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(54) **Spring connection terminal with actuation lever**

(57) A spring connection terminal (2) is described for an electrical apparatus (1), said terminal (2) comprising:
- a case (4) in electrically insulated material having a conductor aperture (5) provided to permit the insertion of an electric conductor (W1) in said terminal (2);
- a locking spring (3) housed in said case (4), the locking spring (3) being a leaf spring provided to block the electric conductor (W1) inserted in the conductor aperture (5) so as to establish an electric connection between the electric conductor (W1) and said terminal (2) ;
- an actuation lever (7) adapted to cooperate with the locking spring (3) to permit the insertion of the electric conductor in said terminal, said lever (7) being adapted to assume an operating position in which said lever (7) can rotate around a rotation axis between a first angular position and second angular position different from each other.

Said terminal (2) being characterised in that it comprises at least one inhibition element (8) provided to prevent a rotation of said lever (7) in a first direction, said lever (7) being adapted to assume a rest position in which the rotation of the actuation lever (7) in said first direction is prevented by said at least one inhibition element (8) and said lever (7) being selectively movable in a sliding manner between said operating position and said rest position.

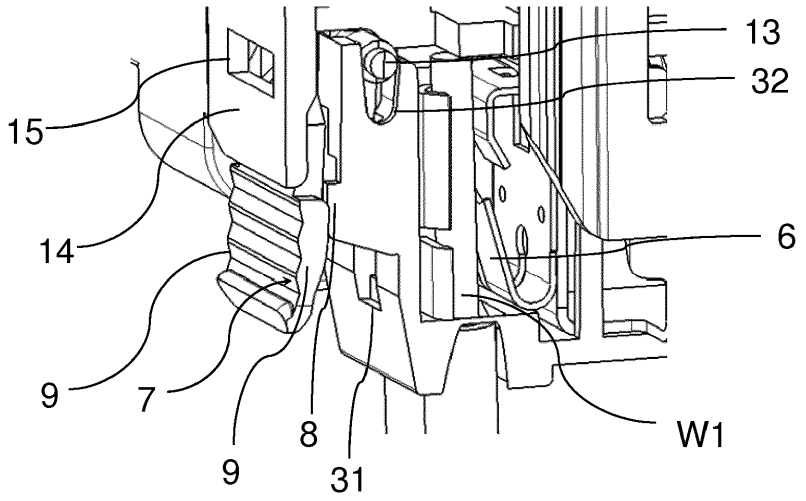

FIG. 5

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Description

DESCRIPTION

[0001] This invention relates to the technical field of electrical apparatuses and, more particularly, relates to a spring connection terminal for an electrical apparatus as defined in the preamble of claim 1.

[0002] In the technical field of electrical apparatuses, electrical apparatuses are widely known and widespread that employ spring connection terminals provided for connecting, to the apparatuses themselves, so-called "rigid" electrical conductors (i.e., electrical conductors that typically comprise a single electrically conducting wire of predetermined section) and/or so-called "flexible" electrical conductors (i.e., electrical conductors that typically comprise a plurality of electrically conductive wires that are held together by a single insulating sheath and each of which has a smaller section than that of the wire of a rigid conductor). Electrical apparatuses of the above type comprise, for example electrical outlets, electrical switches and other electrical apparatuses intended, for example and not limited to, for installation in a wall, using a wall box, or for installation in an electrical panel. The spring connection terminals of the prior art, typically comprise a case or housing made of electrically insulating material and a locking spring housed in the insulating case. This case is normally provided with a conductor aperture to permit the insertion of an electrical conductor in the terminal. The locking spring is usually a leaf spring provided to block the electrical conductor inserted in the conductor aperture so as to establish an electrical connection between the electrical conductor and the connection terminal.

[0003] Among the known connection terminals of the above type, terminals, in particular, are known having an actuation lever that can be rotated around an axis of rotation between an angular insertion position and an angular blocking position. In the angular insertion position, the actuation lever elastically deforms the locking spring to allow the insertion of the electrical conductor in the terminal. In the angular blocking position the actuating lever is arranged in such a way as to allow the locking spring to block the electrical conductor inserted into the terminal.

[0004] A drawback of the aforementioned spring connection terminals having an actuation lever resides in that an accidental operation of the actuation lever once the electrical connection has been made between the spring connection terminal and the electrical conductor may result in a loosening of the blocking action exerted by the locking spring on the electrical conductor. For example, when the electrical apparatus provided with the spring connection terminal is installed in a wall box, this may occur due to the pressure exerted by the electrical cables on the actuation lever during installation. The loosening of the blocking action of the locking spring may worsen or interrupt the electrical connection between the electrical apparatus and the electrical conductor. Furthermore, when the electrical conductor completely disengages from the connection terminal, the operator is likely to be subject to electrical discharges by coming into contact with a live electrical conductor.

[0005] A general purpose of this description is to provide a spring connection terminal that is able to solve or reduce, at least partly, the drawbacks described above with reference to the known art.

[0006] This and other purposes are achieved through a spring connection terminal as defined in claim 1 in its most general form, and in the dependent claims in several particular embodiments.

[0007] This invention also covers an electrical apparatus as defined in claim 9.

[0008] The invention will be better understood from the following detailed description of its embodiments, provided by way of example and therefore in no way limiting, in relation to the accompanying drawings, in which:

- Fig. 1 is a perspective view of an electrical apparatus according to a currently preferred embodiment, where the electrical apparatus comprises three spring connection terminals, one of which is connected with two electrical conductors that are partially represented in this figure;
- Fig. 2 is a perspective view of a part of the electrical apparatus of Fig. 1 showing two spring connection terminals where these connection terminals are represented in two different configurations and where some parts of the electrical apparatus have been removed;
- Fig. 3 is a perspective view of a part of the electrical apparatus of Fig. 1 with further parts removed with respect to Fig. 2, which shows one of the connection terminals of Fig. 2, and where an electrical conductor is partially shown in a phase of insertion into the connection terminal;
- Fig. 4 is a perspective view of a part of the electrical apparatus of Fig. 1 with some parts removed, which shows the connection terminal of Fig. 3 with an electrical conductor completely inserted into the terminal and in which the connection terminal is shown in a different configuration with respect to Fig. 3;
- Fig. 5 is a perspective view of a part of the electrical apparatus of Fig. 1 with some parts removed, which shows the connection terminal of Fig. 3 with an electrical conductor completely inserted into the terminal and in which the connection terminal is shown in a different configuration with respect to Fig. 4;
- Fig. 6 is a perspective view that shows the connection terminal of Fig. 3 viewed from a different angle with respect to Fig. 3 and represented in the configuration of Fig. 1;
- Fig. 7 is a perspective view similar to Fig. 6, in which the connection terminal is represented in the configuration of Fig. 5;
- Fig. 8 is a plan sectional view that shows the con-

nection terminal of Fig. 3 in the configuration of Fig. 5;

- Fig. 9 is a perspective view of a part of the electrical apparatus of Fig. 1 that shows the connection terminal of Fig. 3 without an electrical conductor inserted into the terminal and where further parts of the electrical apparatus have been removed with respect to Fig. 3.

[0009] In the annexed figures, equal or similar elements will be indicated by the same reference numbers.

[0010] Fig. 1 shows an electrical apparatus that is globally indicated with reference number 1. In the example, the apparatus 1 is an electrical socket 1 intended to be installed in a wall, preferably inside a wall box. It should be noted, however, that the teachings of the present description can be applied to any electronic or electromechanical apparatus suitable to be connected with rigid and/or flexible electrical cables such as, for example and not limited to, push button electrical switches or electrical sockets suitable to be installed in a wall, command devices for roller shutters, lamps, etc.

[0011] The electrical socket 1 comprises a plurality of spring connection terminals 2 according to a currently preferred embodiment. In the example, the connection terminals 2 are so-called automatic terminals 2. In the example, the socket 1 comprises, in particular, three spring connection terminals 2. It should be noted, anyway, that an electrical apparatus according to the teachings of this description may comprise, in general, one or more spring connection terminals. It should also be noted that, since the three terminals 2 in the example are equal to each other, in the rest of this description, the structure and operation of the connection terminals 2 will be described with reference to only one of the connection terminals 2.

[0012] With cross reference to Fig. 1 and Fig. 2, the connection terminal 2 comprises a locking spring 3 that is housed in a case 4 made of electrically insulating material of the electrical socket 1. In other words, the case 4 of the electrical socket is, in the example, also the case 4 made of electrically insulating material of the connection terminal 2. As can be seen in Fig. 1, the case 4 preferably has a generally box-shaped conformation.

[0013] The locking spring 3 is a leaf spring provided to block at least one electrical conductor W1, such as a rigid electrical cable W1 or a flexible electrical cable (not shown), once the conductor has been inserted into a conductor aperture 5 provided on the case 4. In practice, in known manner, the locking spring 3 is provided to block the electrical conductor W1 so as to establish an electrical connection between the conductor W1 and the terminal 2. As is known, the conductor aperture 5 is provided to allow the insertion of the electrical conductor W1 in the terminal 2. In accordance with a preferred embodiment, the case 4 of the connection terminal 2 has a pair of conductor apertures 5 and the locking spring 3 comprises a pair of blocking portions 6, or blocking arms 6. The blocking arms 6 are adjacent to each other and are each associated with a respective conductor aperture 5. In this way, as can be seen in Fig. 1, the connection terminal 2 allows to simultaneously block a pair of electrical conductors W1. In particular, according to a preferred embodiment, each conductor W1 is blocked between one of the arms 6 and a respective electrical contact portion 22, of known type, of the terminal 2.

[0014] The connection terminal 2 includes an actuation lever 7 suitable to cooperate with the locking spring 3 to allow the insertion of the electrical conductor W1 in the terminal 2. The lever 7 is suitable to selectively assume an operative position (Fig. 1, Fig.2, Fig. 3, Fig. 4, Fig. 6 and Fig. 9) and a rest position (Fig. 5, Fig. 7 and Fig. 8). In particular, the lever 7 is selectively movable in a sliding manner between the operative position (for example, Fig. 4 or Fig. 6) and the rest position (for example, Fig. 5 or Fig. 7). As can be seen from the accompanying figures, according to a preferred embodiment, the lever 7 is mounted or connected to the case 4 so as to be selectively movable in a sliding manner between the operative position (for example, Fig. 4 or Fig. 6) and the rest position (for example, Fig. 5 or Fig. 7). In the operative position of the lever 7, it is possible to wire the socket 1. In particular, in the operative position, the operating lever 7 can rotate around an axis of rotation between a first angular position and a second angular position, which are distinct from each other. According a preferred embodiment, the first angular position is an angular insertion position (Fig. 2, Fig.3 and Fig. 9), in which the lever 7 elastically deforms the locking spring 3 to allow the insertion of the electrical conductor W1 in the terminal 2. Preferably, the second angular position is, instead, an angular position for locking (Fig. 1, Fig. 4 and Fig. 6) in which the lever 7 is arranged in such a way as to allow the locking spring 3 to block the electrical conductor W1 inserted in the terminal 2. With reference, for example, to Fig. 3, in the angular insertion position, the lever 7 elastically deforms the locking spring 3 to allow the insertion of the electrical conductor W1 in the terminal 2. Preferably, the lever 7 elastically deforms the locking spring 3 via a respective projecting thrust portion 21 (Fig. 9). In the angular blocking position the actuation lever is arranged in such a way as to allow the locking spring to block the electrical conductor W1 inserted in the terminal 2. In this regard, it should be noted that, for the purposes of this description, the expression "angular blocking position" is used indifferently to indicate the position taken in Fig. 1 by the lever 7 of each of the three connection terminals 2 shown in this figure. It should be noted, however, that, as will be explained later when describing an exemplifying method of wiring terminal 2, the angular blocking position of the lever 7 will, in practice, be slightly different depending on the number of conductors W1 inserted in the terminal 2.

[0015] According to a preferred embodiment, the connection terminal 2 comprises a pair of inhibition elements 8 provided or arranged to prevent rotation of the lever 7 in a first direction when the lever 7 assumes the rest position (Fig. 5). It should be noted that, in general, it is

however enough to provide at least one inhibition element 8 in the connection terminal 2. According to a preferred embodiment, the inhibition elements 8 prevent the rotation of the lever towards the locking spring 3. According to a preferred embodiment, the inhibition elements 8 comprise a pair of stop elements 8, preferably a pair of stop projections 8, which are opposite with respect to the actuation lever 7. Furthermore, the lever 7 preferably comprises a pair of projecting lateral rims 9 against which the stop elements 8 are suitable to abut. In other words, as can be seen, for example, in Fig. 6, Fig. 7 or Fig. 9, according to a preferred embodiment, the lever 7 preferably comprises a pair of projecting lateral rims 9 that project laterally from the lever 7 (i.e., that project in the direction of the axis of rotation of the lever 7) and against which the inhibition elements 8 are suitable to abut. According to a preferred embodiment, the lever 7 comprises a projecting actuation portion 10 that preferably comprises the lateral projecting rims 9. This actuation portion 10 is a plate-shaped portion having an actuation face 11 adapted to be pressed with a finger in order to make the actuation lever 7 assume the angular insertion position.

[0016] According to a preferred embodiment, the connection terminal 2 comprises at least one locking element 12 (Fig. 3, Fig. 8) which is suitable to cooperate with the lever 7 to block or impede selectively in a releasable manner the sliding of the actuation lever 7 between the operative position and the rest position. In particular, according to a preferred embodiment, the locking element 12 comprises at least one locking tooth 12 operatively interposed between the operative position and the rest position of the lever 7. Furthermore, the lever 7 comprises a rotation shaft 13 (Fig. 9), or rotation pin 13, to allow the lever to rotate around said axis of rotation. The rotation shaft 13 is such as to act in contrast with the locking tooth 12 when the operating lever slides between the operative position and the rest position so as to allow triggering the actuation lever 7 in the operative and rest positions in which the sliding of the lever 7 is blocked. In the example, the connection terminal 2 comprises a pair of locking teeth 12 which are located on two opposite sides of the lever 7. It should be noted that, according to a preferred embodiment, to allow the translatory movement of the lever 7 between the operative position and the rest position, the lever 7 comprises a guide portion 30 (Fig. 9) which is slidably mounted inside a guide slot 31 (Fig. 5) preferably provided on the case 4. Moreover, always to allow the sliding of the lever 7, for example, with reference to Fig. 5, according to a preferred embodiment, in the case 4 are provided a pair of shaft slots 32 (which are preferably slots having an open end) in which the shaft 13 can slide.

[0017] According to a preferred embodiment, the case 4 comprises a case wall 14 facing to the lever 7 and which is arranged in such a way as to prevent the lever 7 from rotating in a second direction, opposite to the first direction mentioned above, when the lever assumes the angular blocking position. As can be seen, for example, in Fig. 5 and Fig. 8, according to a preferred embodiment, in the rest position of the actuation lever 7, the projecting actuation portion 10 is arranged in an intermediate position between the case wall 14 and the pair of stop elements 8. Preferably, the case wall 14 is provided with a release aperture 15 through which a tool can be inserted, such as a screwdriver, to allow releasing the lever 7 when it assumes the rest position. According to a preferred embodiment, to reduce possible play between the lever 7 and the wall 14 when the lever 7 assumes the rest position, between the lever 7 and the wall 14, one or more play reduction elements 35 (Fig. 9) may be provided to allow more stable blocking of the lever 7. For example, these play reduction elements can include an engagement aperture 35 provided on the lever 7 to which an engagement tooth (not shown), projecting from the wall 14, can be removably engaged when the lever 7 assumes the rest position. Alternatively, according to an embodiment not shown in the figures, a projecting element can be provided on the lever 7, suitable to interfere by friction with the wall 14 when the lever 7 assumes the rest position.

[0018] After the above description of the structure of a spring connection terminal, an exemplifying method of connection of an electrical conductor to this terminal will now be described with reference to the embodiment illustrated in the annexed figures.

[0019] In this regard, the connection terminal 2 it is considered initially in the configuration of Fig. 1 in the case in which there are no electrical conductors W1 inserted in the terminal. In this configuration, the actuation lever 7 is in the operative position and assumes the angular blocking position (Fig. 1). In this configuration, a rotation of the lever 7 toward the wall 14 is prevented by such wall 14. Starting from this configuration, by pressing on the actuation face 11 of the lever 7, it is possible to make the lever 7 assume the angular insertion position (Fig. 2, Fig. 3 and Fig. 9), contrasting the elastic reaction of the locking spring 3. In particular, during the rotation of the actuation lever, the projecting thrust portion 21 acts on the locking spring 3, and, more particularly, on the blocking arms 6, elastically deforming such spring. Once the lever 7 assumes the angular insertion position, it is possible to easily insert one or two electric conductors W1 through the respective conductor apertures 5 provided in the case 4 while maintaining the pressure on the actuation face 11 of the lever 7. At this point, if the pressure on the lever 7 is released, the locking spring 3 again brings lever 7 back to the angular blocking position (Fig. 1) by acting on the thrust portion 21 of the lever 7.

[0020] At the same time, the locking spring 3 blocks the electrical conductors W1 between the blocking arms 6 and the respective portions of the electrical connection 22 in order to establish the electrical connection between the conductors W1 and the terminal 2.

[0021] As mentioned above, it should be noted that the angular position of the lever 7 in the angular blocking position will, in practice, be slightly different depending

on the number of conductors W1 inserted in the terminal 2. In fact, if two conductors W1 have been inserted in the terminal 2, when releasing the pressure on the lever 7 starting from the said angular insertion position, the lever 7 does not return to exactly the same angular position as the lever had initially, when no conductor W1 was inserted into the terminal 2. In fact, since the lever 7 is pushed back by the two arms 6 of the locking spring, if both are engaged for locking a respective conductor W1, then the lever 7 will return back slightly less. Conversely, if no conductor W1 is inserted into the terminal 2, by releasing the pressure on the lever 7 from the angular insertion position, the lever 7 will return exactly in the initial angular position. Similarly, if only one conductor W1 is inserted in the terminal 2, by releasing the pressure on the lever 7 from the angular insertion position, the lever 7 will return exactly in the initial angular position as the locking arm 6, which is not engaged to block the conductor, will return exactly to the initial position also bringing the lever 7 back to the initial position by acting on the thrust portion 21 of the lever itself.

[0022] Once the conductors W1 are blocked, the actuation lever 7 can be moved in a sliding manner, by pushing it until it assumes the rest position. This can be done, for example, by grasping the projecting actuation portion 10 with two fingers positioned respectively on the actuation face 11 and on a face of the actuation portion 10 that is opposite the actuation face 11. During the sliding of the lever 7, the rotation shaft 13 acts in contrast with the locking teeth 12 elastically deforming these teeth 12 and/or the insulating case 4 until the lever 7 snaps into the rest position (Fig. 5, Fig. 7 and Fig. 8). In other words, during the sliding of the lever 7, the rotation shaft 13 engages or contacts the locking teeth 12 elastically deforming these teeth 12 and/or the insulating case 4 until the lever 7 snaps into the rest position (Fig. 5, Fig. 7 and Fig. 8). After reaching the rest position, the rotation of the lever 7 towards the locking spring is prevented by the stop projections 8. Moreover, in the rest position, the sliding of the lever 7 towards the operative position is restricted by the locking teeth 12. In this sense, the sliding of the lever 7 is blocked in a releasable manner in the rest position. In other words, the lever 7 can be brought back to the operative position by pulling the lever 7, for example by grasping the projecting portion 10, so as to slide it towards that position. During such sliding, the rotation shaft 13 again counteracts the action of the locking teeth 12 until the lever 7 snaps into the operative position.

[0023] Based on the above, it is therefore possible to understand how a spring connection terminal according to this description allows achieving the purposes mentioned above with reference to the state of the prior art.

[0024] Conveniently, the fact of providing an actuation lever slidable between an operative position and a rest position and at least one inhibition element provided to prevent a rotation of the lever when the lever assumes the rest position, allows avoiding or reducing accidental actuation of the locking spring, thus ensuring particularly secure and reliable connection between the electrical conductor and the connection terminal.

Claims

1. Spring connection terminal (2) for an electrical apparatus (1), said terminal (2) comprising:

   - a case (4) in electrically insulated material having a conductor aperture (5) provided to permit the insertion of an electric conductor (W1) in said terminal (2);
   - a locking spring (3) housed in said case (4), the locking spring (3) being a leaf spring provided to block the electric conductor (W1) inserted in the conductor aperture (5) so as to establish an electric connection between the electric conductor (W1) and said terminal (2) ;
   - an actuation lever (7) adapted to cooperate with the locking spring (3) to permit the insertion of the electric conductor in said terminal, said lever (7) being adapted to assume an operating position in which said lever (7) can rotate around a rotation axis between a first angular position and second angular position different from each other,

   said terminal (2) being **characterised in that** it comprises at least one inhibition element (8) provided to prevent a rotation of said lever (7) in a first direction, said lever (7) being adapted to assume a rest position in which the rotation of the actuation lever (7) in said first direction is prevented by said at least one inhibition element (8) and said lever (7) being selectively movable in a sliding manner between said operating position and said rest position.

2. Spring connection terminal (2) according to claim 1, wherein said first angular position is an angular insertion position in which said lever (7) elastically deforms the locking spring (3) to permit the insertion of the electric conductor (W1) in said terminal (2), and wherein said second angular position is an angular locking position in which said lever (7) is positioned so as to allow the locking spring (3) to block said electric conductor (W1) inserted in the terminal (2).

3. Spring connection terminal (2) according to claim 1 or 2, wherein said at least one inhibition element (8) prevents the rotation of the actuation lever (7) towards the locking spring (3).

4. Spring connection terminal (2) according to any of the previous claims, comprising at least one locking element (12) adapted to cooperate with said lever (7) to selectively and releasably block the sliding of said actuation lever (7) between the operating posi-

tion and the rest position.

5. Spring connection terminal (2) according to claim 4, wherein said locking element (12) comprises a locking tooth (12) operatively interposed between the operating position and the rest position, and wherein the lever (7) comprises a rotation shaft (13) to enable the actuation lever (7) to rotate around said rotation axis, the rotation shaft (13) being such as to act in contrast with the locking tooth (12) when the actuation lever (7) slides between the operating position and the rest position so as to make it possible to make the actuation lever (7) snap into said operating and rest positions in which the sliding of said lever is blocked.

6. Spring connection terminal (2) according to any of the previous claims, wherein the actuation lever (7) comprises a pair of projecting lateral rims (9) and wherein said at least one inhibition element (8) comprises a pair of stop elements (8) positioned opposite the actuation lever (7) against which said projecting lateral rims (9) are adapted to abut.

7. Spring connection terminal (2) according to claim 6, comprising a projecting actuation portion (10) which includes said projecting lateral rims (9), the actuation portion being a plate-shaped portion (10) having an actuation face (11) adapted to be pressed with a finger to make the actuation lever (7) assume the first angular position.

8. Spring connection terminal (2) according to any of the previous claims, wherein said case (4) comprises a case wall (14) facing the actuation lever (7)and which is positioned so as to prevent said lever (7) from rotating in a second direction, opposite said first direction, when the actuation lever assumes the second angular position.

9. Spring connection terminal (2) according to claim 8 inasmuch as dependent on claim 7, wherein in the rest position of the actuation lever (7), the projecting actuation portion (10) is arranged in an intermediate position between said case wall (14) and said pair of stop elements (8).

10. Electric apparatus (1) according to any of the previous claims, comprising a spring connection terminal (2) as defined in any of the previous claims.

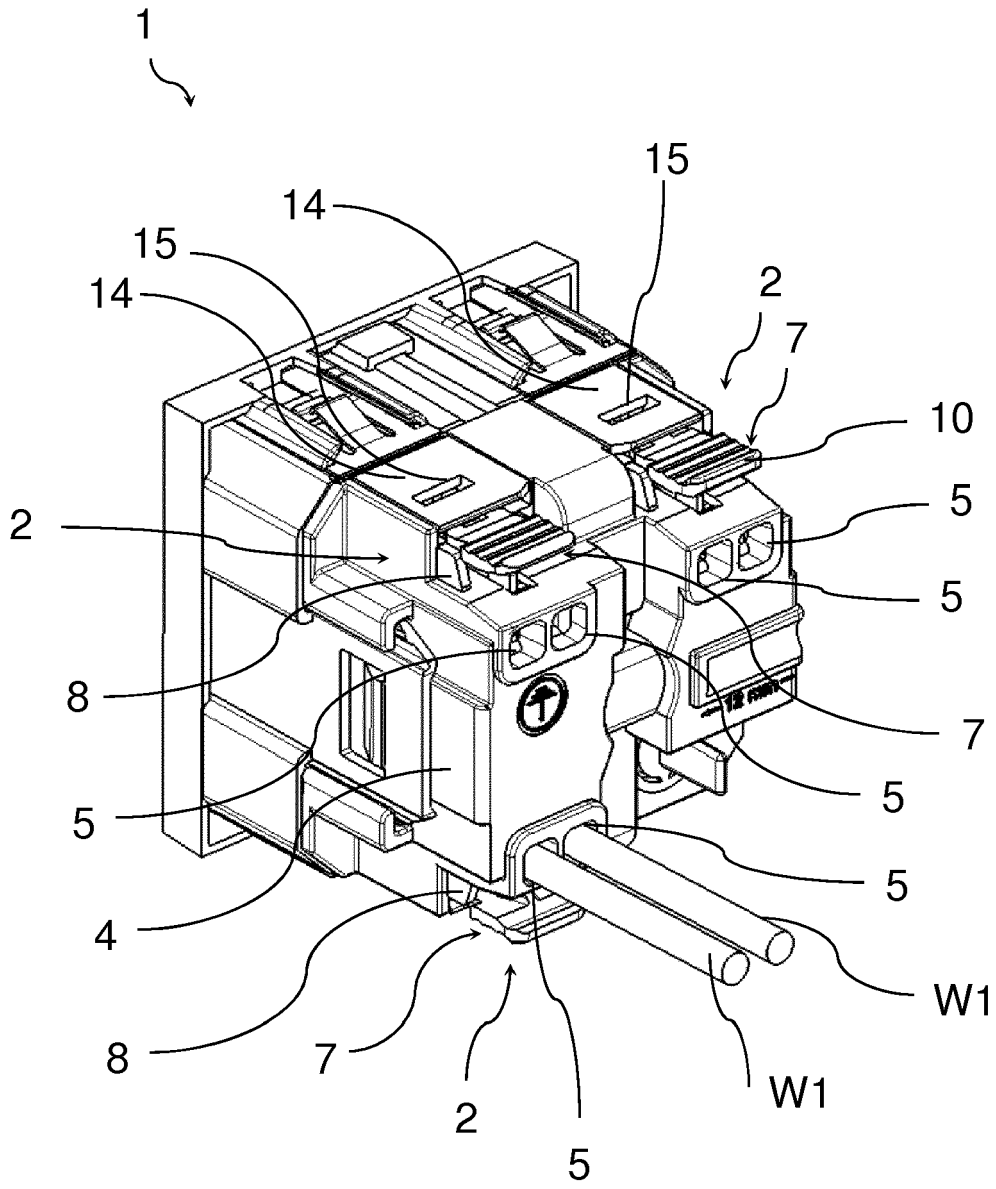

FIG. 1

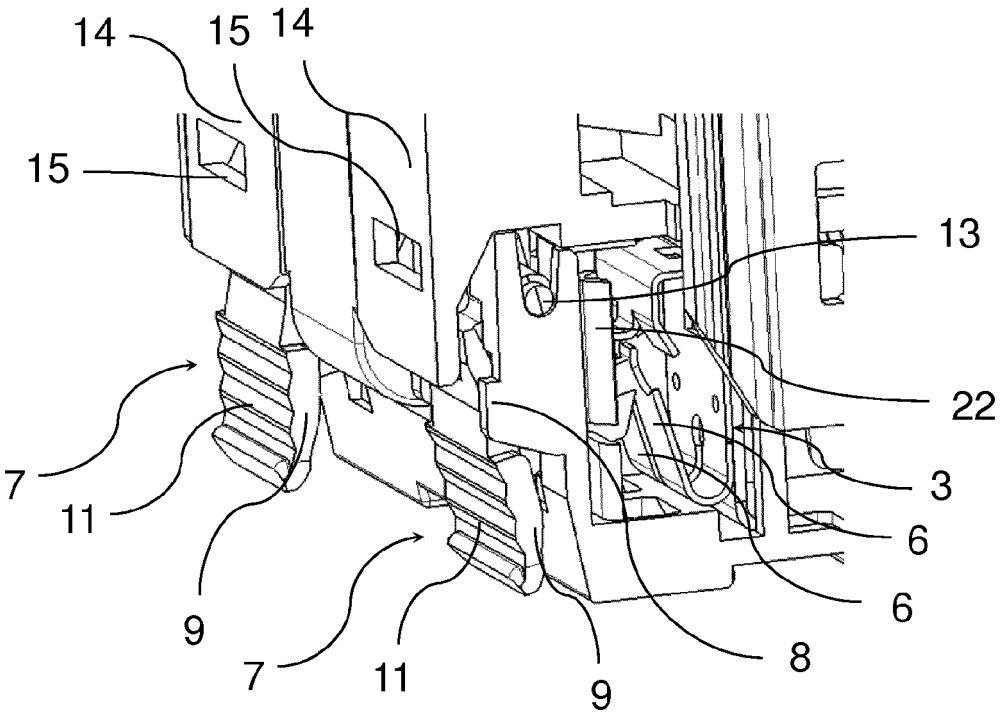

FIG. 2

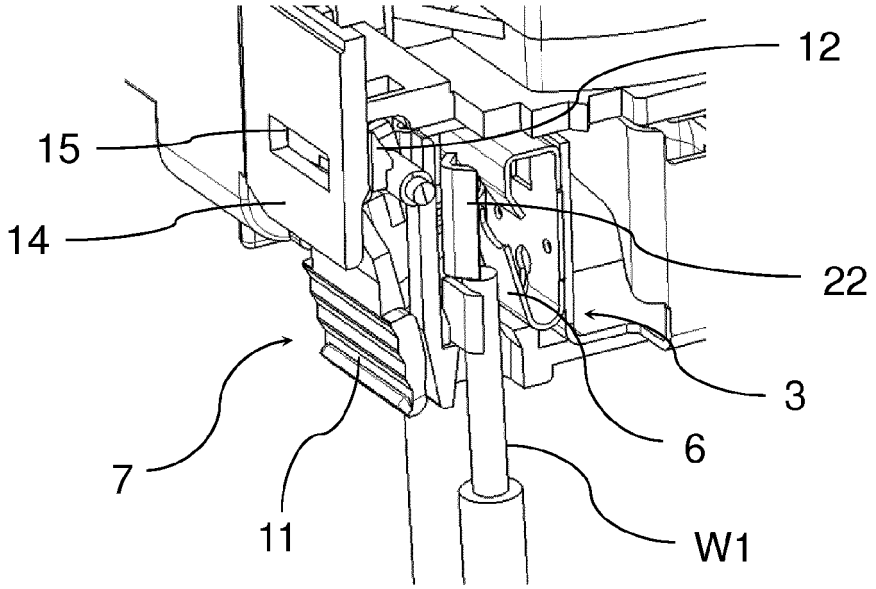

FIG. 3

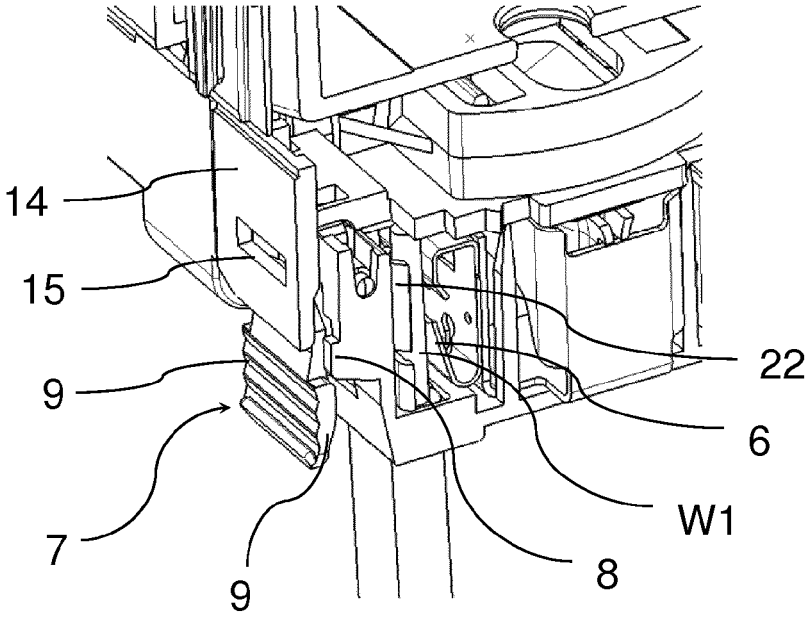

FIG. 4

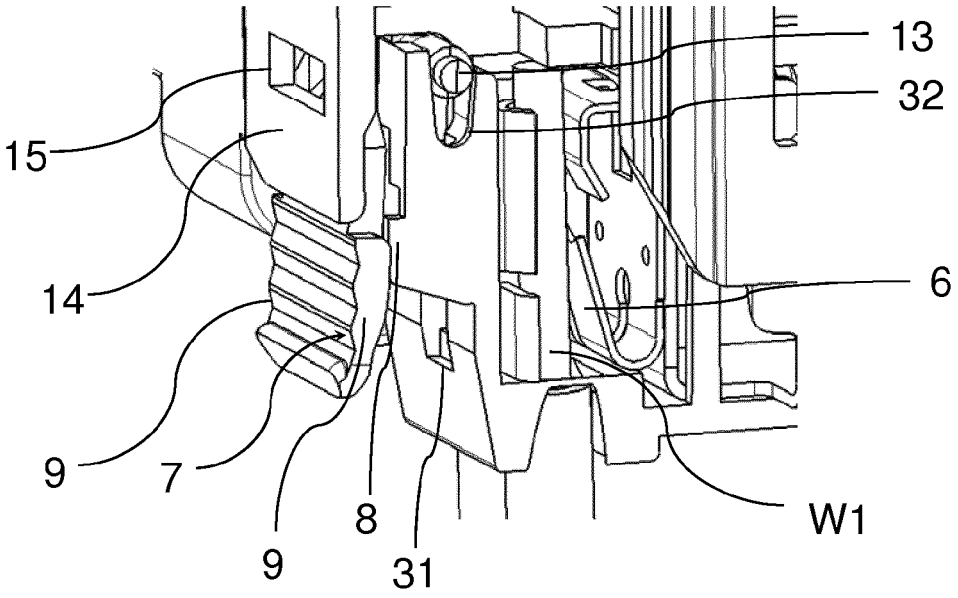

FIG. 5

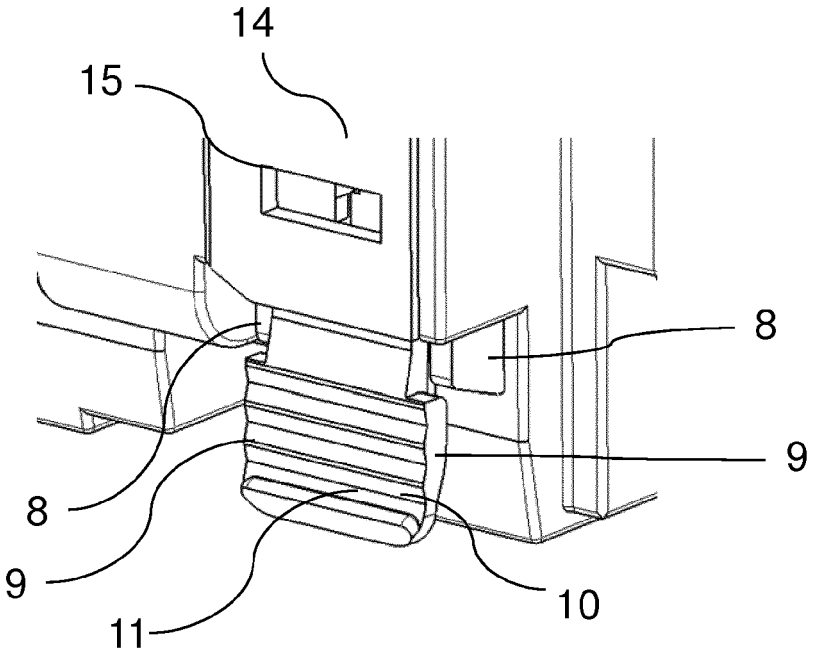

FIG. 6

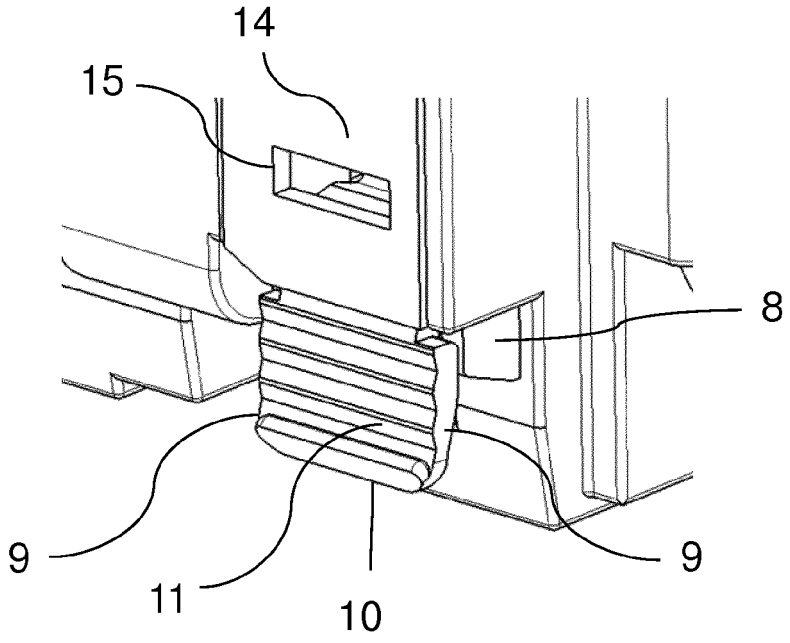

FIG. 7

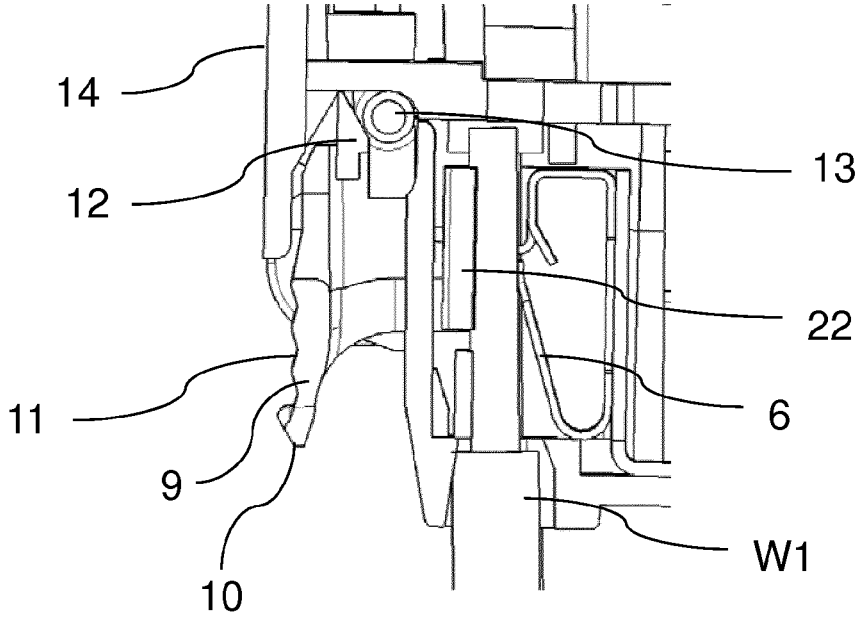

FIG. 8

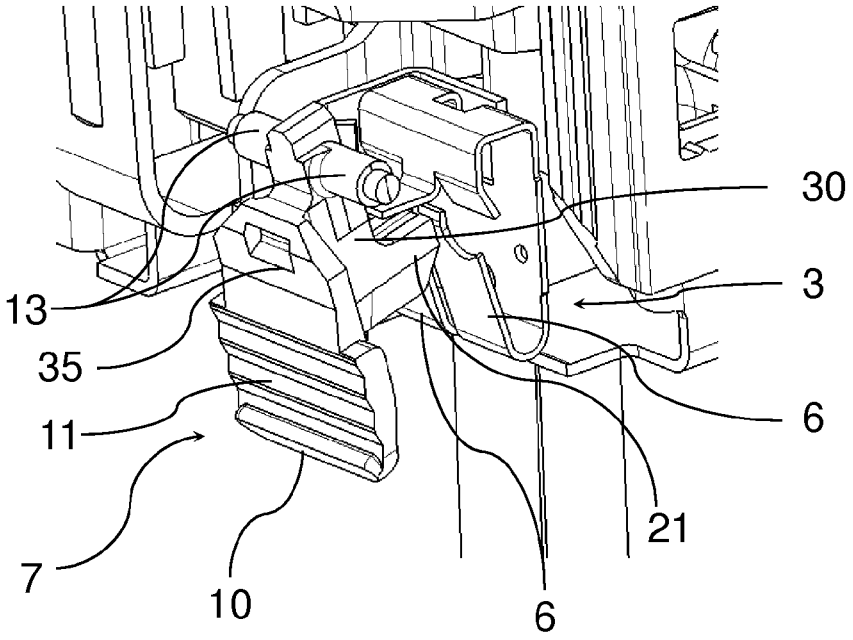

FIG. 9

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EUROPEAN SEARCH REPORT

Application Number
EP 14 20 0432

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
Y	DE 10 2012 005465 B3 (WIELAND ELECTRIC GMBH [DE]) 8 May 2013 (2013-05-08) * paragraph [0001] - paragraph [0060]; claims 1-9; figures 1-13 *	1-10	INV. H01R4/48 H01R9/26 ADD. H01R13/629
Y	US 2005/098419 A1 (MATSUI TSUYOSHI [JP] ET AL) 12 May 2005 (2005-05-12) * paragraph [0086] - paragraph [0089]; figures 23-30c *	1-10	
Y	US 2011/223795 A1 (SCHAFMEISTER ARNDT [DE]) 15 September 2011 (2011-09-15) * paragraph [0031] - paragraph [0040]; figures 1-7 *	1-7,10	
Y	JP 2000 306618 A (MATSUSHITA ELECTRIC WORKS LTD) 2 November 2000 (2000-11-02) * abstract; figures 1-11 *	1-5,8,10	
A	EP 2 355 249 A1 (SCHNEIDER ELECTRIC IND SAS [FR]) 10 August 2011 (2011-08-10) * paragraph [0012] - paragraph [0026]; figures 1-4 *	1-10	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	20 May 2015	Oliveira Braga K., A

CATEGORY OF CITED DOCUMENTS

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EPO FORM 1503 03.82 (P04C01)

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 14 20 0432

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Patent document cited in search report	Publication date	Patent family member(s)	Publication date
DE 102012005465 B3	08-05-2013	DE 102012005465 B3	08-05-2013
		EP 2642599 A1	25-09-2013
US 2005098419 A1	12-05-2005	DE 102004054360 A1	09-06-2005
		JP 4272037 B2	03-06-2009
		JP 2005142107 A	02-06-2005
		US 2005098419 A1	12-05-2005
US 2011223795 A1	15-09-2011	CN 102204015 A	28-09-2011
		DE 102008039868 A1	04-03-2010
		DK 2324533 T3	22-10-2012
		EP 2324533 A2	25-05-2011
		ES 2391535 T3	27-11-2012
		US 2011223795 A1	15-09-2011
		WO 2010031491 A2	25-03-2010
JP 2000306618 A	02-11-2000	NONE	
EP 2355249 A1	10-08-2011	BR PI1100610 A2	30-04-2013
		CN 102195145 A	21-09-2011
		EP 2355249 A1	10-08-2011
		FR 2955978 A1	05-08-2011
		RU 2011103400 A	10-08-2012

EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82