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KH MA MD TN(71) Applicant: **ABB Schweiz AG****5400 Baden (CH)**(72) Inventor: **Iapichella, Rosario****IT-21050 Cairate (IT)**(74) Representative: **De Bortoli, Eros et al****Zanoli & Giavarini S.p.A.****Via Melchiorre Gioia, 64****20125 Milano (IT)**(54) **AN ELECTRICAL DEVICE FOR LOW-VOLTAGE SYSTEMS WITH A MOVABLE COVER AND CONTACT SPRING FOR CLAMPING CABLES**

(57) An electrical device for low voltage electric systems comprising:

- an insulating housing defining an internal volume of said metering device;

- one or more groups of terminal blocks accommodated in the internal volume of said metering device, each terminal block being configured to be electrically and mechanically connected with a corresponding cable of an electric line,

wherein the insulating housing comprises, for at least

a group of terminal blocks, a group of cabling holes, each of which is configured to form a passage for corresponding cables of an electric line and further comprises a movable cover mechanically coupled to said insulating housing movable, in a reversible manner, between a rest position (A) and a pressed position (B), the terminal cover being configured to exert a force on said contact spring to move said contact spring away from the contact portion of said fixed electrode, when moving from said rest position (A) to said pressed position (B)

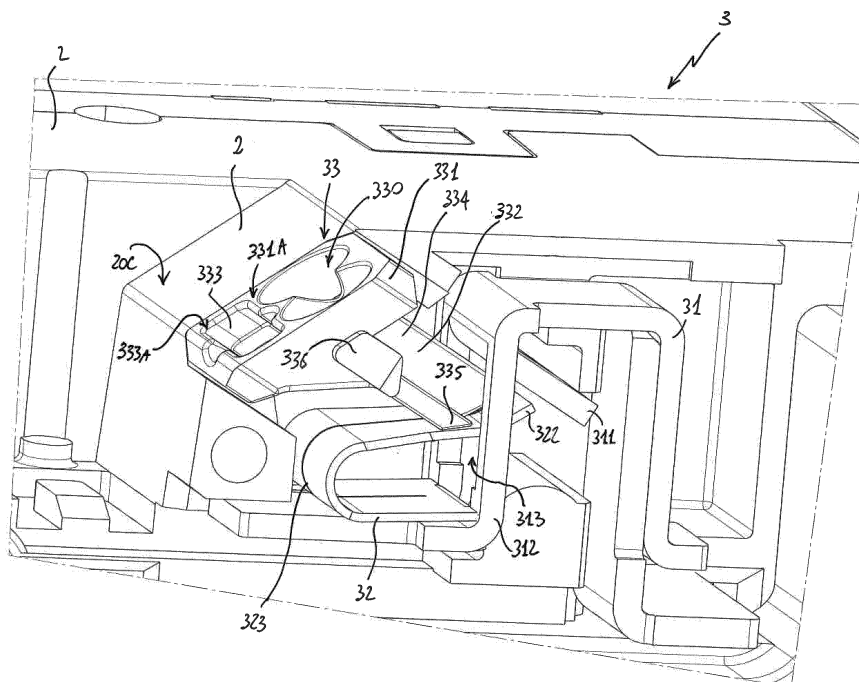


Fig. 4

EP 4 358 308 A1

Description

[0001] The present invention relates to an electrical device for low-voltage electric systems, for example a switching device, a metering device or the like.

[0002] As is known, electrical devices for low-voltage systems (e.g. circuit breakers, residual current devices, energy meters, or the like) normally include terminal blocks for electrical and mechanical connection to the conductors of an electric line.

[0003] Often, these terminal blocks are of the screwless type, i.e. they do not employ screws for connecting to the conductors of an electric line.

[0004] Normally, a terminal block of the screwless type includes a fixed electrode electrically connected to a corresponding conductive path of the electrical device and a contact spring mechanically cooperating with the fixed electrode to retain the cables of an electric line.

[0005] In order to wire a terminal block of the screwless type, a user inserts the cables in the internal volume of the electrical device through suitable apertures in the outer casing and places the cable ends between the fixed electrode and the contact spring in such a way that this latter clamps the cables and exerts a suitable retaining force on the cable.

[0006] The user can carry out such a wiring operation without the use of mechanical tools if the cables to be inserted are sufficiently rigid. Otherwise, the user must insert a screwdriver in the internal volume of the electrical device through a dedicated slot of the outer casing and press the contact spring in such a way to move this latter away from the fixed electrode and obtain a suitable gap in which the ends of the inserted cables can be positioned.

[0007] In order to remove the cables from a terminal block, the user must again insert a screwdriver in the internal volume of the electrical device and press the contact spring as described above in such a way that the clamped cables are released.

[0008] The experience has shown how the above-described wiring and wire-removal operations are often particularly uncomfortable to carry out on the field.

[0009] The user must use a dedicated screwdriver, generally of the flat-blade type.

[0010] Additionally, the user must tune suitably the angle of insertion of the screwdriver in the internal volume of the electrical device in order to intervene correctly on the contact spring without damaging other internal components.

[0011] Finally, the user must generally exert a relevant force to press the contact spring in order to move it away from the fixed electrode.

[0012] The above-described issues can be even made more critical by the circumstance that electrical devices are often installed in positions difficultly accessible to the user with small available spaces.

[0013] In the state of the art, it is still quite felt the need for innovative solutions capable of overcoming or miti-

gating the above-mentioned criticalities as these latter generally entail an increase of the time and costs required for installing the electrical device or for carrying out maintenance interventions thereon, in addition to a risk of damaging the internal components of the electrical device.

[0014] In order to respond to this need, the present invention provides an electrical device according to the following claim 1 and the related dependent claims.

[0015] In a general definition, the electrical device of the invention comprises:

- an insulating housing defining an internal volume of said electrical device and comprising one or more terminal ports, each configured to allow a passage of one or more cables of an electric line;
- one or more terminal blocks, each arranged at a corresponding terminal port of said insulating housing to be electrically and mechanically connected with one or more cables passing through said terminal port.

[0016] According to the invention, one or more of said terminal blocks are of the screwless type. Each terminal block of the screwless type comprises:

- a fixed electrode electrically connected to a corresponding conductive path of said electrical device and including a contact portion to one or more electric cables;
- a contact spring configured to cooperate mechanically with said contact portion to clamp one or more cables passing through said terminal port and inserted between said contact spring and said contact portion;
- a terminal cover arranged at said terminal port and having one or more through holes to allow the passage of said one or more cables through said terminal port.

[0017] According to the invention, the terminal cover of each terminal block of the screwless type is mechanically coupled in a movable manner (preferably in a sliding manner) to said insulating housing, at said terminal port.

[0018] Said terminal cover is movable (preferably translationally movable), in a reversible manner, between a rest position and a pressed position.

[0019] Said terminal cover is configured to exert a force on said contact spring to move said contact spring away from the contact portion of said fixed electrode, when moving from said rest position to said pressed position.

[0020] According to an aspect of the invention, said terminal cover moves from said rest position to said pressed position upon a pressure force exerted by user on said terminal cover.

[0021] Conveniently, said terminal cover comprises a manually operable pressure surface, at which said terminal cover can be operated by a user to move from said

rest position to said pressed position.

[0022] According to an aspect of the invention, said terminal cover moves from said pressed position to said rest position upon a release force exerted by said contact spring on said terminal cover, if at least a cable is not inserted between said contact spring and said contact portion, thereby being not mechanically connected to said terminal block.

[0023] According to an aspect of the invention, said contact spring is formed by a bent laminar body having a blocked end anchored to a fixed point of said electrical device and one or more movable free ends opposite to said blocked end. Each free end of said contact spring is configured to cooperate mechanically with the contact portion of said fixed electrode to clamp a corresponding cable passing through the through holes of the terminal cover and inserted between said free end and said contact portion.

[0024] According to an aspect of the invention, said terminal cover is configured to couple mechanically to said contact spring in proximity of the movable free ends of said contact spring. According to an aspect of the invention, said terminal cover comprises:

- an outer portion configured to obstruct partially said terminal port and having said one or more through holes;
- a pushing portion protruding from said outer portion and extending towards the internal volume of said electrical device. Said pushing portion is configured to couple mechanically to said contact spring, preferably in proximity of the movable free ends of said contact spring.

[0025] Preferably, the pushing portion of said terminal cover comprises one or more lateral surfaces configured to be in sliding contact with one or more cables passing through the through holes of said terminal cover.

[0026] According to an aspect of the invention, said terminal cover comprises one or more first guiding surfaces mechanically coupled in a sliding manner with one or more second guiding surfaces of said insulating housing, at said terminal port.

[0027] Further characteristics and advantages of the invention will become apparent from the detailed description of exemplary embodiments, which are illustrated only by way of non-limitative examples in the accompanying drawings, wherein:

- Figures 1-2 schematically show the electrical device, according to the invention;
- Figures 3-9 schematically show different views of a terminal block of the screwless type included in the electrical device, according to the invention.

[0028] With reference to the cited figures, the present invention relates to an electrical device 1 for low-voltage electric systems.

[0029] For the purposes of the present invention, the term "low-voltage" refers to operating voltage levels lower than 1,5 kV AC and 2.0 kV DC.

[0030] In principle, the electrical device 1 may be any electrical device electrically and mechanically connectable to the conductors of an electric line.

[0031] According to preferred embodiments of the invention, an example of which is shown in the cited figures, the electrical device 1 is a switching device for low-voltage systems, for example a circuit-breaker, a residual current device, or the like.

[0032] According to other alternatives (not shown), however, the electrical device 1 can be a metering device, a detection device, a lighting device, or the like.

[0033] The electrical device 1 comprises an insulating housing 2 defining an internal volume of the electrical device.

[0034] The insulating housing 2 is conveniently made of an electrically insulating plastic material, for example a thermosetting or thermoplastic material.

[0035] The insulating housing 2 has preferably a cuboid shape with pairs of opposite walls and it may be formed by a plurality of shells (e.g. a base shell and a cover shell) mutually joined by means of screws or snap-fit arrangements.

[0036] As shown in the cited figures, at one or more walls of the insulating housing 2, the electrical device 1 may include a number of manually operable user-interface arrangements that may be of known type, for example handles, buttons, micro-switches, or the like.

[0037] The insulating housing 2 comprises one or more terminal ports 21, each configured to allow the passage of one or more cables of an electric line in the internal volume of the electrical device.

[0038] Each terminal port 21 extends along a main longitudinal axis 500 (figure 3) passing through the insulating housing 2 and puts in communication the internal volume of the electrical device with the outer environment.

[0039] Preferably, each terminal port 21 is formed by a shaped pass-through hole (e.g. with a squared section) of the insulating housing 2.

[0040] According to the invention, the electrical device 1 comprises one or more terminal blocks 3 accommodated in the internal volume defined by the insulating housing 2.

[0041] Each terminal block 3 is arranged at a corresponding terminal port 21 of the insulating housing and it is configured to be electrically and mechanically connected with one or more cables of an electric line.

[0042] Preferably, the electrical device 1 comprises a pair of terminal blocks 3 for each electric phase. In this case, a terminal block is electrically connectable to an equivalent electric source while the other terminal block is electrically connectable to an equivalent electric load.

[0043] Preferably, each terminal block 3 may be connected to one or two electric cables of an electric line. Basically, the number of cables connected to each ter-

minal block depends on how the electric line is arranged. In practice, if the electric line includes a single cable for each electric phase, a terminal block will be connected to one cable only whereas, if the electric line includes two cables in parallel for each electric phase, a terminal block may be connected to two cables. According to the invention, one or more of the terminal blocks 3 of the electrical device 1 are of the screwless type, they are electrically and mechanically connectable to one or more electric cables without using screws or similar connecting means.

[0044] In the embodiment shown in the cited figures, the electrical device 1 comprises a single group of terminal blocks 3 of the screwless type, which preferably includes terminal blocks (one for electric phase) electrically connectable to an equivalent electric source.

[0045] According to other embodiments (not shown), however, the terminal blocks 3 of the screwless type may be electrically connectable to an equivalent electric load.

[0046] According to further alternative embodiments (not shown), the electrical device 1 may include multiple groups of terminal blocks 3 of the screwless type.

[0047] Each terminal block 3 of the screwless type comprises a fixed electrode 31 electrically connected to a conductive path of the electrical device (e.g. to a corresponding electric pole). The fixed electrode 31 comprises a contact portion 311, at which it can be removably put in electrical contact with one or more electric cables 100.

[0048] Referring to the embodiment shown in the cited figures, the fixed electrode 31 is formed by a U-shaped conductive body (e.g. made of copper) fixed to the insulating housing 2. A section 312 of the fixed electrode 31, which is in proximal position to a corresponding terminal port 21 of the insulating housing, includes a first cutout 313 and the contact portion 311, which is bent towards in an opposite direction relative to the terminal port 21.

[0049] Conveniently, the contact portion 311 is oriented in parallel to the main longitudinal axis of the terminal port 21, so that a cable 100 inserted through said terminal port can be easily put in electrical contact with the fixed electrode 31.

[0050] Each terminal block 3 of the screwless type additionally comprises a contact spring 32 operatively coupled to the fixed electrode 31.

[0051] The contact spring 32 is configured to cooperate mechanically with the contact portion 311 of the fixed electrode to clamp one or more cables 100 passing through the terminal port 21 and inserted between the contact spring 32 and the contact portion 311. In this way, the cables 100 are subject to a retaining force maintaining them in their operating position.

[0052] Referring to the embodiment shown in the cited figures, the contact spring 32 is formed by a bent laminar body (preferably conductive, e.g. made of steel), which has a blocked end 321 anchored to a fixed point of the electrical device (e.g. the fixed electrode 31) and one or more free ends 322 in an opposite position relative to the

blocked end 321. The laminar body of the contact spring 32 includes a second cutout 323 defining the free ends 322 of the contact spring (figures 4, 6, 8-9).

[0053] The free ends 322 of the contact spring are movable in the sense that they can be bent at different bending angles relative to the blocked end 321.

[0054] Conveniently, the contact spring 32 is structurally integrated with the fixed electrode 31 in order to reduce the overall size of the terminal block 3.

[0055] The blocked end 321 of the contact spring is fixedly coupled to the fixed electrode 31 while the bent free ends 322 of the contact spring pass through the first cutout 313 of the fixed electrode and are oriented towards the contact portion 311.

[0056] Preferably, the contact spring 32 comprises a pair of free ends 322 in such a way that the terminal block 3 can be connected to one or two cables of an electric line.

[0057] In general, each free end 322 of the contact spring 32 is configured to cooperate mechanically with the contact portion 311 of the fixed electrode 31 to clamp a corresponding cable 100 passing through the terminal port 21 of the insulating housing and inserted between said free end and said contact portion.

[0058] Figures 3-4 show a terminal block 3 of the screwless type when no cables are inserted through the corresponding terminal port 21. As it is possible to notice, the contact spring 32 is in a pre-loaded condition (due to the elastic force stored by its bent laminar body) and it has the free ends 322 positioned in proximity of (or resting against) the contact portion 311.

[0059] Figures 5-6 show a terminal block 3 of the screwless type when a single cable 100 is inserted through the corresponding terminal port 21. As it is possible to notice (figure 5), a free end 322B of the spring contact 32 is still in a pre-loaded condition as described above while the other free end 322A is bent separately and exerts a clamping force on a corresponding cable 100 inserted between this free end and the contact portion 311.

[0060] Each terminal block 3 of the screwless type further comprises a terminal cover 33 arranged at the terminal port 21 and having one or more through holes 330 to allow the passage of one or more cables 100 through the terminal port.

[0061] Preferably, the terminal cover 33 comprises a pair of through holes 330 in such a way that the terminal block 3 can be connected to one or two cables of an electric line.

[0062] Preferably, the terminal cover 33 is formed by a shaped body of electrically insulating material. According to an essential aspect of the invention, the terminal cover 33 is mechanically coupled in a movable manner to the insulating housing 2 at the corresponding terminal port 21.

[0063] Preferably, the terminal cover 33 is slidably coupled to the insulating housing 2 so as to be movable relative to this latter.

[0064] The terminal cover 33 is movable, in reversible

manner, with respect to the insulating housing 2 between a rest position A and a pressed position B.

[0065] Preferably, the terminal cover 33 is translationally movable relative to the insulating housing 2. At the rest position A, the terminal cover 33 is mechanically coupled to the contact spring 32 and maintains this latter in a pre-loaded condition.

[0066] When moving from the rest position A to the pressed position B, the terminal cover 33 is configured to exert a force (preferably a pressing force) on said contact spring, which is directed in such a way to move the contact spring 32 away from the contact portion 311 of the fixed electrode 31.

[0067] When the terminal cover 33 is in the pressed position B, an extended gap is formed between the contact portion 311 of the fixed electrode and the contact spring 32 (namely the free ends 322 thereof). The presence of such an extended gap allows the insertion of the cables 100 between the contact portion 311 and the contact spring 32 or the extraction of said cables.

[0068] Preferably, the terminal cover 33 moves from the rest position A to the pressed position B upon a pressure force exerted by user on the terminal cover 33. In order to press the terminal cover 33, a user can conveniently use a mechanical tool, such as a screwdriver.

[0069] According to an aspect of the invention, the terminal cover 33 comprises a manually operable pressure surface 333, at which it can be operated by a user through a mechanical tool to move from the rest position A to the pressed position B.

[0070] Preferably, the manually operable pressure surface 333 is shaped so that a user can employ mechanical tools of different type (a screw-driver of the flat-blade type or a Phillips screwdriver) to operate the terminal cover 33 (i.e. to exert a pressure force on it).

[0071] Preferably, the terminal cover 33 moves from the pressed position B to the rest position A upon a release force exerted by the contact spring 32 on said terminal cover, if at least a cable is not inserted in the terminal block.

[0072] According to the embodiments shown in the cited figures, the terminal cover 33 can slide with respect to the insulating housing 2 by moving in a translational manner along a direction parallel to the main longitudinal axis of the corresponding terminal port 21 of the insulating housing 2. Preferably, the terminal cover 33 comprises one or more first guiding surfaces 336 mechanically coupled in a sliding manner with one or more second guiding surfaces 20 of the insulating housing 2, at the said terminal port 21 (figures 8 and 9).

[0073] Preferably, when it reaches a rest position A, the terminal cover 33 abuts against one or more stop portions 20A of the second guiding surfaces 20 of the insulating housing 2. In this way, the rest position A of terminal cover 33 corresponds to an end-of-run position. Obviously, the length of the path between the rest position A and the pressed position B of the terminal cover 33 is designed in such way that the terminal cover 33

can suitably maintain the spring contact 32 in a pre-loaded condition, when it is in the rest position A.

[0074] According to other embodiments of the invention (not shown), the terminal cover 33 may be arranged in such a way to be rotatable (at least partially) relative to the insulating housing 2. For example, the terminal cover 33 may be arranged in such a way to slide with respect to the insulating housing 2 and move in a rotational manner about an axis perpendicular to the main longitudinal axis of the corresponding terminal port 21 of the insulating housing 2. According to a further aspect of the invention, the terminal cover 33 is configured to couple to the contact spring 32 in proximity of the free ends 322 of said contact spring. This solution is particularly advantageous as it allows decreasing the force to be applied on the contact spring 32 to overcome the elastic force of this latter and bring it in a pressed condition.

[0075] Preferably, the terminal cover 33 is formed by a shaped body of electrically insulating material, which preferably has a mushroom structure.

[0076] Referring to the embodiment shown in the cited figures, the terminal cover 33 comprises an outer portion 331 and a pushing portion 332, which are preferably joined together to form a single piece.

[0077] The outer portion 331 of the terminal cover 33 is configured to obstruct partially the corresponding terminal port 21.

[0078] Preferably, the outer portion 331 comprises an outer surface 331A (facing the outer environment), which extends flush with the outer surface 20C of the insulating housing 2, when the terminal cover 33 is in the rest position A (figures 3, 4 and 6).

[0079] The outer portion 331 of the terminal cover 33 has the above-mentioned one or more through holes 330, in which one or more corresponding cables of an electric line can be inserted.

[0080] The through holes 330 conveniently extend between the outer surface 331A and an inner surface 331B (facing the internal volume of the electrical device) of the outer portion 331 in parallel to the main longitudinal axis of the terminal port 21 (figure 3).

[0081] Preferably, at the outer surface 331A, the outer portion 331 comprises a grooved region 333A including the above-mentioned manually operable pressure surface 333 (figures 4 and 6).

[0082] Preferably, the outer portion 331 comprises a pair of lateral protrusions 336A including the above-mentioned first guiding surfaces 336. The lateral protrusions 336A are mechanically coupled in a sliding manner with corresponding lateral grooves 20B of the insulating housing 2, which include the above-mentioned second guiding surfaces 20. In this way, the terminal cover 33 can slide with respect to the insulating housing 2 as described above.

[0083] When the terminal cover 33 reaches a rest position A, its lateral protrusions 336A abut against the portions 20A of the second lateral surfaces 20 of lateral grooves 20B of the insulating housing 2. The terminal

cover 33 thus is in an end-of-run position when it is in the rest position A.

[0084] The pushing portion 332 of the terminal cover 32 protrudes from the outer portion 331 and it extends towards the internal volume of the electrical device, conveniently along the main longitudinal axis of the corresponding terminal port 21 of the insulating housing 2.

[0085] In a distal position relative to the outer portion 331, the pushing portion 332 has a free end 335 configured to couple mechanically with the contact spring 32, preferably in proximity of the movable free ends 322 of said contact spring.

[0086] Preferably, the pushing portion 332 comprises one or more lateral surfaces 334 configured to be in sliding contact with the cables 100 inserted in the internal volume of the electrical device through the holes 330 of the terminal cover 33. The lateral surfaces 334 of the pushing portion 332 extends along the pushing portion 332 with a rounded profile in such a way to favor the insertion of the cables 100 through the holes 330.

[0087] In the following, the wire-removal and wiring operations of a terminal block 3 of the screwless type are briefly described.

Wire-removal from a screwless terminal block

[0088] A screwless terminal block 3 is supposed to be electrically and mechanically connected to a single cable 100 of an electric line, which is inserted in the internal volume of the electrical device through a corresponding hole 330 of the terminal cover 33 (figures 5-6).

[0089] In this situation, the terminal cover 33 is in a rest position A while the cable 100 is placed between a corresponding free end 322A of the contact spring 32 and the contact portion 311 of the fixed electrode. These latter components cooperate mechanically to exert a retaining force on the cable 100.

[0090] In order to remove the cable 100, the user can push the terminal cover 33 by means of a mechanical tool (e.g. a screwdriver - not shown). This latter is conveniently positioned at the manually operable pressure surface 333 of the terminal cover.

[0091] Upon the pressure exerted by the user, the terminal cover 33 moves translationally from the rest position A to the pressed position B by sliding along the second guiding surfaces 20 of the insulating housing 2 (figures 7-9).

[0092] When moving to the pressed condition B, the terminal cover 33 exerts, through its pushing portion 332, a pressing force on the contact spring 32. The free ends 322 of the contact spring 32 are moved away from the contact portion 311 of the fixed electrode 31. The free end 322A thus decouples from the cable 100, which is no more subject to a retaining force and it can be easily extracted manually by the user (figure 7).

[0093] The user then releases the terminal cover 33. In this way, the contact spring 32 returns in a pre-loaded condition. The release force exerted by the contact spring

32 on the terminal cover 33 moves this latter from the pressed position B to the rest position A.

[0094] The above-illustrated wire-removal operations will be substantially the same, if a pair of cables have to be removed from the terminal block 3.

Wiring of a screwless terminal block

[0095] It is supposed that a screwless terminal block 3 has to be wired with a cable 100 of the electric line. The cable 100 can be inserted in the internal volume of the electrical device through a corresponding hole 330 of the terminal cover 33 (figures 3-4).

[0096] If it is sufficiently rigid, the cable 100 can be directly inserted between a corresponding free end 322 of the contact spring 32 and the contact portion 311 of the fixed electrode 31. To this aim, it is enough to push suitably the cable 100 without pressing the terminal cover 33.

[0097] If the cable 100 is flexible, the user has to push the terminal cover 33 by means of a mechanical tool in such a way to move this latter from the rest position A to the pressed position B (figure 7-9).

[0098] The pushing portion 332 of the terminal cover 33 thus exerts a pressing force on the contact spring 32 so that the free ends 322 of the contact spring 32 are moved away from the contact portion 311 of the fixed electrode 31.

[0099] A gap is thus formed between the free ends 322 of the contact spring 32 and the contact portion 311 of the fixed electrode.

[0100] The user can thus insert the cable 100 through a corresponding hole 330 of the terminal cover 33 and place such a cable between a corresponding free end 322A of the contact spring 32 and the contact portion 311 of the fixed electrode (figure 7).

[0101] The user can then release the terminal cover 33. In this way, the free end 322A of the contact spring 32 can clamp the cable 100 against the contact portion 311 of the fixed electrode while the other free end 322B of the contact spring 32 is no more subject to a pressing force and it returns in a pre-loaded condition in proximity of the contact portion 311 of the fixed electrode. While making such a return movement, the free end 322B of the contact spring 322 pushes the terminal cover 33 from the pressed position B to the rest position A.

[0102] The above-illustrated wiring operations will be substantially the same, if a pair of cables have to be electrically connected to the terminal block 3. In this case, however, when both the cables 100 are connected to the terminal block 3, the terminal cover 33 remains in the pressed position B. Both the free ends 322 of the contact spring 32 are, in fact, engaged to clamp the inserted cables 100.

[0103] In practice, it has been found that the electrical device, according to the invention, fully achieves the intended aim and objects.

[0104] In the electrical device, according to the inven-

tion, the wiring and wire-removal operations of the screwless terminal blocks are greatly facilitated compared to the traditional devices of the state of the art.

[0105] In particular, the wire-removal operations can be carried out efficiently and quickly without the risk of damaging the internal components of the electrical device and the need of exerting an excessively strong force with the mechanical tool.

[0106] As a matter of fact, in the electrical device, according to the invention, the insertion of mechanical tools in the internal volume of the electrical device is no more needed for carrying out the above-mentioned wiring and wire-removal operations of the screwless terminal block. The contact spring 32 can thus be pressed easily without having to tune the position of the mechanical tool and without using a dedicated mechanical tool. Mechanical tools of different types (e.g. a screwdriver of the flat-blade type or the Phillips type) can, in fact, be used to push the terminal cover 33.

[0107] By virtue of the above-mentioned technical capabilities, installation and maintenance operations on the electrical device of the invention are greatly facilitated compared to the traditional electrical devices. These advantages are achieved by the electrical device of the invention without any increase of the overall size compared to the traditional devices available on the market.

[0108] The electrical device of the invention has proven to be easy to manufacture industrially, at competitive costs compared to currently available electrical devices of the state of the art.

Claims

1. An electrical device (1) for low-voltage electric systems, said electrical device comprising:

- an insulating housing (2) defining an internal volume of said electrical device and comprising one or more terminal ports (21), each configured to allow a passage of one or more cables (100) of an electric line;
- one or more terminal blocks (3), each arranged at a corresponding terminal port (21) of said insulating housing and electrically and mechanically connectable with one or more cables (100) passing through said terminal port (21),

wherein one or more terminal blocks (3) comprise:

- a fixed electrode (31) electrically connected to a corresponding conductive path of said electrical device and including a contact portion (311) with one or more electric cables (100);
- a contact spring (32) configured to cooperate mechanically with said contact portion (311) to clamp one or more cables (100) passing through said terminal port (21) and inserted between

said contact spring (32) and said contact portion (311);

- a terminal cover (33) arranged at said terminal port (21) and having one or more through holes (330) to allow the passage of said one or more cables (100) through said terminal port;

characterised in that said terminal cover (33) is mechanically coupled, in a movable manner, to said insulating housing (2) at said terminal port (21), said terminal cover being movable, in a reversible manner, between a rest position (A) and a pressed position (B), said terminal cover being configured to exert a force on said contact spring to move said contact spring away from the contact portion (311) of said fixed electrode, when moving from said rest position (A) to said pressed position (B).

2. Electrical device, according to claim 1, **characterised in that** said terminal cover (33) is mechanically coupled, in a sliding manner, to said insulating housing (2) at said terminal port (21), said terminal cover being translationally movable, in a reversible manner, between said rest position (A) and said pressed position (B).
3. Electrical device, according to one of the previous claims, **characterised in that** said terminal cover (33) moves from said rest position (A) to said pressed position (B) upon a pressure force exerted by user on said terminal cover (33).
4. Electrical device, according to claim 3, **characterised in that** said terminal cover (33) comprises a manually operable pressure surface (333), at which said terminal cover can be operated by a user to move from said rest position (A) to said pressed position (B).
5. Electrical device, according to one of the previous claims, **characterised in that** said terminal cover (33) moves from said pressed position (B) to said rest position (A) upon a release force exerted by said contact spring (32) on said terminal cover (33).
6. Electrical device, according to one of the previous claims, **characterised in that** said terminal cover (33) is configured to couple mechanically to said contact spring (32) in proximity of one or more free ends (322) of said contact spring.
7. Electrical device, according to one of the previous claims, **characterised in that** said terminal cover (33) comprises:
 - an outer portion (331) configured to obstruct partially said terminal port (21) and having said one or more through holes (330);

- a pushing portion (332) protruding from said outer portion (331) towards the internal volume of said electrical device, said pushing portion being configured to couple mechanically with said contact spring (32).

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8. Electrical device, according to claim 7, **characterised in that** said pushing portion (332) comprises one or more lateral surfaces (334) configured to be in sliding contact with one or more cables (100) passing through the through holes (330) of said terminal cover (33). 10
9. Electrical device, according to one of the previous claims, **characterised in that** said terminal cover (33) comprises one or more first guiding surfaces (336) mechanically coupled in a sliding manner with one or more second guiding surfaces (20) of said insulating housing (2), at said terminal port (21). 15
10. Electrical device, according to one of the previous claims, **characterised in that** said contact spring (32) is formed by a bent laminar body having a blocked end (321) anchored to a fixed point of said electrical device and one or more free ends (322) opposite to said blocked end, each free end (322) being configured to cooperate mechanically with the contact portion (311) of said fixed electrode to clamp a corresponding cable (100) passing through the through holes (330) of said terminal cover (33) and inserted between said free end (322) and said contact portion (311). 20 25 30
11. Electrical device, according to one of the previous claims, **characterised in that** it is a switching device or a metering device for low-voltage systems. 35

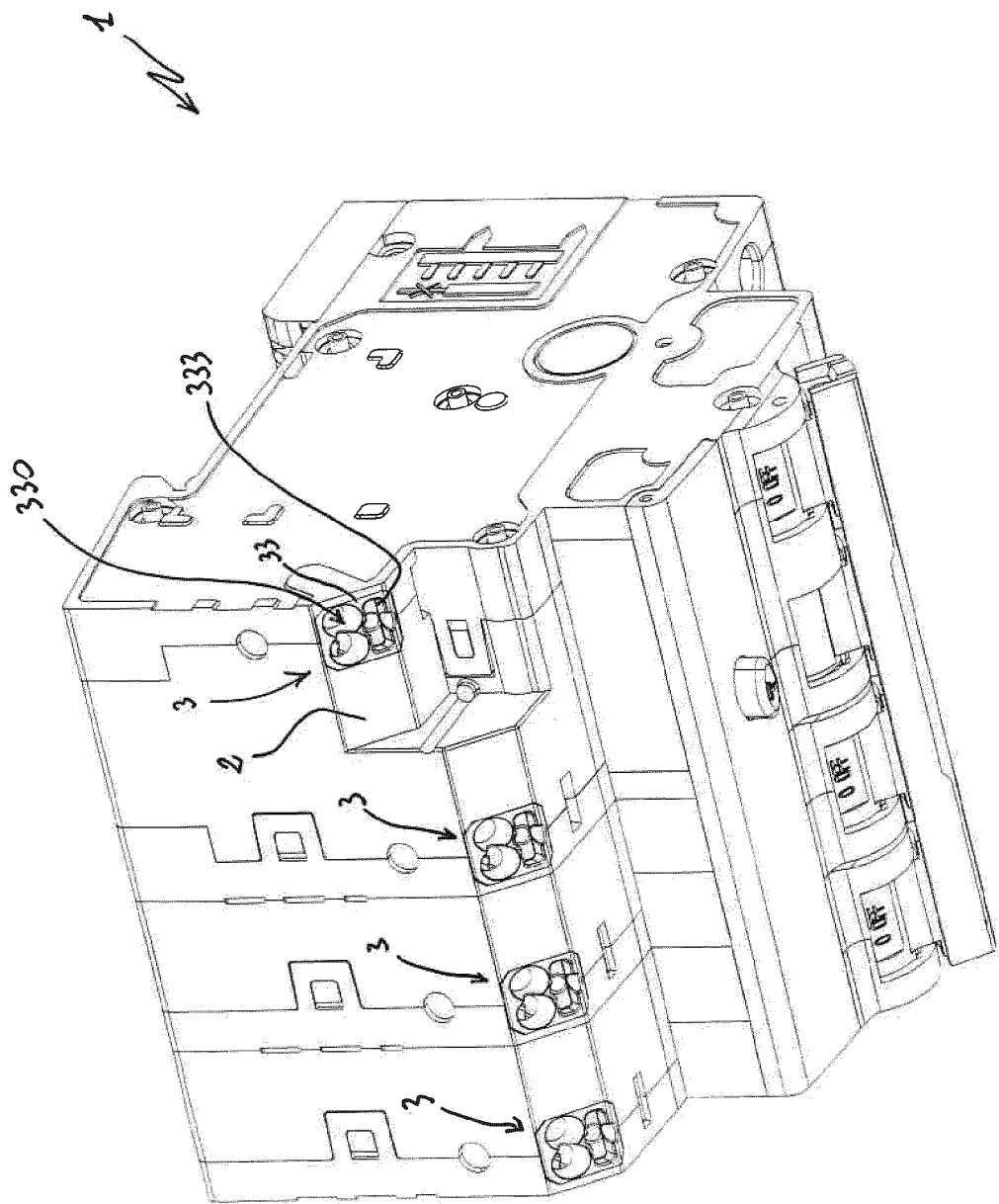
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Fig. 1



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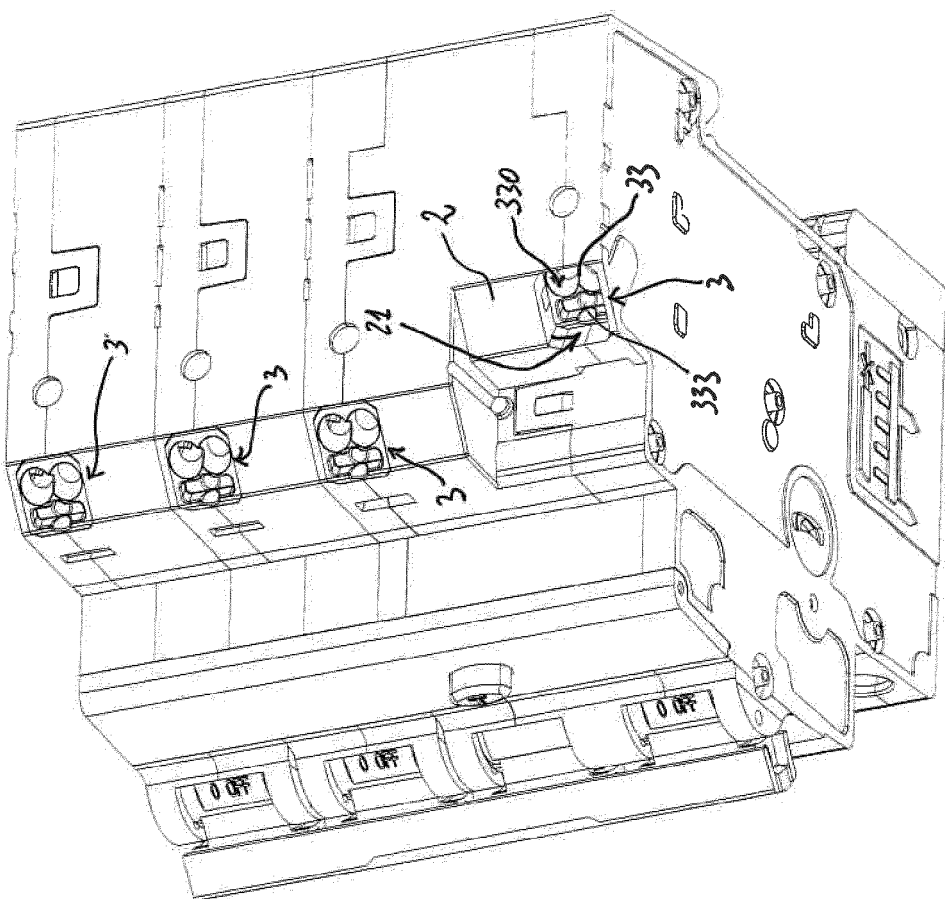


Fig. 2

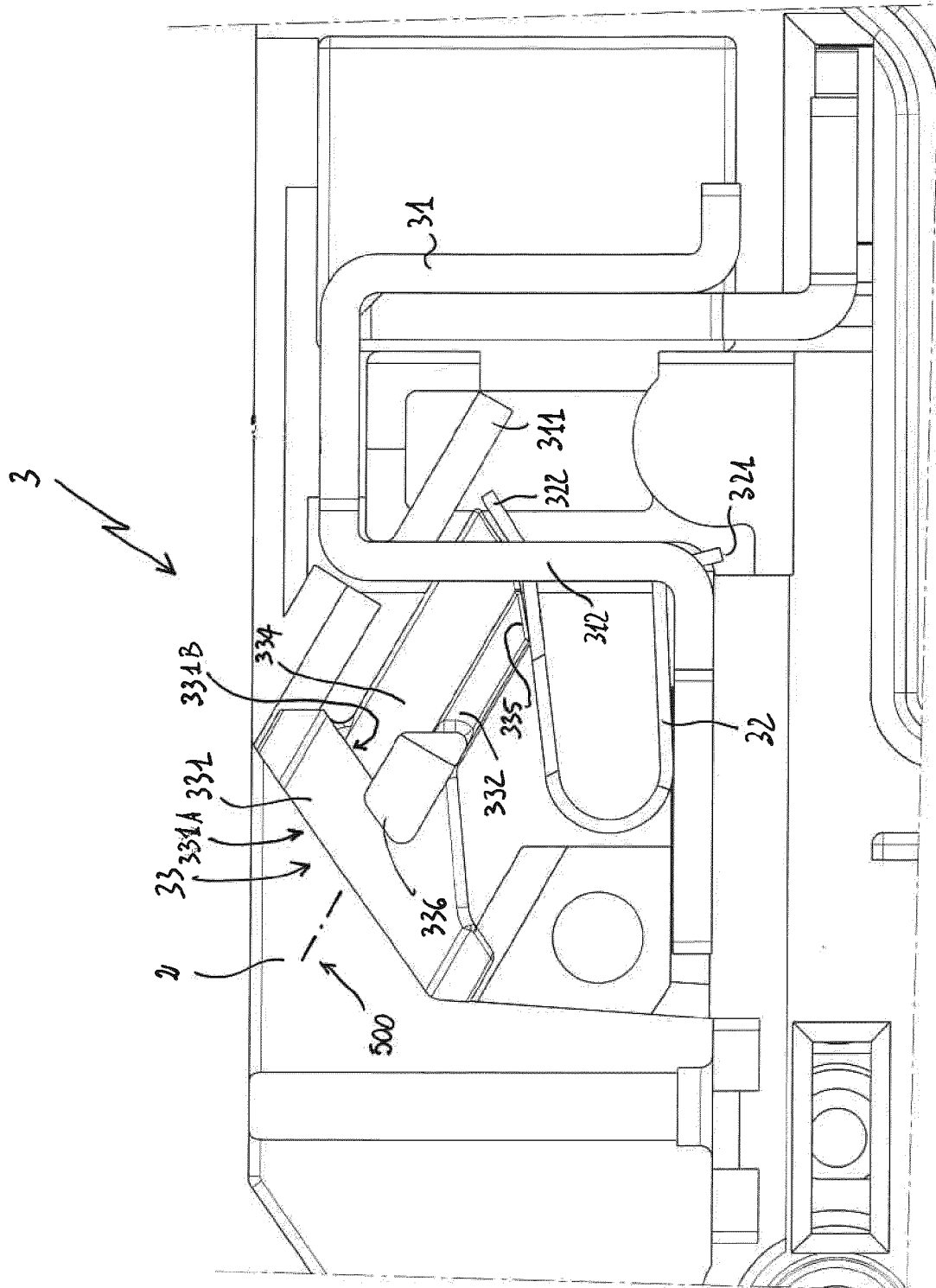


Fig. 3

Fig. 4

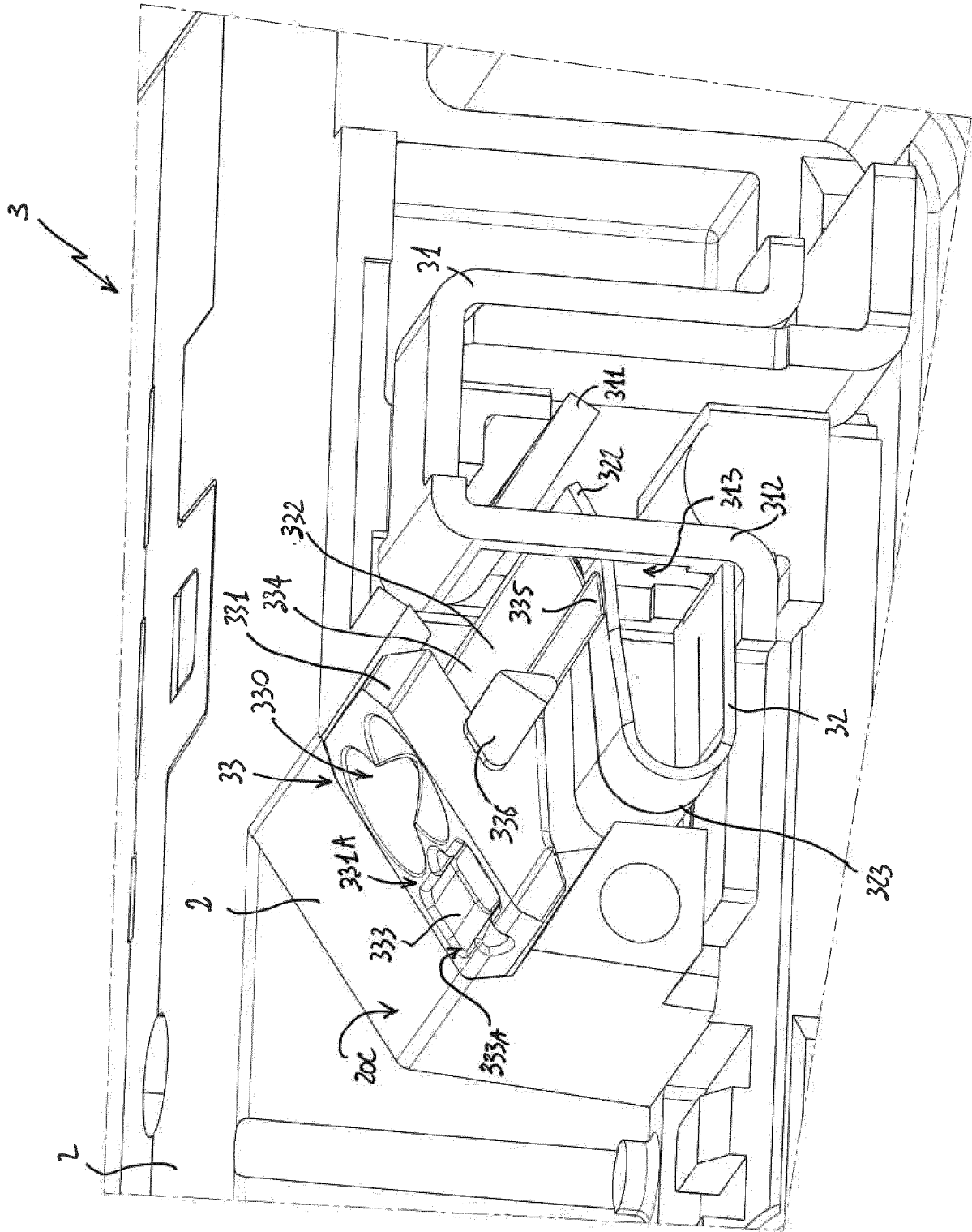


Fig. 5

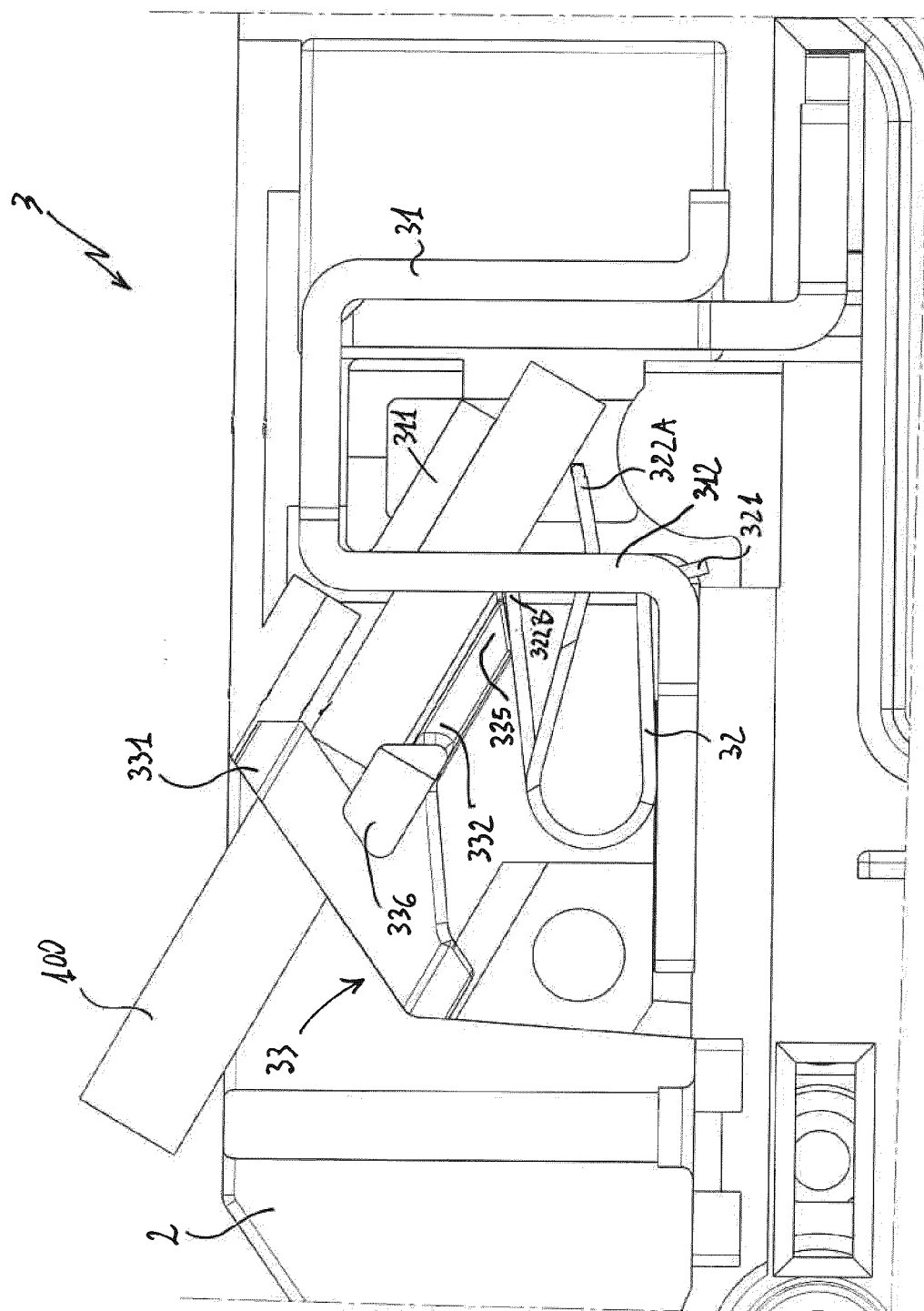


Fig. 6

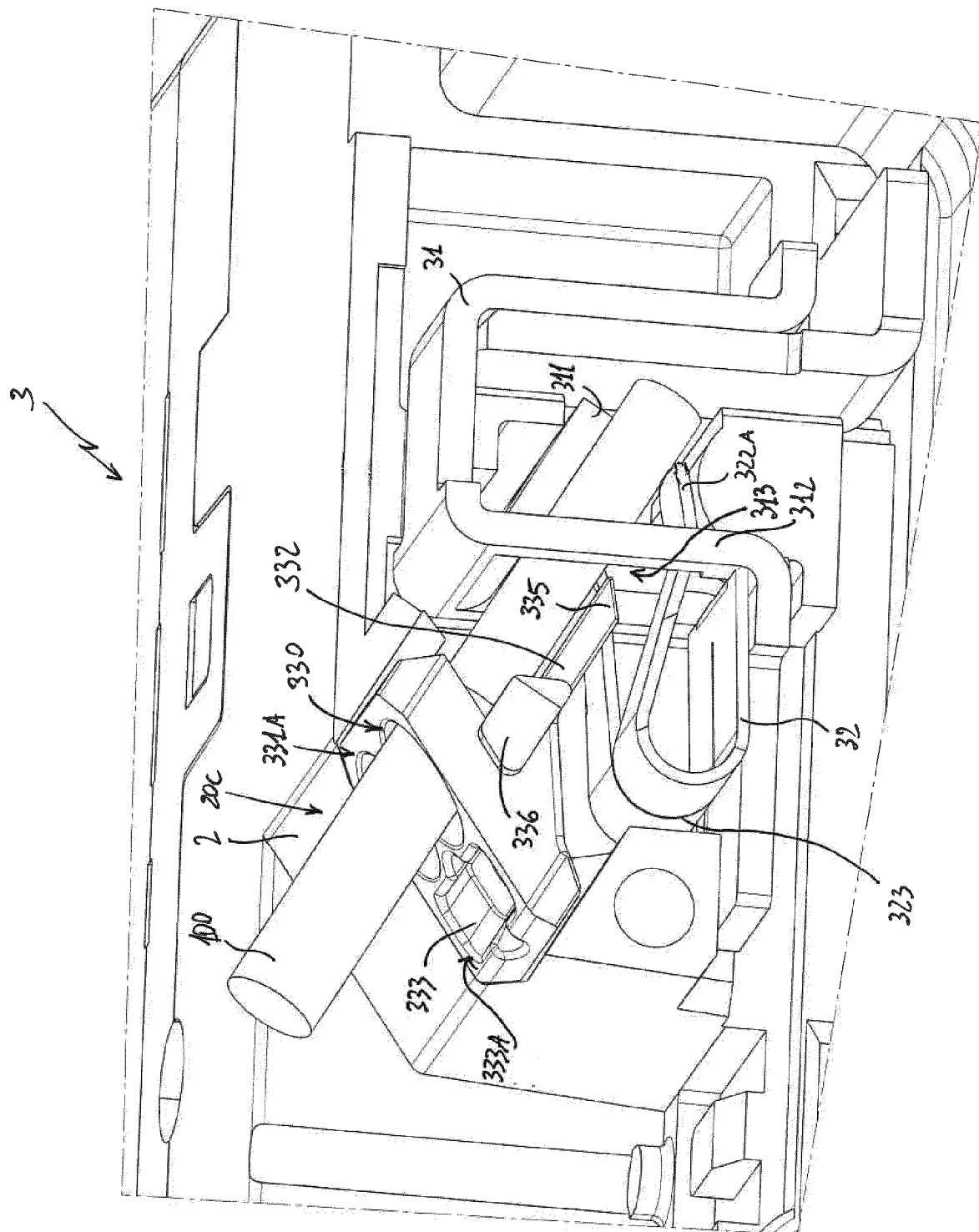


Fig. 7

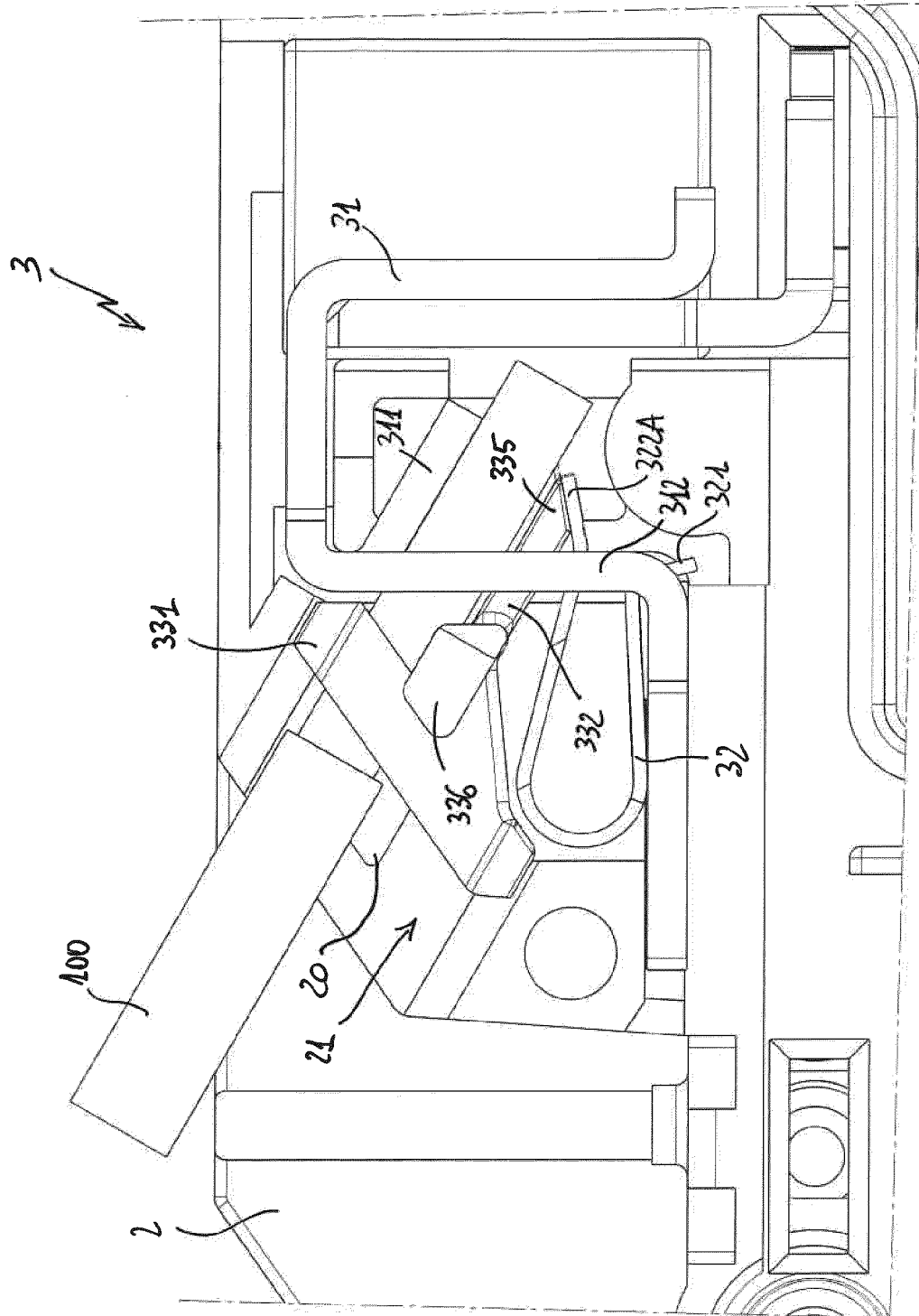
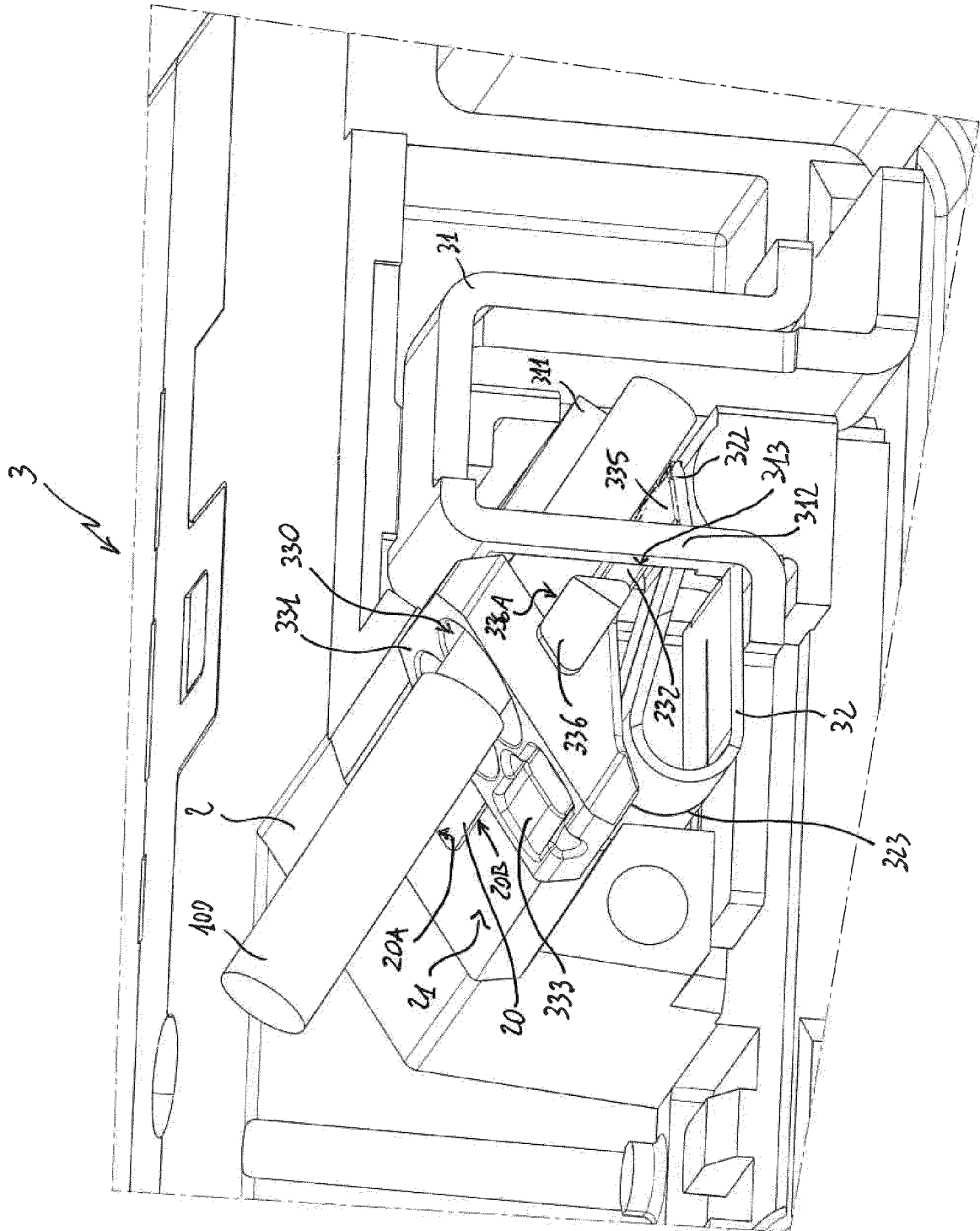
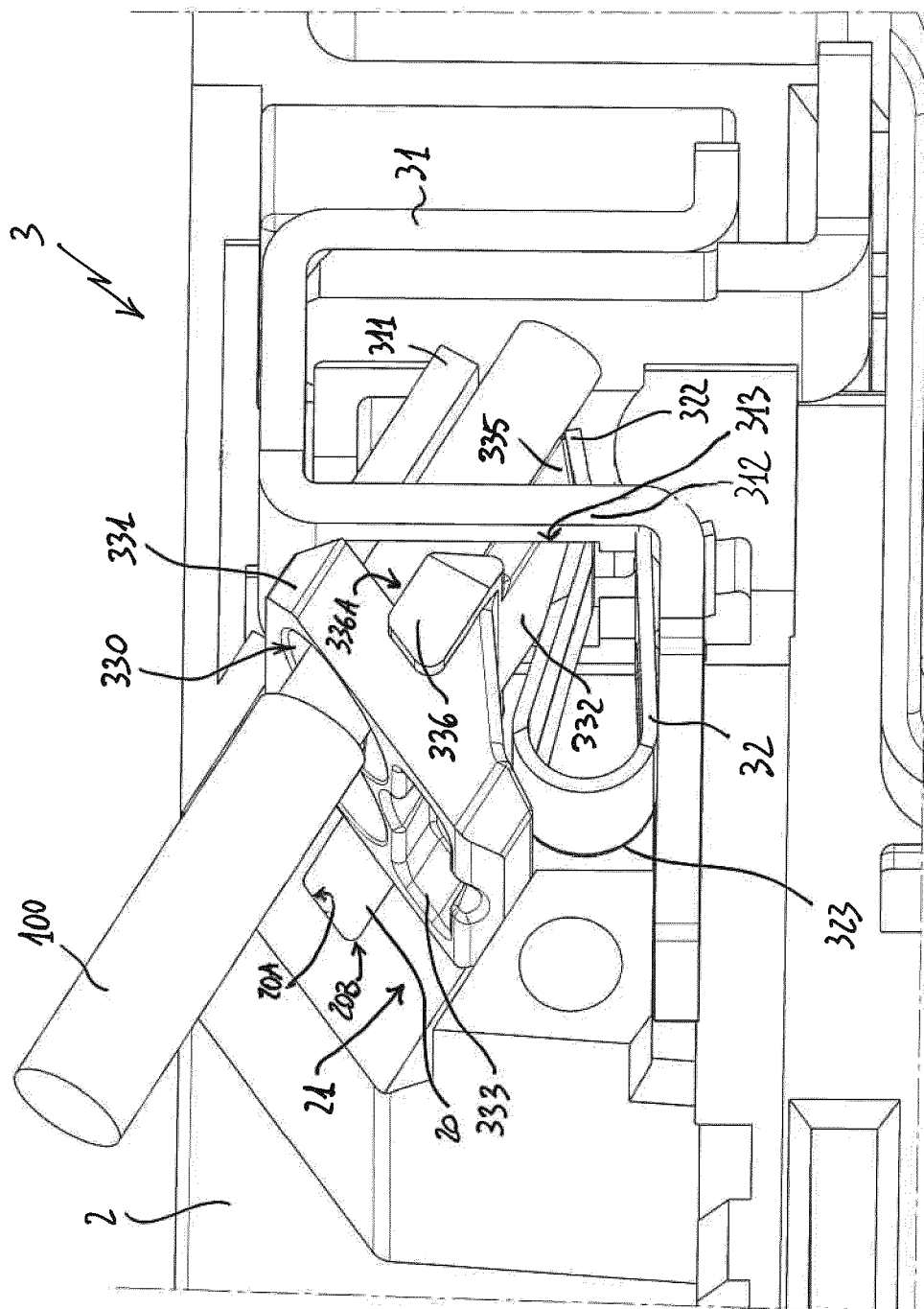


Fig. 8





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