



(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
29.09.2010 Bulletin 2010/39

(51) Int Cl.:
H01H 71/10 (2006.01)

(21) Application number: **09177385.3**

(22) Date of filing: **27.11.2009**

(84) Designated Contracting States:
AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO SE SI SK SM TR
Designated Extension States:
AL BA RS

(72) Inventors:
• **Cirolini, Andrea**
21010 Ferno (Varese) (IT)
• **Zilio, Luca**
21024 Biandronno (Varese) (IT)

(30) Priority: **27.03.2009 IT RM20090143**

(74) Representative: **Carangelo, Pierluigi et al**
Jacobacci & Partners S.p.A.
Via delle Quattro Fontane 15
00184 Roma (IT)

(71) Applicant: **BTICINO S.P.A.**
20154 Milano (IT)

(54) **Modular electrical apparatus with coupling rod to a control level of a further modular electrical apparatus**

(57) Modular electrical apparatus (2) comprising:
- a box-shaped main body (10, 11) delimited between two opposite side walls (13, 14) the distance thereof defines the modular dimension (W2) of the electrical apparatus;
- a coupling rod (3) that laterally projects from the main body (10, 11) protruding relative to said main body on the side of one (13) of said side walls (13, 14) for coupling the electrical apparatus (2) with a further modular electrical apparatus (4) intended to be installed alongside said modular electrical apparatus (2), the coupling rod

(3) being suitable for engaging and operatively cooperating with a control lever (5) of said further modular electrical apparatus (4).

The coupling rod (3) comprises a first rod segment (20) kinematically coupled with said box-shaped main body (10, 11) protruding laterally from said main body on the side of said side wall (13) and a second rod segment (21) adapted to be removably coupled with the first rod segment (20) to allow said first rod segment (20) to be extended to adapt the length of said coupling rod (3) to the modular size of said further electrical apparatus (4).

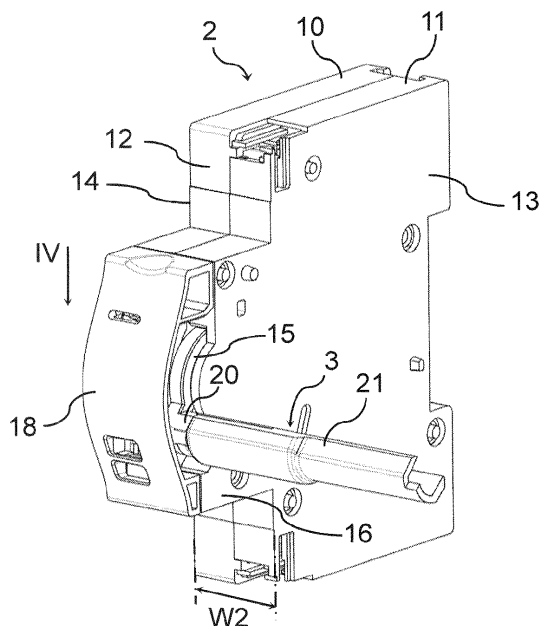


FIG. 2

Description

[0001] The present disclosure relates to the technical field of modular electrical apparatuses.

[0002] In the field of modular electrical apparatuses, particularly for civil and residential appliances, modular electrical apparatuses are known, for example intended for being installed on a DIN rail, provided with a laterally protruding coupling rod. Such coupling rod projects from a side of the box-shaped main body of the electrical apparatus for cooperating with a control lever of a further modular apparatus intended for being installed, in an electrical panel or in a switchboard, alongside the electrical apparatus provided with such laterally protruding coupling rod.

[0003] A first example of modular electrical apparatus of the type indicated above is described in European patent application EP 1441376, which in particular discloses a motor-driven actuation device which can be associated to an electrical circuit breaker for remotely controlling the latter. Also European patent application EP 1744428 discloses an example of modular electrical apparatus in the form of a motor-driven actuation device comprising a laterally protruding coupling rod.

[0004] European patent application EP 1916682 describes a modular electrical apparatus that in particular is composed of an interlock device for electrical apparatuses comprising two laterally protruding coupling rods.

[0005] In the modular electrical apparatuses of the type described above, the length of the laterally protruding coupling rod is generally proportional to the size in number of modules of the modular electrical apparatus with which the electrical apparatus provided with the coupling rod is intended to cooperate. For this reason, the manufacturers of electrical apparatuses currently make multiple different products available, which clearly correspond to respective different product codes, which differ from one another only in that they have laterally protruding coupling rods of different lengths, based on the modular size of the electrical apparatus with which the electrical apparatuses provided with the laterally protruding coupling rod are intended to be made cooperate.

[0006] For example, in the specific case of modular electrical apparatuses in the form of motor-driven actuation devices, such as for example the electrical apparatuses described in the above European patent applications EP 1441376 and EP 1744428, the market requirements require the manufacturers to provide for different motor-driven actuation devices for actuating modular electrical circuit breakers with a different number of poles. In fact, the modular electrical circuit breakers may for example be both of the unipolar type, for example having a size in number of modules equal to "1", thus requiring to be actuated thorough a coupling rod of relatively small length, and of the multipolar type, for example having a size in number of modules equal to "4" in the case of a quadripolar circuit breaker, thus requiring to be actuated by a coupling rod of relatively large length. While

the movement of the control lever of a quadripolar circuit breaker theoretically is identical to that of any other circuit breaker having a smaller number of polarities, such movement requires an adequate coverage of the control lever of the circuit breaker to be actuated by the coupling rod to be guaranteed. In fact, if such condition is not met, problems may occur with the inflection of the control lever of the quadripolar circuit breaker that may cause a failure in the execution of the manoeuvre to be made by the motor-driven actuation device, especially if it is a manoeuvre for closing the circuit breaker. For this reason, currently, the manufacturers produce and sell motor-driven actuation devices that belong to a same product family but that differ from one another in that they have laterally protruding coupling rods of different length. This solution is little flexible and causes disadvantages for both the manufacturer and the end consumer. The latter, in fact, for example if he/she has bought a motor-driven actuation device for unipolar circuit breakers, cannot use the same device for a quadripolar circuit breaker, and vice versa.

[0007] An object of the present disclosure is to provide an electrical apparatus with laterally protruding coupling rod which should be capable of overcoming the drawbacks described above with reference to the prior art.

[0008] Such object is achieved by an electrical apparatus as described in general in the annexed claim 1. Preferred embodiments of said apparatus are described in the dependent claims.

[0009] Further features and advantages of an electrical apparatus according to the present disclosure will appear clearly from the following detailed description, made by way of a non-limiting example with reference to the annexed drawings, wherein:

- figure 1 shows a perspective view of an assembled electrical kit of parts comprising a motor-driven modular control device, provided with a coupling rod, and further comprising a modular electrical apparatus in the form of a quadripolar electrical circuit breaker;
- figure 2 shows a perspective view of the motor-driven modular control device of figure 1 in a first operating configuration;
- figure 3 shows a perspective view of an assembled electrical kit of parts comprising the motor-driven control device of figure 1 and a modular electrical apparatus in the form of a bipolar electrical circuit breaker;
- figure 4 shows a perspective view of the motor-driven modular control device of figure 1 in a second operating configuration;
- figure 5 shows a perspective back view that shows in greater detail the coupling rod of the motor-driven modular control device of figure 1 when this takes on the first operating configuration;
- figure 6 shows a perspective back view that shows in greater detail the coupling rod of the motor-driven modular control device of figure 1 when this takes

- on the second operating configuration;
- figure 7 shows a plan back view that shows in greater detail the coupling rod of the motor-driven modular control device of figure 1 when this takes on the first operating configuration; and
- figure 8 shows a plan view that shows an enlarged portion of figure 7.

[0010] Figure 1 shows, purely by way of an example, an assembled electrical kit of parts 1 comprising a first modular electrical apparatus 2, provided with a laterally protruding coupling rod 3, and further comprising a further modular electrical apparatus in the form of a quadripolar circuit breaker 4 provided with a control lever 5 movable for bringing circuit breaker 4 to an open operating status or a closed operating status. The modular electrical apparatus 2 is disposed alongside and adjacent the quadripolar circuit breaker 4 and the laterally protruding coupling rod 3 is such as to operatively cooperate with the control lever 5.

[0011] In the particular example shown, the quadripolar circuit breaker 4 consists of four unipolar circuit breakers 6 disposed alongside and made integral to each other by a rivet system 8. Each of said unipolar circuit breakers 6 corresponds to a "DIN" module, so the quadripolar circuit breaker 4 has a width W1 corresponding to four DIN modules. In a per se known manner, the control lever 5 of the quadripolar circuit breaker 4 comprises a rod 9 with an essentially C-shaped or U-shaped transversal profile which is fitted on the end portions of the four control levers of the unipolar circuit breakers 6 (not shown in the figures) and is fixed thereto, in order to allow a simultaneous actuation of such control levers. In the particular example shown, the control lever 5 is a lever pivotable around an axis of rotation and suitable for taking two steady angular positions, respectively corresponding to a closed operating status of circuit breaker 4 (wherein the control lever 5 is oriented upwards, as shown in figure 1) and to an open operating status (wherein the control lever 5 is oriented downwards).

[0012] In a per se known manner, the quadripolar circuit breaker 4 is such as to be fixed by a hook system 7 to a DIN rail, not shown in the figures, for allowing the installation of the quadripolar circuit breaker 4 inside a switchboard or an electrical panel.

[0013] In the particular example shown, the modular electrical apparatus 2 is a motor-driven actuation device suitable for allowing an operator, or a control system, to remotely control the quadripolar circuit breaker 4. For example, such motor-driven actuation device 2 is similar to the motor-driven actuation device described in European patent application EP 1441376 or to that described in European patent application EP 1744428.

[0014] In an alternative embodiment the modular electrical apparatus 2 is not necessarily a motor-driven actuation device, for example being an interlock device, for example similar to that described in the European patent application EP 1916682.

[0015] Hereinafter, reference shall only be made to a modular electrical apparatus 2 in the form of a motor-driven actuation device, without introducing any limitation thereby.

[0016] The motor-driven actuation device 2 comprises a box-shaped main body 10, 11 comprising two juxtaposed half-shells 10, 11. The box-shaped main body 10, 11 is delimited between two opposite side walls 12, 13, and essentially plane and parallel, the reciprocal distance W2 whereof defining the modular dimension of apparatus 2, in this example equal to a module. The box-shaped main body 10, 11 is fixable, in a per se known manner, to the same DIN rail circuit breaker 4 is fixable to, or it is directly fixable, in a per se known manner, to a side wall of circuit breaker 4, or is fixable, in a per se known manner, to both the DIN rail and to a side wall of circuit breaker 4.

[0017] The coupling rod 3 of the motor-driven actuation device 2 laterally projects from the main body 10, 11 relative to one of the two opposite side walls 13, 14, in the example relative to the side wall 13, for cooperating with the control lever 5 of the quadripolar circuit breaker 4. It should be noted that, in other words, the coupling rod projects from the main body 10, 11 so as to protrude beyond one of said side walls 13, 14 along a direction perpendicular to said side wall 13.

[0018] In the particular example shown, the coupling rod 3 is pivotable around a rotation axis A1 (figure 5) between two angular operating positions for moving the control lever 5 of circuit breaker 4 in one of the two steady angular positions in order to make circuit breaker 4 take the open operating status or the closed operating status. The coupling rod 3 is mechanically coupled, through a mobile member 15 (turning in this example) and through a suitable linkage (per se known and not shown in the figures) to a motor housed inside the box-shaped main body 10, 11 for being moved by the same motor, for example based on a command sent by a remote operator. According to the embodiment shown in the figures, the mobile member 15 is essentially shaped as a pivotable wheel and is housed in a protruding front portion 16 of the main body 10, 11 of the motor-driven actuation device 2.

[0019] It should be noted that while in figure 1 the coupling rod 3 is shown in the angular position corresponding to the closed operating status ("ON") of circuit breaker 4, in figure 2 such rod 3 is shown in the angular position corresponding to the open operating status of circuit breaker 4. In the particular example shown, the motor-driven actuation device 2 further comprises a locking system 18 for locking the coupling rod 3 in the operating configuration of figure 2, so as to prevent an untimely actuation of the coupling rod 3, attempting to move such rod to the angular position of figure 1, from impairing the safety of the system and of any operators. The locking system for example comprises a sliding cursor 18 along a direction parallel to arrow IV, slidably coupled to the projecting front portion 16 of the box-shaped body 10, 11

and adapted to be moved between two operating positions wherein such cursor 18 respectively allows and prevents a rotation of the pivotable member 15 and thus of the coupling rod 3. A sliding cursor 18 of the type indicated above is per se known and for this reason shall not be further described.

[0020] With reference to figures 2 to 8, the coupling rod 3 comprises a first rod segment 20 kinematically coupled with the box-shaped main body 10, 11 and a second rod segment 21 able to be removably coupled with the first rod segment 20 to allow the first rod segment 20 to be length-extended to adapt the overall length of the coupling rod 3 to the modular size of the particular electrical apparatus 4 the control device 2 is intended to be coupled with. According to the particular embodiment disclosed in this case kinematically coupled means rotatably coupled. According to a variant embodiment, the first rod segment could be slidably coupled to the main body, in this case the kinematically coupling between the first rod segment and the main body should be intended as being a sliding coupling.

[0021] The first rod segment 20 laterally protrudes from the main body 10, 11, in the example it protrudes on the side of the side wall 13 in a direction substantially perpendicular to such wall. In this way, advantageously, when the second rod segment 21 is not coupled with the first rod segment 20, the coupling rod 3 has a relatively smaller overall length, so the control device 2 can be coupled with a modular electrical apparatus 4 of relatively small modular size, whereas when the second rod segment 21 is coupled with the first rod segment 20 the coupling rod 3 has a relatively larger overall length, so the control device 2 can be coupled to a modular electrical apparatus 4 of relatively larger modular size. In other words, the second rod segment is a length extension associable to the first rod segment.

[0022] In a particularly preferred embodiment, the length of the first rod segment 20, or better of the portion thereof laterally protruding beyond the side wall 13, is substantially equal to the width of a DIN module and the overall length of the coupling rod 3, or better of the portion thereof laterally protruding beyond the side wall 13, when the second segment 21 is coupled with the first segment 20 is substantially equal to three times the width of a DIN module. In this embodiment, when the second rod segment 21 is not coupled with the first rod segment 20, the control device 2 can be coupled with a modular electrical apparatus 4 of the same size as a DIN module, for example a unipolar circuit breaker, or with a modular electrical apparatus 4 of a size equal to two DIN modules, for example with a bipolar circuit breaker. On the other hand, when the second rod segment 21 is coupled with the first rod segment 20, the control device 2 can be coupled with a modular electrical apparatus 4 of the same size as three DIN modules, for example a tripolar circuit breaker, or with a modular electrical apparatus 4 of a size equal to four DIN modules, for example with a quadripolar circuit breaker 4.

[0023] Figure 3 shows, by way of an example, the actuation device 2 of the kit of parts of figure 1 coupled with a bipolar modular electrical apparatus 4, totally similar to the quadripolar circuit breaker 4 of figure 1 and that differ therefrom essentially in that it has a modular size smaller than it. In the practice, the bipolar modular circuit breaker 4 has a modular size W3 equal to two modules. As can be seen, the second rod segment 21 has been disconnected from the first rod segment 20, since the first rod segment 20 has a sufficient length (in this example about equal to the width of a DIN module) for allowing the actuation of the control lever 5 by the control device 2.

[0024] In a particularly preferred embodiment, the second rod segment 21 is made of a plastic material having a high elastic modulus value so as to ensure a high bending stiffness. More preferably, the second rod segment 21 is made from polyphthalamide reinforced with a mixed filler (mineral filler and glass fibre) or another material with similar or equivalent features in terms of elastic modulus. More preferably, the second rod segment 21 is made from polyphthalamide reinforced with a 65% of mixed filler (mineral filler and glass fibre) or another material with similar or equivalent features in terms of elastic modulus. As regards the first rod segment 20, although there are less strict requirements in terms of elastic modulus, the same material used for making the second rod segment 21 may be used.

[0025] As can be seen in the example shown in figures 5 and 6, the coupling rod 3 has an essentially C-shaped or U-shaped transversal profile, thus hollow, so as to define an inner coupling channel 22, 23 suitable for receiving a free end portion of the control lever 5 of circuit breaker 4 for engaging and operatively cooperating with said control lever 5. Conveniently, such inner channel 22, 23 comprises a first portion 22 made inside the first rod segment 20 and a second portion 23 made inside the second rod segment 21. Preferably, the coupling channel 22, 23 is a substantially continuous channel with substantially constant cross section when the first 20 and the second rod segment 21 are coupled together. It must be observed that the second rod segment when connected to the first rod segment extends the length of the coupling channel of the first rod segment thus creating a continuous longer channel having constant, or substantially constant, cross section.

[0026] According to an embodiment, one of the two rod segments 20, 21 is adapted to be at least partially fitted inside the other of the two rod segments. Preferably, the second rod segment 21 comprises a widened free end portion 24 (relative to the remaining portion 25 of such rod segment 21) and the first rod segment 20 is adapted to be at least partially axially fitted into such widened free end portion 24.

[0027] According to the embodiment shown in figure 7, the widened free end portion 24 has a cross section (for example along axis A2) of larger inside and outside dimensions than the inside and outside dimensions of the cross section (for example along axis A3) of the re-

maining portion 24 of the second rod segment 21.

[0028] According to an embodiment, the inner walls of the widened free end portion 24 are counter-shaped with respect to outer walls of the first rod segment 20, so that in the engagement a shape coupling is made that allows a stable coupling between the first 20 and the second rod segment 21. To this end, guide elements 26, 27 protruding/retracting counter-shaped with respect to each other, such as for example at least one groove 27 and a complementary ribbing 26 suitable for being received inside the groove, are preferably provided on the outer walls of the first rod segment 20 and on the inner walls 21 of the widened portion 24. For example, two opposite ribbings 25 are provided on the outer wall of the first rod segment 20, suitable for being received in corresponding counter-shaped grooves 27 (of which only one is visible in the figures) provided inside the widened free end portion 24.

[0029] According to a particularly advantageous embodiment, the coupling rod 3 comprises snap locking elements to prevent undesired axial sliding between the second rod segment 21 and the first rod segment 20 when they are coupled together. With reference to figure 8, by axial direction A4 it is meant a direction parallel to that of prevailing longitudinal extension of the coupling rod 5.

[0030] For example, with reference to figure 8 the snap locking elements comprise a tooth 28 that radially projects, that is to say, in radial direction, from the first rod segment 20 to be received in a respective recess 29 provided in the second rod segment 21. With reference to figure 8, by radial direction it is meant a direction perpendicular to the axial direction A4. According to an alternative embodiment, tooth 28 projects from the second rod segment 21 and the recess is provided in the first rod segment 20.

[0031] According to a particularly advantageous embodiment, a substantial portion (for example, 100% or 90% of the overall length) of the first rod segment 20 can be engaged inside the widened free end portion 23.

[0032] According to a particularly advantageous embodiment, one of the two rod segments is provided on the side of the coupling channel 22, 23 with a recess 30, or with a notch, having an open side and intended to be arranged between the first 20 and the second rod segment 21 when they are coupled together. Advantageously, such recess 30 allows an easier disconnection between the two rod segments 20, 21. For example, with reference to figure 8 it should be noted that inserting the head of a flat screwdriver or of another suitable tool, in recess 30 and turning such head levering up walls 31 and 32 it is possible to remove such walls 31, 32 to release tooth 28 from recess 29. Preferably, wall 31 adjacent the open side of recess 30 is a wall with inclined plane to allow an easier insertion and centring of the screwdriver head, or of another suitable tool, inside recess 30.

[0033] Based on the above description, it is therefore

possible to understand how an electrical apparatus according to the present invention is such as to solve the drawbacks mentioned above with reference to the prior art. In fact, it should be noted that an electrical apparatus of the type described above may be coupled with electrical apparatuses having different modular widths, greatly simplifying the production/management costs of a manufacturer but also making the selection and the purchase more practical for an installer. In fact, it is possible to provide for a manufacturer to already provide the second rod segment in the package of the electrical apparatus provided with the laterally protruding coupling rod 3 so as to leave the possibility of configuring the electrical apparatus to the installer, based on the specific requirements.

[0034] The principle of the invention being understood, the manufacturing details and the embodiments may widely vary compared to what described and illustrated by way of a non-limiting example only, without departing from the scope of protection as defined in the annexed claims.

Claims

1. Modular electrical apparatus (2) comprising:

- a box-shaped main body (10, 11) delimited between two opposite side walls (13, 14) the distance thereof defines the modular dimension (W2) of the electrical apparatus;
- a coupling rod (3) that laterally projects from the main body (10, 11) protruding relative to said main body on the side of one (13) of said side walls (13, 14) for coupling the electrical apparatus (2) with a further modular electrical apparatus (4) intended to be installed alongside said modular electrical apparatus (2), the coupling rod (3) being suitable for engaging and operatively cooperating with a control lever (5) of said further modular electrical apparatus (4),

characterised in that

the coupling rod (3) comprises a first rod segment (20) kinematically coupled with said box-shaped main body (10, 11) protruding laterally from said main body on the side of said side wall (13) and a second rod segment (21) adapted to be removably coupled with the first rod segment (20) to allow said first rod segment (20) to be extended to adapt the length of said coupling rod (3) to the modular size of said further electrical apparatus (4).

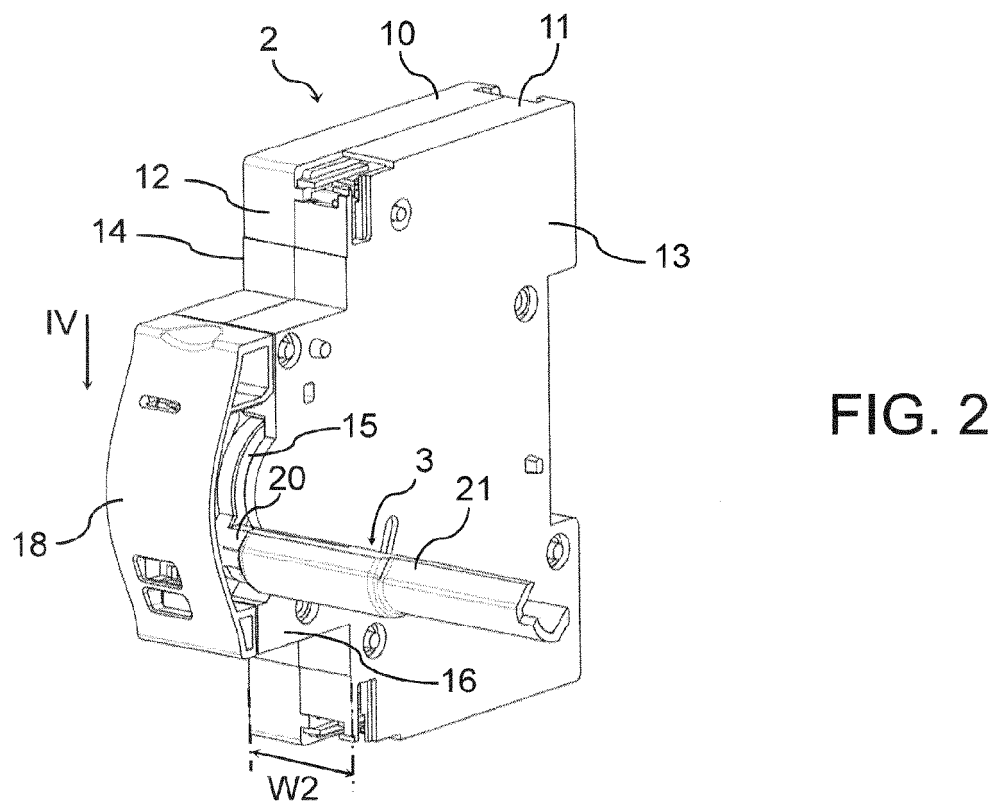
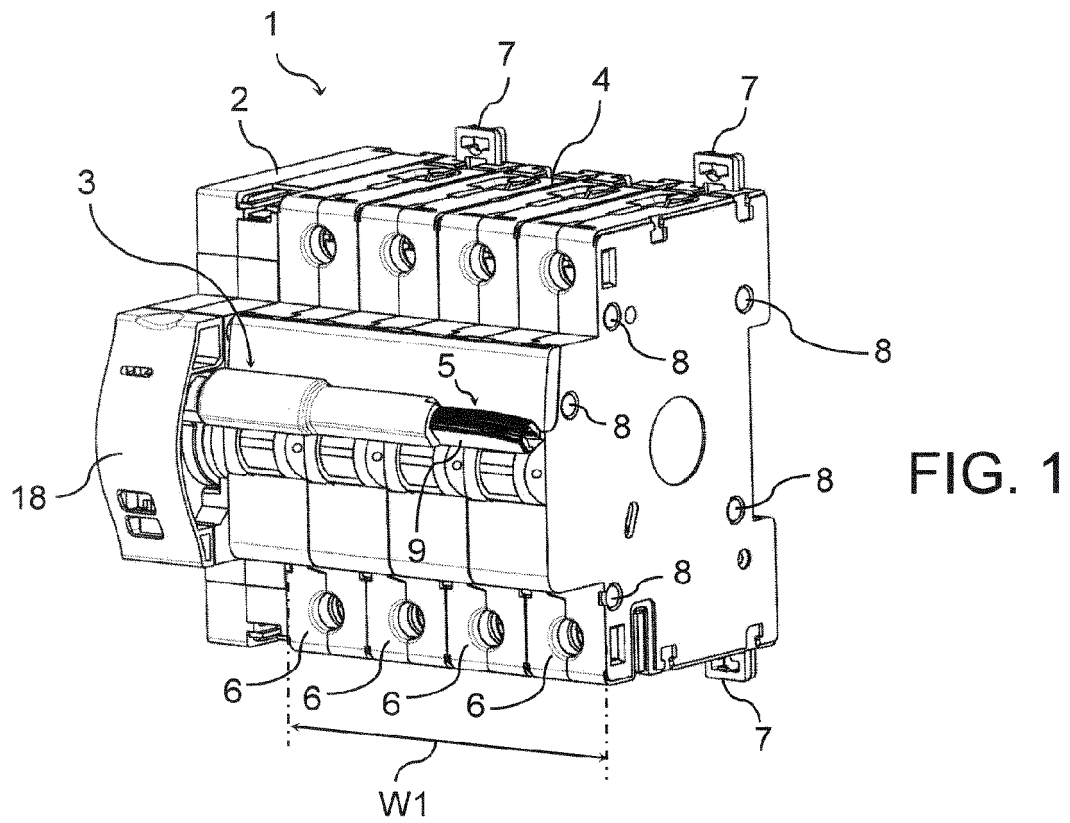
2. Modular electrical apparatus (2) according to claim 1, wherein the coupling rod (3) has an essentially C-shaped or U-shaped transversal profile, so as to define an inner coupling channel (22, 23) comprising a first portion (22) arranged inside the first rod segment

(20) and a second portion (23) arranged inside the second rod segment (21).

3. Modular electrical apparatus (2) according to claim 2, wherein the coupling channel (22, 23) is a substantially continuous channel with substantially constant cross section when the first rod segment (20) and the second rod segment (21) are coupled together. 5
4. Modular electrical apparatus (2) according to claim 3, wherein one of said rod segments (20, 21) can be at least partially fitted into the other of the two rod segments.
5. Modular electrical apparatus (2) according to claim 4, wherein the second rod segment (21) comprises a widened free end portion (24) and the first rod segment (20) can be at least partially fitted into such a widened free end portion (24).
6. Modular electrical apparatus (2) according to claim 5, wherein a substantial portion of the first rod segment (20) can be fitted into the widened free end portion (24). 25
7. Modular electrical apparatus (2) according to claims 5 or 6, wherein the widened free end portion (24) comprises inner walls that are counter-shaped with respect to outer walls of the first rod segment (20), so that upon fitting a shape coupling is made that allows a firm coupling between the first rod segment (20) and the second rod segment (21). 30
8. Modular electrical apparatus (2) according to claim 7, wherein guide elements (26, 27) are provided on the outer walls of the first rod segment (20) and on the inner walls (21) of the widened free end portion (24). 35 40
9. Modular electrical apparatus (2) according to claim 8, wherein two opposite ribbings (25) are provided on the outer wall of the first rod segment (20), suitable for being received in corresponding counter-shaped grooves (27) provided inside the widened free end portion (24). 45
10. Modular electrical apparatus (2) according to claim 9, wherein the coupling rod (3) comprises snap locking elements to prevent axial sliding between the second rod segment (21) and the first rod segment (20) when they are coupled together. 50
11. Modular electrical apparatus (2) according to any one of claims 2 to 10, wherein one of the two rod segments (20, 21) is provided on the side of the coupling channel (22, 23) with a recess (30) having an open side intended to be arranged between the first 55

rod segment (20) and the second rod segment (21) when they are coupled together.

12. Modular electrical apparatus (2) according to any one of the previous claims, wherein the second rod segment (21) is made from polyphthalamide reinforced with a mixed filler comprising mineral filler and glass fibre.
13. Modular electrical apparatus (2) according to any one of the previous claims, wherein the first rod segment protrudes from the main body (10, 11) along a direction perpendicular to said side wall (13). 10
14. Modular electrical apparatus (2) according to any one of claims 1 to 13, wherein such modular electrical apparatus is a motor-driven actuation device which can be associated to an electrical circuit breaker. 15
15. Modular electrical apparatus (2) according to any one of the previous claims, wherein such modular electrical apparatus is an interlock device which can be associated to an electrical circuit breaker. 20 25



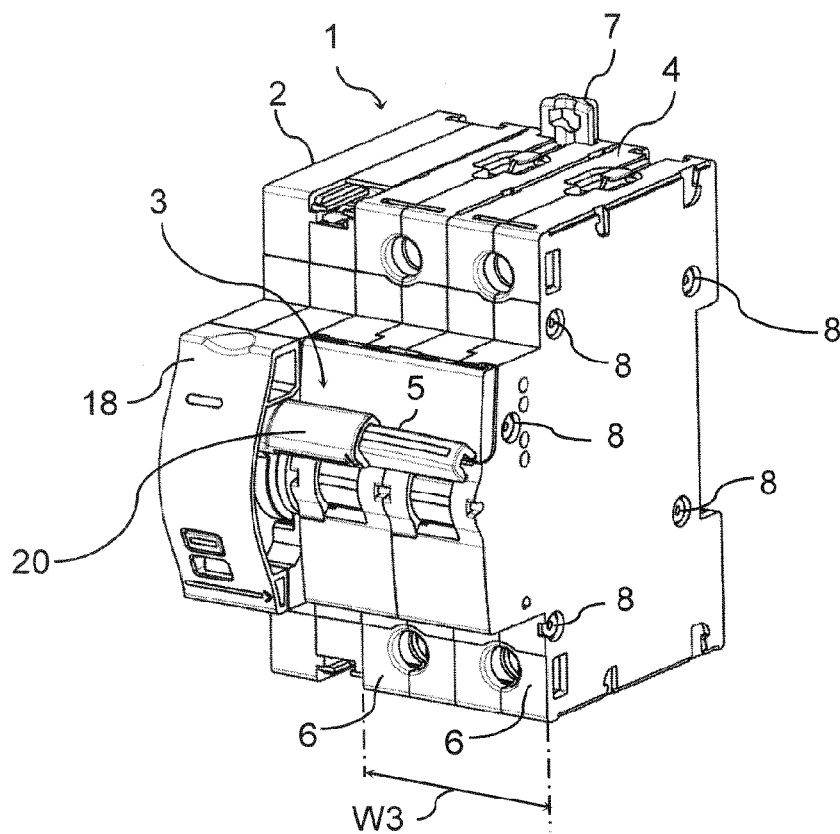


FIG. 3

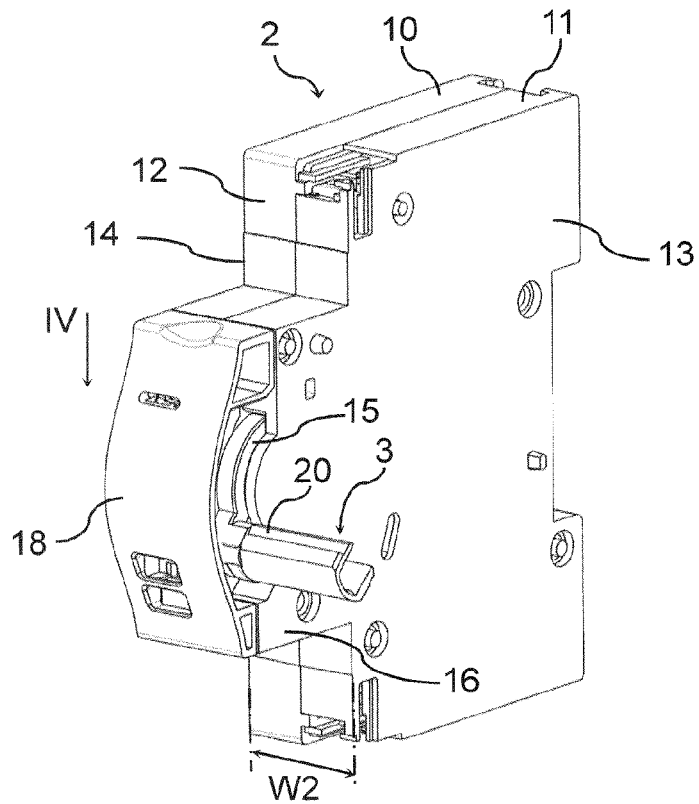


FIG. 4

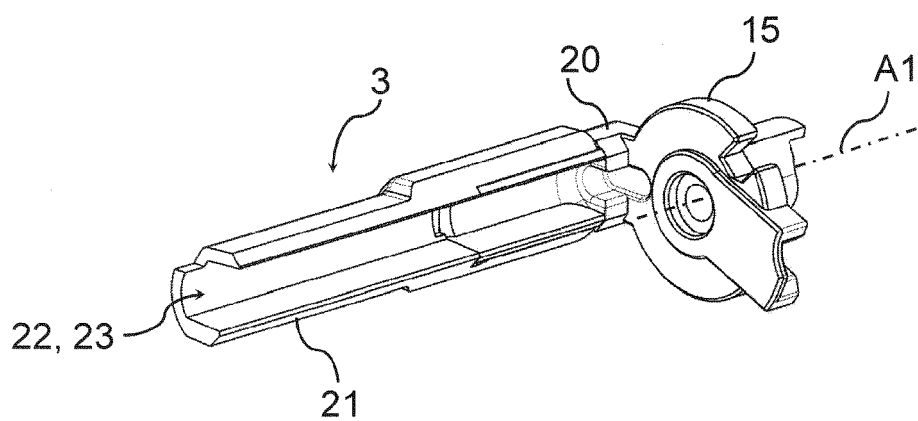


FIG. 5

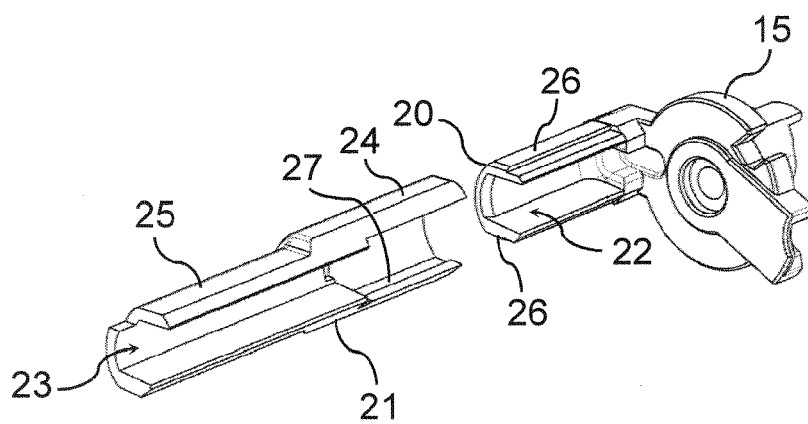


FIG. 6

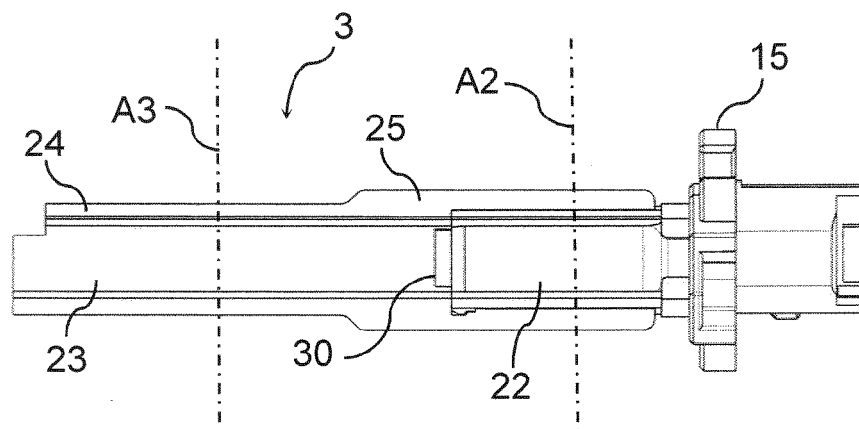


FIG. 7

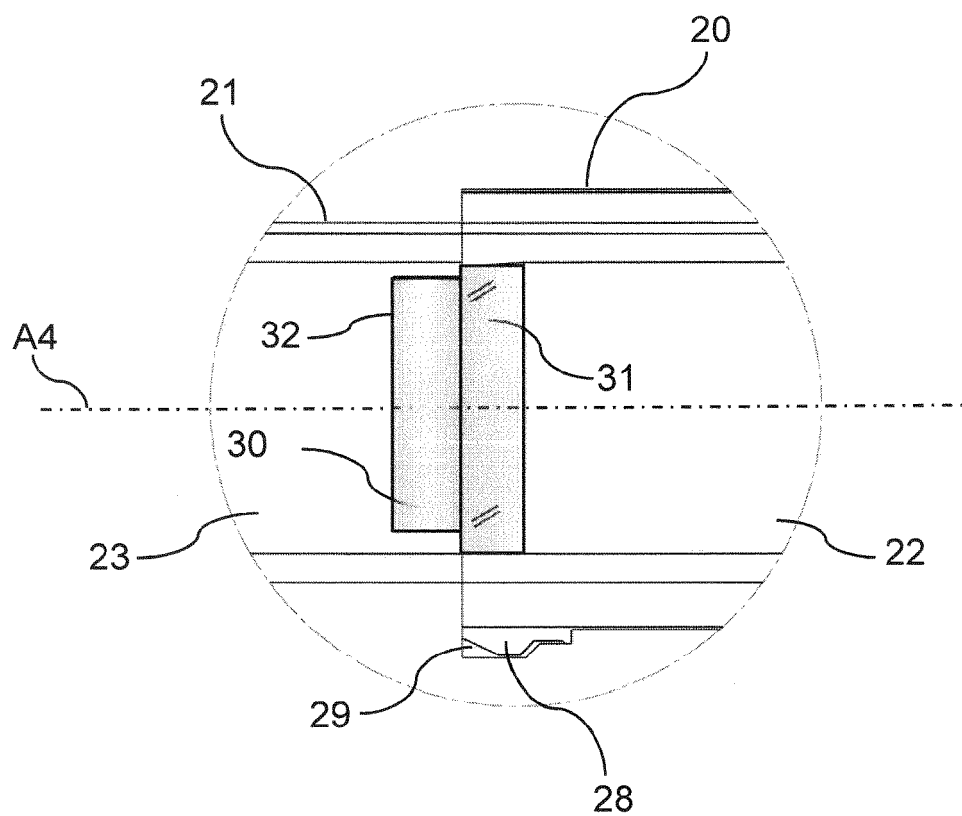


FIG. 8



EUROPEAN SEARCH REPORT

Application Number
EP 09 17 7385

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A	DE 19 73 477 U (SIEMENS AG [DE]) 30 November 1967 (1967-11-30) * claim 1; figure 1 * -----	1-15	INV. H01H71/10
A,D	EP 1 441 376 A1 (BTICINO SPA [IT]) 28 July 2004 (2004-07-28) * the whole document * -----	1	
			TECHNICAL FIELDS SEARCHED (IPC)
			H01H
The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 17 June 2010	Examiner Simonini, Stefano
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

1
EPO FORM 1503 03.82 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 09 17 7385

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
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

17-06-2010

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
DE 1973477	U	30-11-1967	NONE	

EP 1441376	A1	28-07-2004	NONE	

REFERENCES CITED IN THE DESCRIPTION

This list of references cited by the applicant is for the reader's convenience only. It does not form part of the European patent document. Even though great care has been taken in compiling the references, errors or omissions cannot be excluded and the EPO disclaims all liability in this regard.

Patent documents cited in the description

- EP 1441376 A [0003] [0006] [0013]
- EP 1744428 A [0003] [0006] [0013]
- EP 1916682 A [0004] [0014]