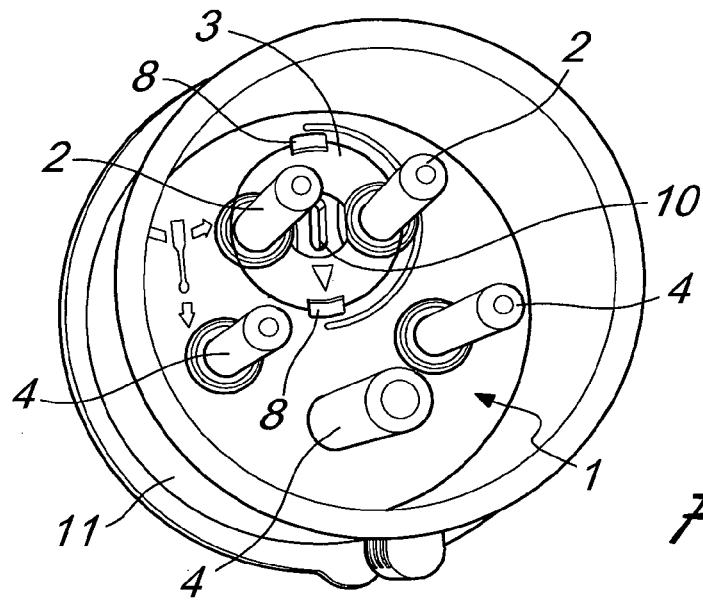


Fig. 1

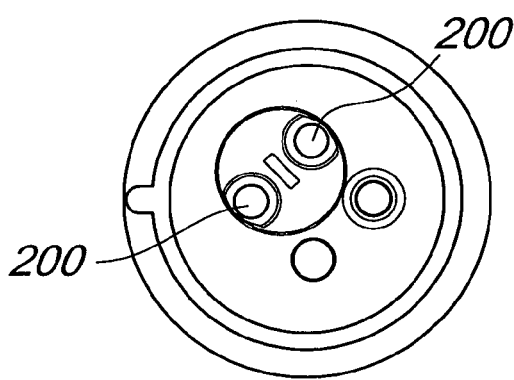


Fig. 2

PRIOR ART

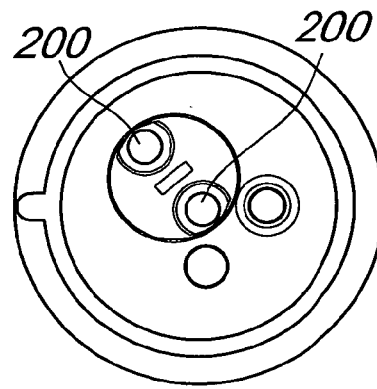


Fig. 3

PRIOR ART

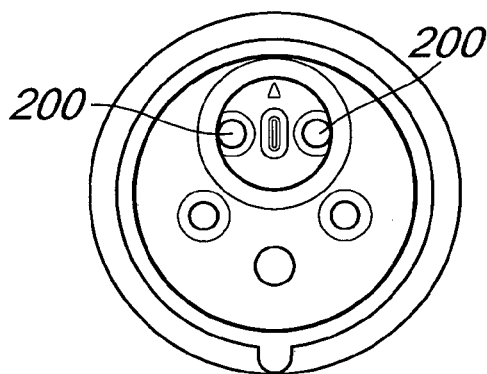


Fig. 4

PRIOR ART

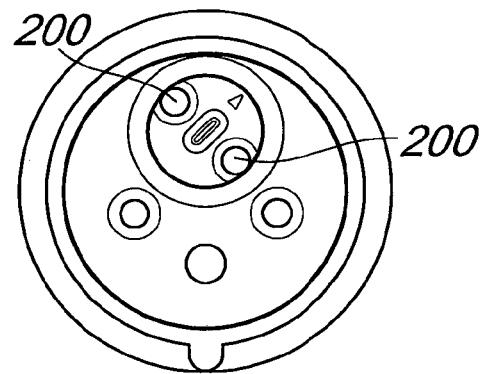


Fig. 5

PRIOR ART

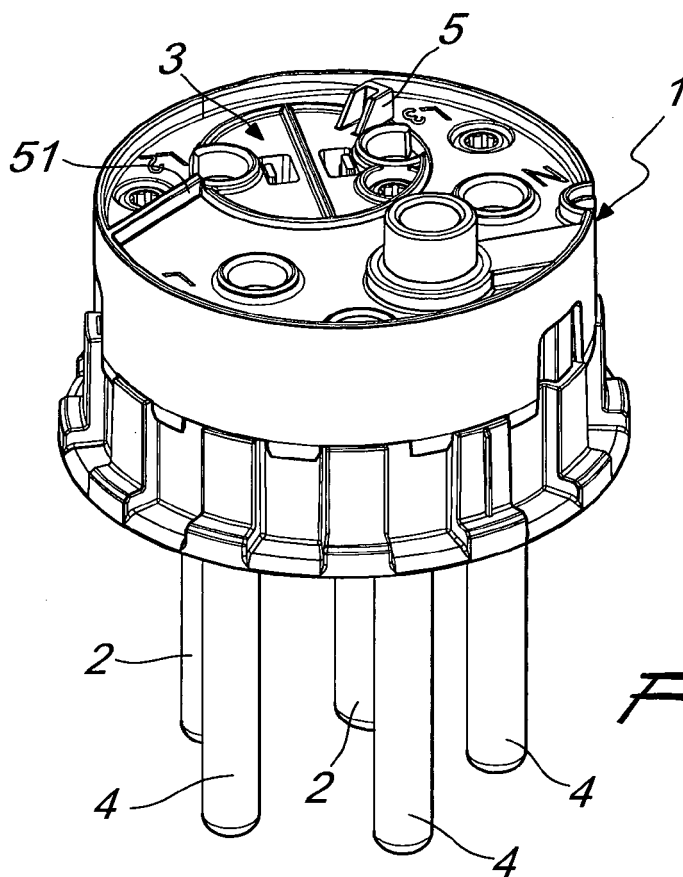


Fig. 6

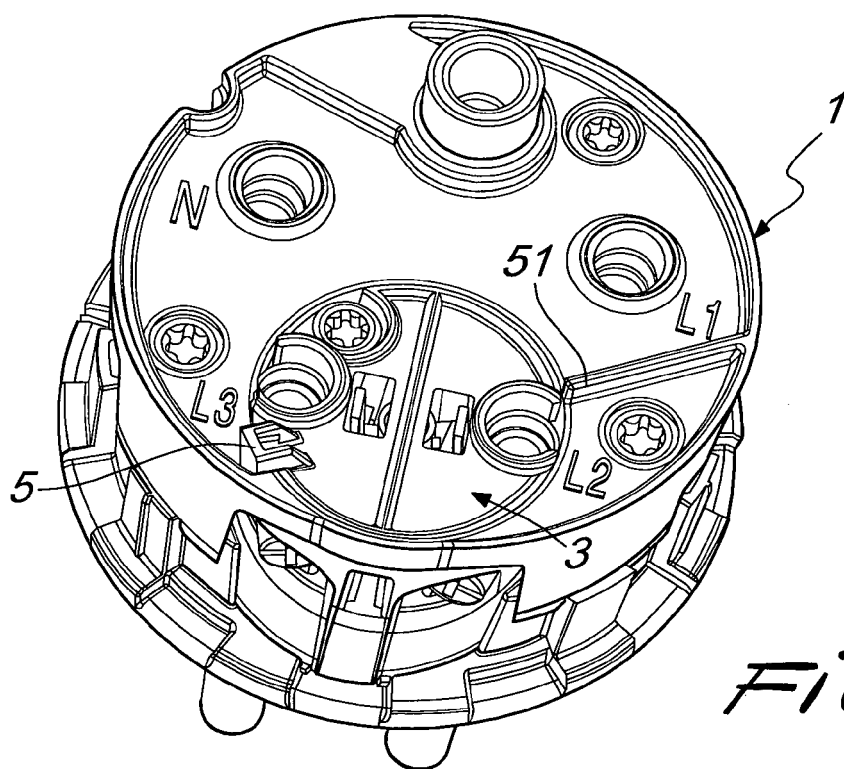


Fig. 7

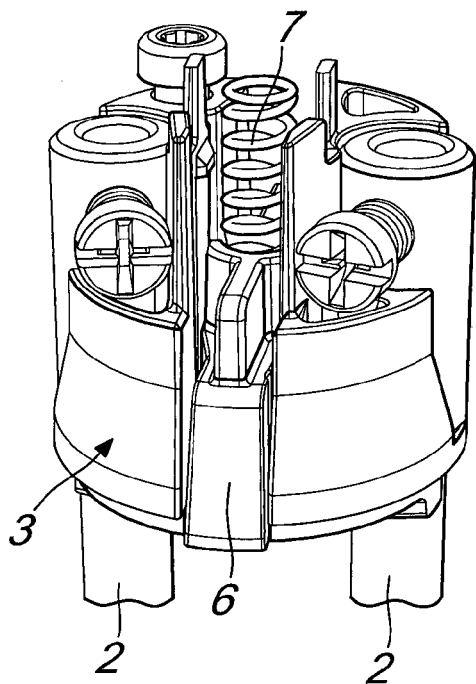


Fig. 8

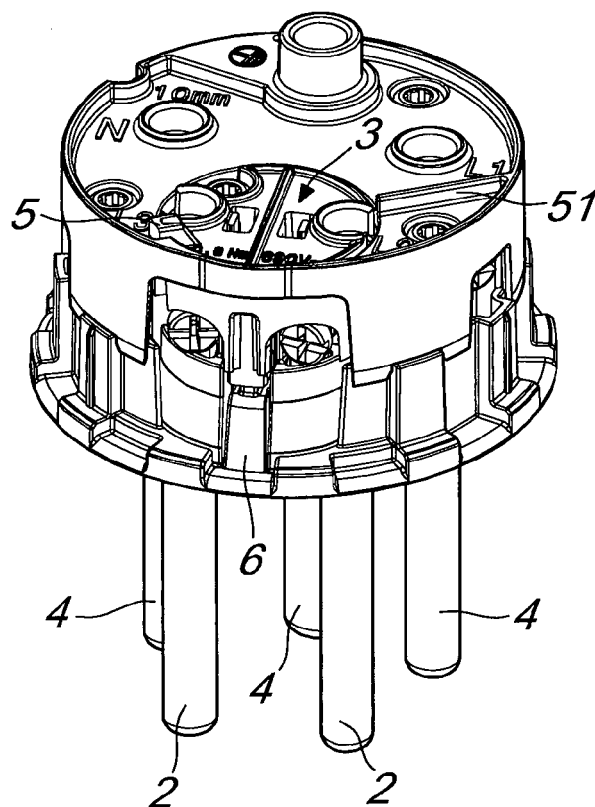


Fig. 9

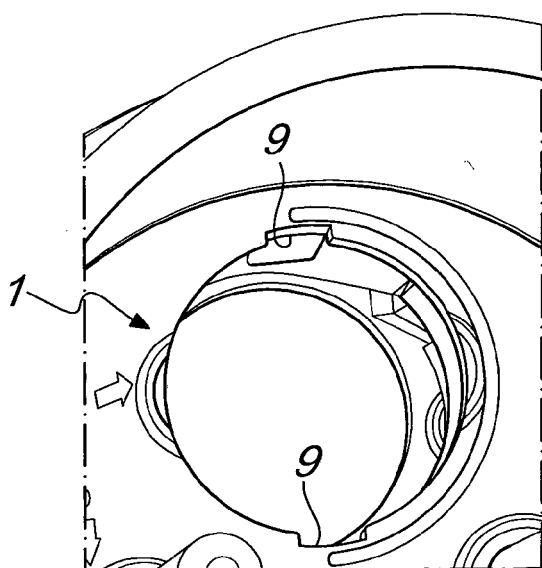


Fig. 10



EUROPEAN SEARCH REPORT

 Application Number
 EP 17 00 1231

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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	DE 44 31 451 A1 (MUELLER PLASTIK GMBH [DE]) 7 March 1996 (1996-03-07) * column 3, line 6 - line 56; figures 7-10 *	1-9	INV. H01R29/00
X	EP 0 841 726 A2 (ALOYS MENNEKES ANLAGEN [DE]) 13 May 1998 (1998-05-13) * column 5, line 44 - column 7, line 52; figures 1-6 *	1-9	ADD. H01R24/86
X	AT 410 269 B (PC ELECTRIC GMBH [AT]) 25 March 2003 (2003-03-25) * page 3, line 10 - page 4, line 12; claim 1; figures 1-5 *	1-9	
			TECHNICAL FIELDS SEARCHED (IPC)
			H01R
The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 12 October 2017	Examiner Bouhana, Emmanuel
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**ANNEX TO THE EUROPEAN SEARCH REPORT
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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

REFERENCES CITED IN THE DESCRIPTION

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