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(54) **Mounting interface for electrical module and corresponding electrical device**

(57) This invention relates to a mounting interface (1) for fixing an electrical module (2) to a wall, wherein said mounting interface (1) has a main plane (3), which is parallel to the wall when the mounting interface (1) is in its normal mounted position, and also has a central opening, parallel to the main plane (3) and through which the electrical module (2) can be inserted in the mounting interface (1).

This mounting interface (1) is characterised in that it comprises an arch (5), or bridge, which has internal plug terminals for plugging the electrical module (2) therein, a module receiving cavity or volume is defined between the central opening and the connection arch (5), and said arch (5) comprises external connection terminals (7) which are accessible for inserting external wires from the outside of the module cavity, without passing in said cavity.

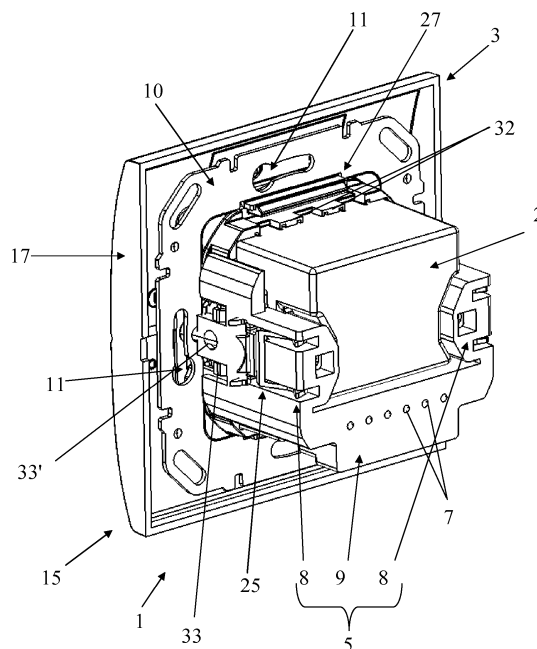


Fig. 1

Description

[0001] This invention relates to equipments for a home electrical network, like domestic electrical power network or home automation network, and especially to electrical devices to be wall mounted, like sockets or control switches, mainly comprising an electrical module and a mounting interface. The object of this invention is both a mounting interface for electrical modules, and an electrical device comprising such a mounting interface with a corresponding electrical module.

[0002] EP0772132 discloses a home automation electrical device having three different electrical modules. Each electrical module comprises a power module and an application module. The wires of the external network are connected to the power module. The application module works as an interface for the user and is plugged to the power module with pins and corresponding connectors. However, for such embodiments, the connection of the external wires to the power module is not really ergonomic. It also often requires long wires which occupy too much space in the mounting box.

[0003] EP0436804 discloses a home automation device in which the application module is fixed to the mounting plate by two pairs of spring blades. The external wires are connected to an insert, which can be received and plugged in a corresponding cavity in the power module.

[0004] In DE29504491, the application module is electrically plugged on the power module but is mechanically fixed to the mounting plate thanks to corresponding springs.

[0005] However, the following problem appears for electrical modules fixed by retaining springs, rather than screws: the wires connected to the back of said module generate forces which tend to push the module out of the mounting box. This can result in a slight but visible offset for the electrical module. It can even result in the electrical module being difficult to insert or not firmly held in place.

[0006] DE4036846 discloses a mounting interface comprising a box for a flush mounting. A printed circuit board is located in the bottom of said box, and comprises connection pins. An electrical module can be inserted in the box and plugged to the connection pins. One of the advantages of such a proposal is that this mounting box can be used as a standard design reference: the inserted module can be taken out and another one with the same geometry and plug layout can simply be inserted, without changing the box configuration. A standard layout can then be obtained, for both the mounting box and the electrical module, which significantly reduces the industrial manufacturing costs.

[0007] However, according to another aspect, such electrical devices usually comprise fixation claws, for holding it in a mounting box or embedded housing, located in the wall. These claws are normally directly anchored by a screw to the electrical module itself, for example on the power module. However, when pressing against the mounting box, the claws can generate high

compression forces on the electrical module and deform it. Such a deformation should be avoided, especially for electronic based modules, as they comprise a lot of fragile electronic components.

[0008] Therefore, the various objectives of the present invention are: developing an industrial standard layout for electrical devices, providing a flexible modular mounting concept, reducing the forces exerted by the claws on the electrical module, avoiding any offset of the module resulting from the forces of interfering wires pushing it out, making the installation more ergonomic and simple and allowing an easy checking of the electrical connections after installation in situ.

[0009] According to the invention, at least the main above mentioned objectives are attained by a mounting interface for fixing or installing an electrical module to or at least partly into a wall, wherein said mounting interface has a main plane, which is parallel to the wall when the mounting interface is in its normal in situ mounted position, and has a central opening through which the electrical module can be inserted in the mounting interface, mounting interface characterised in that it comprises an arch, or bridge, which has internal plug or socket terminals for plugging therein the electrical module equipped with adapted complementary socket or plug elements, by mere nesting, in a direction perpendicular to said main plane, in that a mainly open module receiving cavity or volume is partly defined between the central opening and the connection arch, and in that said arch comprises external connection terminals which are accessible for inserting external wires or conductors from the outside of the module cavity, without passing in said cavity or interfering with its internal volume.

[0010] Thus the main sought objectives are fulfilled by a mounting interface which comprises an arch of a given geometry and which comprises a set of connectors for simply plugging in the module, as well as a set of connectors for receiving the external wires from outside. A larger portion of the volume of the mounting box or embedded housing can then be dedicated to the electrical module.

[0011] From an electrical device point of view, this invention also consists, according to claim 13, in an electrical device to be wall mounted, comprising at least a mounting interface as defined and at least one corresponding electrical module.

[0012] Additional possible advantages features or alternate embodiments of the invention are mentioned in claims 2 to 12 and 14 to 16.

[0013] These and other objects, features and advantages of the present invention will become more apparent from the following description when taken in connection with the accompanying drawings which show, for purposes of illustration only, embodiments in accordance with the present invention:

- figure 1 is a back view of an electrical device to be wall mounted according to the invention;
- figure 2 is a corresponding view of the device of figure 1, without the plate and the surrounding frame;
- figure 3 is a corresponding view of the device of figure 2, with the electrical module removed;
- figure 4 shows a mounting interface according to one embodiment of the invention;
- figure 5 shows a portion of the mounting interface of figure 4;
- figures 6 and 7 both relate to a specific embodiment of the bridge or arch part, figure 6 showing the embodiment of figures 1 to 3;
- figures 8 and 9 show side views of two different embodiments of the mounting interface according to the invention comprising the embodiments of the arch of figures 6 and 7;
- figure 10 shows an electrical module compatible with the mounting interface according to the invention and already shown in figures 1 and 2;
- figure 11 is a cross section showing the complementary shapes of the electrical module and the bridge according to the embodiment of figures 1 to 3;
- figure 12 is a cross section showing the recess of the electrical module for the claw based fixation means of the arch or bridge part of the mounting interface of the invention;
- figures 13 and 14 show electrical devices according to the invention, with a mounting interface and an electrical module of complementary shape;
- figure 15 shows a partial sectional view of a specific connection design;
- figure 16 is an exploded view of an electrical device comprising a mounting interface according to an embodiment of the invention, showing several possible (functional and design) embodiments of such a device;
- figure 17 is a partially exploded view showing a pre-installed mounting interface according to the invention and three examples of electrical modules which can be plugged in it.

[0014] The enclosed figures show, at least partly, a mounting interface 1 for fixing or installing an electrical module 2 to or at least partly into a wall, wherein said mounting interface 1 has a main plane 3, which is parallel to the wall when the mounting interface 1 is in its normal in situ mounted position, and has a central opening 4 through which the electrical module 2 can be inserted in the mounting interface 1.

[0015] According to the invention, said mounting interface 1 also comprises an arch 5, or bridge, which has internal plug or socket terminals 14 for plugging therein the electrical module 2 equipped with adapted complementary socket or plug elements 24, by mere nesting, in a direction perpendicular to said main plane 3.

[0016] A mainly open module receiving cavity or volume 6 (delimited with dotted lines in figures 8 and 9) is

partly defined between the central opening 4 and the connection arch 5, and said arch 5 comprises external connection terminals 7 which are accessible for inserting external wires or conductors from the outside of the module cavity 6, without passing in said cavity 6 or interfering with its internal volume.

[0017] The mounting interface 1 according to the invention is preferably dedicated to fixing an electrical module 2 to a wall, either in a flush mounted configuration (for example within a wall embedded casing 30 - Figure 17), or in an out-of-the wall configuration. The electrical module 2 is preferably for home automation functionalities, and exchanges information with a home automation network, in a compatible electrical format.

[0018] Nevertheless, the plugged-in electrical module 2 can also incorporate more basic functions such as electrical outlet or power socket, ON/OFF switch(es), dimmer switch or similar (Fig. 17).

[0019] As will be described, the mounting interface 1 works as a standard element for fixing any kind of specific electrical module 2 of corresponding layout to a wall, and for connecting it to the electrical home automation network.

[0020] The mounting interface 1 is to be fixed to a mounting element, like a mounting box, embedded in the wall or fixed on the outer surface thereof. The mounting interface 1 also has screw passages 11, for its fixation to said mounting element. A screw passage 11 has the shape of a curved slot, the end of which being large enough to receive the head of the screw, and the rest being smaller and sized for the body of the screw. Therefore, screws can be anchored in the mounting element, and the mounting interface 1 can later be inserted on said screws, and pivoted in the correct position.

[0021] A rocker 20 can be mounted at the top of the electrical module 2, for interaction with the user. The rocker 20 has preferably a set of selection buttons for sending signals and/or feedback means, like indicators or a display. A surrounding frame 17 is fixed on the mounting interface 1, around the rocker 20. The frame 17 is preferably fixed by snap fitting.

[0022] As mentioned before, the mounting interface 1 comprises an arch 5, or bridge, which has internal plug terminals 14 for plugging the electrical module 2 therein. This arch 5, located at the back side 19 of the mounting interface 1, has a global U shape. The connection arch 5 comprises two lateral blocks 8 facing each other, forming opposed legs or arms of said arch and extending from two opposite edges of the central opening 4 in a direction mainly perpendicular to the main plane 3 and a transversal part or block 9, extending from one lateral block 8 to the other as a connection limb, mainly parallel to the main plane 3. The lateral blocks 8 correspond to the legs of the U shape, and the transversal block 9 corresponds to the central part of the U shape.

[0023] The bridge or arch 5 with its lateral legs 8 and its connection links 9 ensures a guidance and centering of the module 2 during its insertion phase, provides a

sharply defined stopping by abutment at the end of the insertion travel and allows for the mechanical constraint (lateral clamping or fastening) to be applied in areas offset from the electrical connection area.

[0024] Said bridge or arch 5 also serves as a rigid backbone support structure for the housing 16 of the module 2.

[0025] Providing a mechanical and electrical interface structure in the shape of an arch or bridge 5 does also allow the installer to check visually and physically the wiring and the strength and quality of the connections at the outer facing terminals 7.

[0026] Preferably, the external connection terminals 7 have insertion openings or sockets facing the external environment around the cavity 6 or directed towards said external environment, and their clamping, locking or blocking control means 7' are accessible through the central opening 4.

[0027] For rigidly connecting the arch 5, and thus the interface device 1 and the module 2, to the mounting box or similar embedded reception housing, various fastening means of known types can be used.

[0028] Advantageously, the arch 5, more specifically its legs 8, can comprise, or have sites 26 adapted to receive, claw based fixation or locking means 25, for example for fixedly connecting the arch 5 to a surrounding embedded housing, a mounting box, or a similar reception device, the control means 25' of said locking or fixation means 25 being accessible through the central opening 4.

[0029] In line with one of the objectives, the invention can also provide for a set of arches and bridges 5 of different shapes and conformations to be provided as modular parts, connectable directly to the plate 10 or on the intermediate part 12, each type of arches 5 being adapted for a correspondingly shaped type of electrical module 2. Preferably, the legs 8 and the links 9 of the arch 5 having a rigid bulky structure and forming block type parts, made preferably of hard plastic material, as the intermediate part 12, their external faces fitting in shape partially, at least at some local areas, the internal face of an embedded housing or similar wall mounted reception device.

[0030] In this context, the skilled person will understand that, depending in particular on the type of the electrical module 2, the plug or socket terminals 14 and the external connection terminals 7 can be either power or signal terminals, or a mixture of both types. In particular, blade type power connection means can be used (figures 10 and 15).

[0031] Furthermore, the outer terminals 7 can be situated on one or several faces of the transversal part 9, for example of a square section, directed in different directions.

[0032] The mounting interface 1 also has a flat element 10, pressed against the mounting element and to which the surrounding frame 17 is attached, possibly through the intermediate part 12. This flat element 10 defines the main plane 3 of the mounting interface 1. As will be de-

scribed later on, this flat element is preferably in the form of a plate 10, made of metal or even plastic. After installation, this flat element 10 is parallel to the wall. In a flush mounted configuration, this flat element mainly arrives at the level of the outer surface of the wall. As shown in figures 8 and 9, one side of the mounting interface 1 mainly corresponds to the user side 18, and the other side is the back side 19 of the mounting interface 1. Once inserted, the electrical module 2 is in the back side 19 of the mounting interface 1. The rocker 20 is in the user side 18 of the mounting interface 1.

[0033] The flat element 10 has a central opening 4, preferably of a square or rectangular shape. The electrical module 2 is to be inserted through this central opening 4, in a movement perpendicular to the main plane 3. Therefore, the cross section of the electrical module 2 and the central opening 4 have corresponding shapes.

[0034] Means for holding the electrical module 2 to the mounting interface 1 are also provided. Such means can for example be a snap fitting solution 21, with at least one hook provided on the electrical module 2, cooperating with a surface next to the central opening 4. Other known solutions use blade shaped springs, mounted on the external surface of the electrical module 2, and pressing outwardly on the mounting interface 1, and more precisely on side walls 13 further described later on. Of course, other fixation means can be used.

[0035] As can be seen from the enclosed drawings, the volume of the receiving cavity 6 is defined partly physically by the arch 5 and partly (mainly) virtually by the projection of the central opening 4 (see in particular figures 8 and 9). Said cavity 6 forms with the connecting limb 9 of the arch 5 a substantially cubic or at least parallelepipedic volume (see also figures 11, 13 and 14).

[0036] The specific shape of the arch 5, with guiding surfaces providing lateral legs 8 and a connection limb 9 with plug in terminals 14, directed perpendicularly to the main plane 3, allows to rigidly girdle the module but also to leave free access to large parts of the outer faces of the module 2, when the latter is plug in.

[0037] Furthermore, less material is needed to provide said arch 5 in comparison to a completely surrounding casing.

[0038] The transversal block 9 is globally parallel to the main plane 3, separated from the main plane 3 with a distance corresponding to the length of the lateral blocks 8.

[0039] As can be seen at least from figures 1 to 4, the transversal block 9 can be located approximately at the level of an edge of the central opening 4, so that the projection of the transversal block 9 on the main plane 3, and in a direction perpendicular to said plane, mainly corresponds to an edge of the central opening 4. Preferably, the central opening 4 has a globally rectangular shape, and the transversal block 9 extends at the level of an edge of said central opening 4, at a distance from the main plane 3.

[0040] Alternatively, as shown in figures 7 or 9, the

transversal block 9 is at the level of the middle zone between two opposite edges of the central opening 4, so that the projection of the transversal block 9 on the main plane 3, in a direction perpendicular to said plane, mainly corresponds to an axis located in the middle between two opposite edges of the central opening 4. However, the first configuration is preferred, because the design of an electrical module 2 of a complementary shape is easier.

[0041] The lateral blocks 8 are globally flat, approximately extending from an edge of the central opening 4. The outer shape of the transversal block 9 globally corresponds to a beam with a rectangular cross section, extending in a direction parallel to an edge of the central opening 4. The transversal block 9 has an inner zone 22, which is directly accessible from the user side 18 through the central opening 4, and an opposite outer zone 23, which is only accessible from the opposite side.

[0042] Preferably, the outer zone 23 of the transversal block 9 has a surface parallel to the main plane 3 and a surface perpendicular to said main plane 3. As shown in the illustrated embodiment, the internal plug terminals 14 are provided on the inner zone 22 and accessible from the user side 18 through the central opening 4. The external connection terminals 7 are located on the outer zone 23 and accessible from the back of the electrical device 15 or at least from the zone surrounding the volume 6 dedicated to the electrical module 2. The wires can be inserted therein from the back side 19 of the mounting interface 1 with a movement which is parallel or perpendicular to the main plane 3, in the direction of the volume dedicated to the electrical module 2.

[0043] As already said, the mounting interface 1 is able to receive an electrical module 2, inserted through the central opening 4. For this purpose, the mounting interface 1 has a module receiving cavity or volume 6, in which an electrical module 2 can be received. This module receiving cavity or volume 6 is defined between the central opening 4 and the connection arch 5. The receiving volume 6 is globally defined from the central opening 4 to the arch 5, preferably from the main plane 3 to the farthest surface of the transversal block 9. The cross section of the volume 6 globally corresponds to the central opening 4. The volume 6 mainly goes from the main plane 3 to the outer zone 23 of the transversal block 9, and preferably to the surface of said block 9 which is parallel to the main plane 3.

[0044] The arch 5 comprises external connection terminals 7 which are accessible for inserting external wires from the outside of the module cavity 6, without passing in said cavity 6 or interfering with its volume. A larger volume can be dedicated to the electrical module 2 than in solutions wherein the wires have to cross the cavity 6 to reach the external connection terminals 7. Moreover, these wires or conductors can be connected and disconnected with the module 2 in place, i.e. without removing the matter.

[0045] As the external connection terminals 7 are lo-

cated in the transversal block 9 of the arch 5, in the outer zone 23, they are located at a certain distance from the main plane 3 at the back side 19. This distance approximately corresponds to the length of the cavity 6, from the main plane 3. Therefore, once plugged, the back of an electrical module 2 can arrive at the level of the external connection terminals 7.

[0046] The arch 5 has internal plug terminals 14 for the electrical module 2. The internal plug terminals 14 are preferably located at the inner zone 22 of the arch 5, preferably on the transversal block 9. The internal plug terminals 14 can receive an electrical module 2 inserted perpendicularly to the main plane 3. Therefore, installing an electrical device 15 with such a mounting interface 1 is very ergonomic: the wires of the external network are first connected to the external connection terminals 7, then the mounting interface 1 is fixed to the mounting element with a set of screws, and the electrical module 2 is finally inserted in the mounting interface 1 and simultaneously plugged therein, with a simple movement perpendicular to the mounting wall.

[0047] An internal plug terminal 14 preferably has the shape of a base in which contacting elements of the electrical module 2 can be inserted perpendicularly to the main plane 3. The internal plug terminals 14 and the contacting elements of the electrical module 2 are complementary, and these contacting elements preferably have the shape of elongated blades or pins, extending from the back of the electrical module 2. Therefore, the internal plug terminals 14 are accessible from the inside of the volume 6, through the central opening 4.

[0048] Figures 4, 5, and 7 show internal plug terminals 14 in the shape of holes in which corresponding pins (not shown) provided on the electrical module 2 can be inserted. A different configuration is shown in figures 10 and 15: the electrical module 2 has contacting blades 24, and a corresponding internal plug terminal 14 has the shape of two pieces of metal between which the blade 24 can be inserted.

[0049] The design of the internal plug terminal 14 is such as to allow a connection with a linear movement perpendicular to the main plane 3. On the other side, an external connection terminal 7 is adapted for connecting a wire, and any existing contact technology can be used: quick connect, insulation displacement, screw based, blade spring, etc. It is clear that the technology used for the external connection terminal 7 can be completely different from the technology used for the internal plug terminal 14.

[0050] Figures 4, 6 and 15 show an external connection terminal 7, which is accessible for inserting a wire in a direction parallel to the main plane 3. The wire is then blocked by a threaded bolt, moved by a screw accessible through the central opening 4. Figure 5 shows an external connection terminal 7 with a blade shaped spring.

[0051] According to a possible additional feature, the arch 5 comprises or is adapted to receive claw based fixation means. As shown in figure 1, a claw 25 can be

mounted in each lateral block 8, preferably with the corresponding spring, screw and threaded support. Alternatively, the lateral block 8 can simply have claw recesses 26 for receiving these elements. In alternative embodiments, the lateral block 8 can have a recess in which a claw module can be inserted and fixed thereto. Such a claw module mainly consists in a mechanical basis in which the claw, spring, and threaded support are mounted. This claw based fixation means is used to fix the mounting interface 1 to the mounting element, like a mounting box, for example. Therefore, as the claws are mechanical linked to the arch 5, they create no pressure on the electrical module 2. Said electrical module 2 is firmly fixed to the wall thanks to the mounting interface 1 in which it is mounted, said mounting interface 1 being firmly fixed to the mounting element with the claw based fixation means.

[0052] Preferably, the mounting interface 1 comprises a plate 10 for a fixation to a mounting element, like a flush mounting box, and said plate 10 comprises screw passages 11. In some embodiments, the arch 5 and the plate 10 form together a single part. This part can be a molded plastic part. In some other embodiments, the arch 5 and the plate 10 are separate parts, preferably joined together through a double snap in connection at the ends of the legs 8 of the arch 5, possibly in a releasable way, can be separated from the plate 10. Preferably, the plate 10 is made of a metallic flat element, to which the arch 5 is fixed, for example by snap fitting. This can lead to cost reduction, as a standard plate 10 can be reused, and an arch 5 can simply be fixed thereto afterwards.

[0053] According to another possible additional feature, best seen from figures 3, 4, 5 and 11, the mounting interface 1 comprises a ring shape intermediate part 12, which defines the central opening 4, which is mounted on the plate 10, and which has two side walls 13, which extend from facing edges of the central opening 4 in a direction essentially perpendicular to the main plane 3. This ring 12 is preferably made of plastic, located at the level of the main plane 3 and mounted in the plate 10 with a snap fit solution 27. The central zone of the ring 12 corresponds to the central opening 4, and the electrical module 2 is preferably fixed in this ring 12, so that the ring 12 surrounds the module 2 when the latter is inserted in the mounting interface 1. The ring 12, which has a global square shape, also has two side walls 13, extending perpendicularly to the main plane 3, in the direction of the back of the mounting interface 1. The side walls 13 face each other and extend from two opposite edges of the square shaped ring 12. Normally, when the module 2 is fixed by blade springs, the latter press outwardly on said side walls 13.

[0054] Preferably, the ring shaped intermediate part 12 comprises, around the central opening 4 and approximately in the plane of the plate 10, an internal peripheral shoulder 12', able to engage with a complementary shape cooperation an external peripheral shoulder 2' of the housing 16 of the electrical module 2.

[0055] The intermediate part 12 can also comprise at least one notched, ribbed or serrated tongue, wing or flange 31, and possibly also at least one positioning finger 31', protruding towards the outside relatively to the plane 3 of the plate 10 and able to come into engagement with corresponding complementary sites of the design frame 17.

[0056] Furthermore, said intermediate part 12 forming the insertion opening 4 for the electrical module 2 to be plugged in, can also comprise, in addition to the side walls 13 to which the legs 8 of the arch or bridge part 5 are connected, top and bottom profiled tongues, wings or flanges 32 helping with a guided introduction of the electrical module 2 through the opening 4 and contributing to a well fitted and rigid hold of the module 2 when the latter is plugged in, in cooperation with the side walls 13.

[0057] These side walls 13 and/or the plate 10 are fixedly connected to the lateral opposed legs 8 of the arch or bridge part 5, for example by snap-fitting 33 and/or screwing 33' connection(s).

[0058] As shown for example on figures 1 to 5, 13 and 14, the mutual assembly and engagement areas of the legs 8 with the side walls 13 extend along a significant height, preferably along a major part of the height of said side walls 13. As also shown, the legs 8 can spread at their connection ends into several connection fingers or into enlarged connection walls 34, with adapted complementary connecting sites for the snap-fitting and screwing means 33, 33' of the intermediate part 12 and/or the plate 10. For example, the plate 10 can be provided with inwardly directed lateral tongues or wing portions provided with elastically deformable fingers and the side walls 13 can have sites for receiving screws mounted into the end portions of the legs 8.

[0059] Thus, the intermediate part 12 is forming with the arch or bridge 5 part and the plate 10 the core part of the mounting interface 1.

[0060] As can be seen from figure 3 or 4, and according to an additional possible feature, each lateral block 8 of the arch 5 is located at the level of a side wall 13.

[0061] Therefore, as the wires are connected on the arch 5 rather than on the electrical module 2 itself, the force of said wires, which tends to push things outside, is not directed on the electrical module 2 but on said arch 5. As the arch 5 is firmly fixed in the mounting interface 1 and/or with claws 25, the force of the wires is correctly stopped, without pushing the module 2 out of the mounting interface 1.

[0062] Further, as the claws 25 are mounted on the arch 5 rather than on the electrical module 2, they create no pressure on the latter. Therefore, the risk of harming the electrical module 2 or its electronic components is very limited.

[0063] The invention also consists in an electrical device 15 to be mounted to a wall, comprising at least one mounting interface 1 such as described, and at least one corresponding electrical module 2, the electrical module

2 being adapted to be nested and plugged into the arch 5. The electrical device 15 also comprises a frame 17, surrounding the electrical module 2.

[0064] The electrical module 2 has connecting elements 24 adapted to the internal plug terminals 14, for example in the form of pins, or blades.

[0065] Preferably, the electrical module 2 is a home automation control module, for a connection to a home information network by plugging it in the arch 5, and the internal plug terminals 14, as well as the external connection terminals 7, are for connecting the electrical module 2 to a home automation network. The electrical module 2 comprises a plurality of electronic components, and is connected to a home automation network, to send and/or receive information, instruction, or else. The electrical module 2 has a set of control zones, mounted on a rocker 20, like buttons provided in the front surface. It can also have a display, or any other indication means.

[0066] The arch 5 is connected to the automation network by the external connection terminals 7, in which wires are connected. Each external connection terminal 7 is directly connected to an internal plug terminal 14. A single metallic part can be used for both an external connection terminal 7 and the corresponding internal plug terminal 14, as shown figures 5 or 15. Therefore, the electrical module 2 is connected to the home automation network thanks to, first, the internal plug terminals 14 to which it is electrically connected, and, second, the external connection terminals 7, to which the wires of the network are connected.

[0067] According to a possible additional feature, the electrical module 2 comprises a housing 16, said housing 16 and the arch 5 having complementary shapes, at least at the level of the transversal block 9, and the housing 16 is adapted to an insertion through the central opening 4. The housing 16 works as a plastic box in which the components of the electrical module 2 are mounted and protected. The complementary shapes is shown figure 11.

[0068] The housing 16 of the electrical module 2 has a globally parallelepipedic shape. The cross section corresponds to the central opening 4, and the length corresponds to the distance between the main plane 3 and the farthest end surface of the transversal block 9, part of the outer zone 23. The housing 16 has a back recess 28 for receiving the transversal block 9 in the back side. Said back recess 28 and said transversal block 9 have complementary shapes, as shown figure 11. As can be seen from figures 8, 9, and 11, the electrical module 2 and the dedicated cavity 6 approximately have the same shape.

[0069] The contact elements 24 of the electrical module 2 are provided in the back recess 28. These contact elements 24 can be plugged in the internal plug or socket terminals 14. The housing 16 can also have two lateral recesses 28', with shapes complementary to the shapes of the sites 26 receiving the claw based fixation means.

[0070] The mounting interface 1 works as a mechani-

cal interface between the electrical module 2 and the wall, and, thanks to both the internal plug terminals 14 and the external connection terminals 7, also works as an electrical interface between the electrical module 2 and the home automation network. Therefore, it is possible to use a single design of the mounting interface 1 for almost any kind of electrical device 15. The mounting interface 1 can be a standard element used for a platform of different electrical devices 15, each having a specific electrical module 2. This standardisation of the mounting interface 1 can generate significant cost reduction: the mounting interface 1 is designed once for all, and there is no need to have special dedicated manufacturing tools for each specific electrical device 15.

[0071] Another advantage of this solution is that retrofitting is very easy. When the electrical device 15 needs to be upgraded or changed for any reason, the electrical module 2 is simply pulled out of the mounting interface 1 and replaced by a new one, with dimensions and connections compatible with the mounting interface 1.

[0072] The connection terminals 7 can be of different known types such as screw connections, clamp connections or so-called quick connections, preferably associated with corresponding connection control means 7'.

[0073] The mounting interface 1, declined in its version compatible with the type of electrical module 2 to be installed, can be easily and quickly put into place in the wall during a preinstallation phase.

[0074] Figures 16 and 17 show by way of examples some of the possibilities of implementations of the invention.

[0075] While this description describes only non limitative embodiments in accordance with the present invention, it is understood that the same is not limited thereto but is susceptible of numerous changes and modifications as known to those skilled in the art. Therefore, the present invention is not limited to the details shown and described herein but also covers all such changes and modifications.

Claims

1. Mounting interface (1) for fixing or installing an electrical module (2) to or at least partly into a wall, wherein said mounting interface (1) has a main plane (3), which is parallel to the wall when the mounting interface (1) is in its normal in situ mounted position, and has a central opening (4) through which the electrical module (2) can be inserted in the mounting interface (1),
mounting interface (1) **characterised in that** it comprises an arch (5), or bridge, which has internal plug or socket terminals (14) for plugging therein the electrical module (2) equipped with adapted complementary socket or plug elements (24), by mere nesting, in a direction perpendicular to said main plane (3),
in that a mainly open module receiving cavity or vol-

- ume (6) is partly defined between the central opening (4) and the connection arch (5), and
in that said arch (5) comprises external connection terminals (7) which are accessible for inserting external wires or conductors from the outside of the module cavity (6), without passing in said cavity (6) or interfering with its internal volume.
2. Mounting interface (1) according to claim 1, wherein the external connection terminals (7) have insertion openings or sockets facing the external environment of the cavity (6) or directed towards said external environment, and their clamping locking or blocking means (7') are accessible through the central opening (4).
 3. Mounting interface (1) according to anyone of claims 1 or 2, wherein the connection arch (5) comprises
 - i) two lateral parts (8) facing each other, forming opposed legs or arms of said arch (5) and extending from two opposite edges or sides of the central opening (4) in a direction mainly perpendicular to the main plane (3) and ii) a transversal part (9), extending from one lateral block (8) to the other as a connection limb or bridging part, mainly parallel to the main plane (3).
 4. Mounting interface (1) according to claim 3, wherein the central opening (4) has a globally rectangular or square shape, the transversal part (9) extends parallel to a side of said central opening (4), at a distance from the main plane (3), either centrally or along an edge of said cavity or volume (6).
 5. Mounting interface (1) according to anyone of claims 1 to 4, wherein

the mounting interface (1) comprises a plate (10) to be positioned against the wall, and allowing the fixation of a mounting element, like a flush mounting box or a similar item, said plate (10) comprising screw passages (11) and being rigidly connected to the arch (5).
 6. Mounting interface (1) according to claim 5, wherein the arch (5) and the plate (10) form together a single part.
 7. Mounting interface (1) according to claim 5 wherein the arch (5) and the plate (10) are separate parts, preferably joined together through a double snap in connection at the ends of the legs (8) of the arch (5), possibly in a releasable way.
 8. Mounting interface (1) according to claim 5, wherein the mounting interface (1) comprises a ring shaped intermediate part (12), which defines the central opening (4), which is mounted on the plate (10), and which has two side walls (13), and said side walls (13) extend from mutually facing edges of the central opening (4) in a direction essentially perpendicular to the main plane (3).
 9. Mounting interface (1) according to claim 8 and anyone of claims 3 or 4, wherein

each lateral leg (8) of the arch (5) is located at the level of a side wall (13) and is fixedly connected to it and/or to the plate (10), for example by snap-fitting and/or screwing connection.
 10. Mounting interface (1) according to claim 8 or 9, wherein the ring shaped intermediate part (12) comprises, around the central opening (4) and approximately in the plane of the plate (10), an internal peripheral shoulder (12'), able to engage with a complementary shape cooperation an external peripheral shoulder (2') of the housing of the electrical module (2).
 11. Mounting interface (1) according to anyone of claims 1 to 10, wherein

the arch (5) comprises, or has sites (26) adapted to receive, claw based fixation or locking means (25), for example for fixedly connecting the arch (5) to a surrounding embedded housing, a mounting box, or a similar reception device, the control means (25') of said locking or fixation means (25) being accessible through the central opening (4).
 12. Mounting interface (1) according to claim 3 and anyone of claims 5 and 7 to 9, wherein

a set of arches and bridges (5) of different shapes and conformations are provided as modular parts, connectable directly to the plate (10) or to the intermediate part (12), each adapted for a corresponding by shaped type of electrical module (2), the legs (8) and the links (9) of the arch (5) having a rigid bulky structure and forming block type parts, made preferably of hard plastic material, as the intermediate part (12), their external faces fitting in shape partially, at least at some local areas, the internal face of an embedded housing or similar wall mounted reception device.
 13. Mounting interface (1) according to anyone of claims 1 to 12, wherein

the internal plug terminals (14) can receive an electrical module (2) inserted perpendicularly to the main plane (3) with a simultaneous electrical and mechanical connection.
 14. Electrical device (15) to be mounted to a wall, comprising

at least one mounting interface (1) according to anyone of claims 1 to 13 and at least one corresponding electrical module (2), the electrical module (2) being

adapted to be nested and plugged into the arch (5).

- 15.** Electrical device (15) according to claim 14, wherein the electrical module (2) is a home automation control module, for a connection to a home information network by plugging it in the arch (5), and the internal plug or socket terminals (14), as well as the external connection terminals (7), are for connecting the electrical module (2) to a home automation network.
- 16.** Electrical device (15) according to anyone of claims 14 or 15, wherein the electrical module (2) comprises a housing (16), said housing (16) and the arch (5) having complementary shapes, at least at the level of the transversal part (9), and the housing (16) is adapted to an insertion through the central opening (4).

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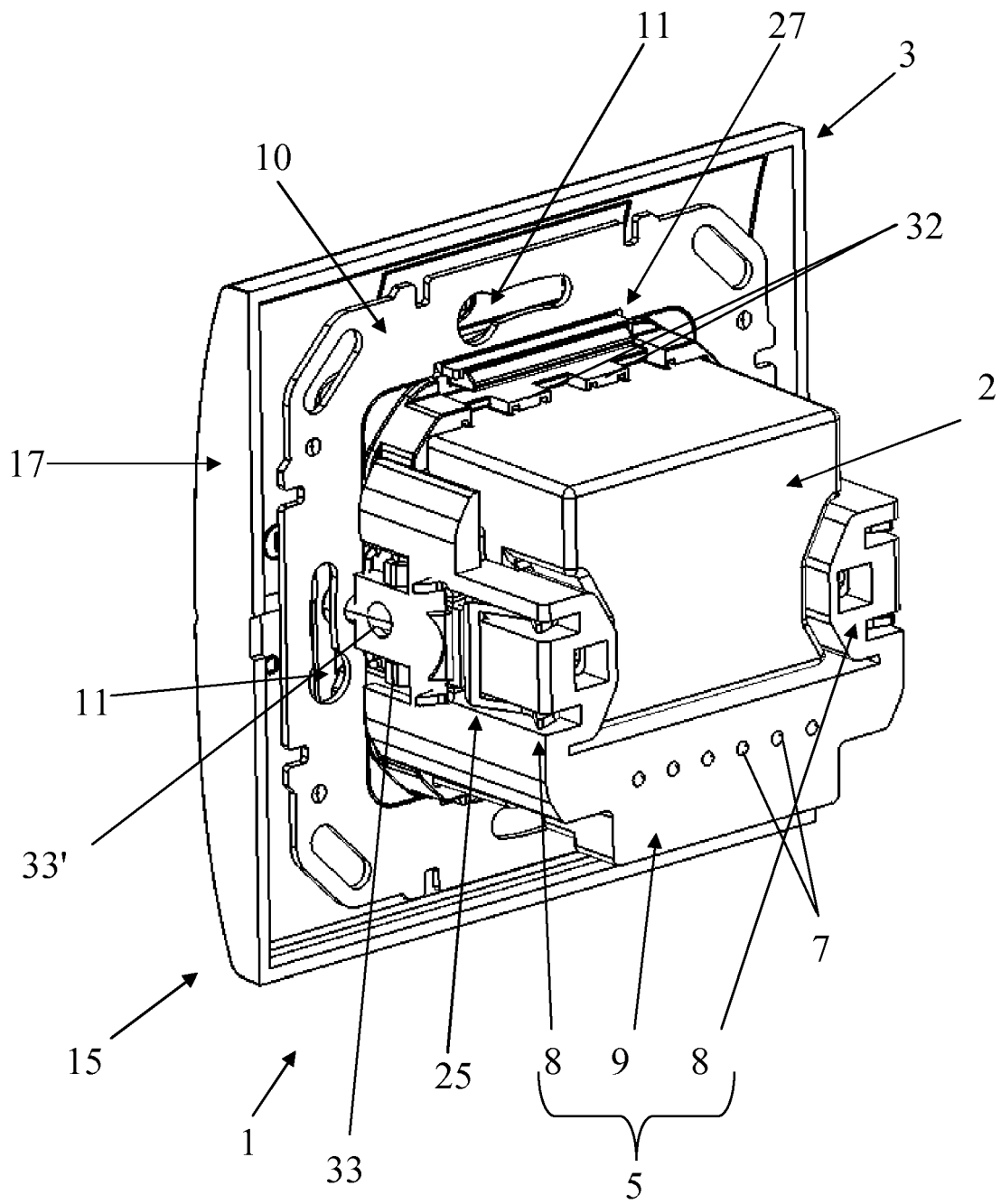


Fig. 1

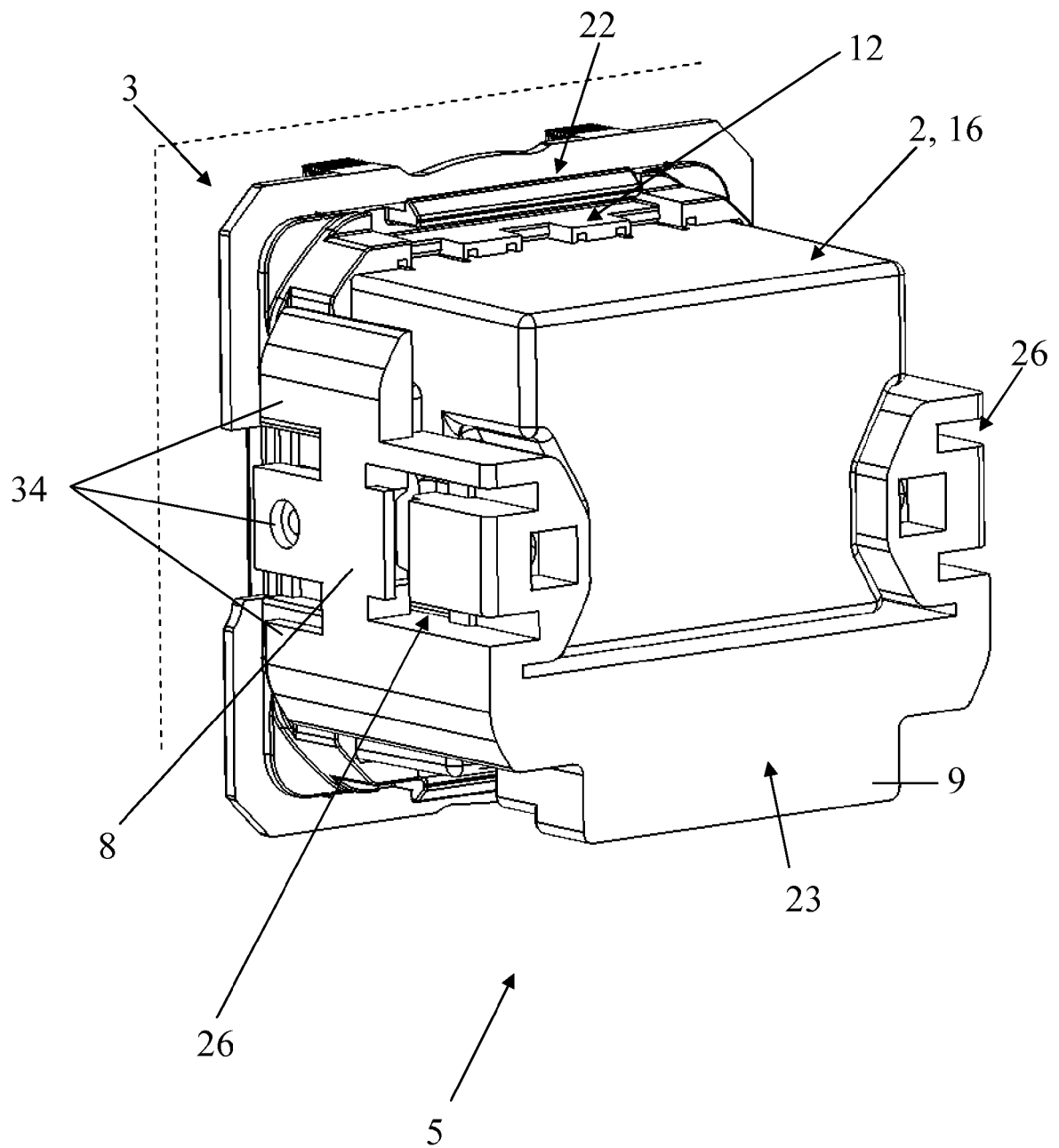


Fig. 2

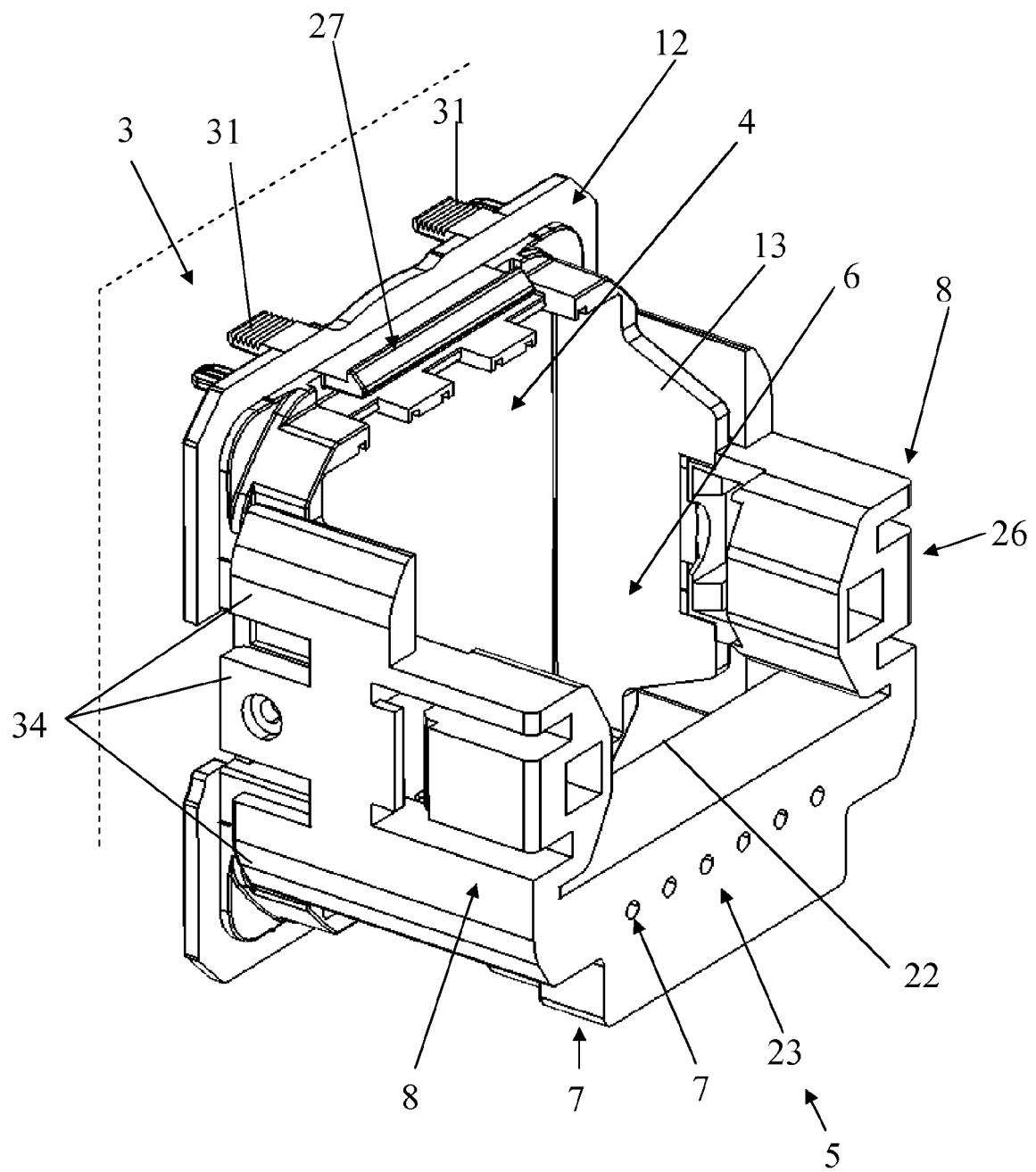


Fig. 3

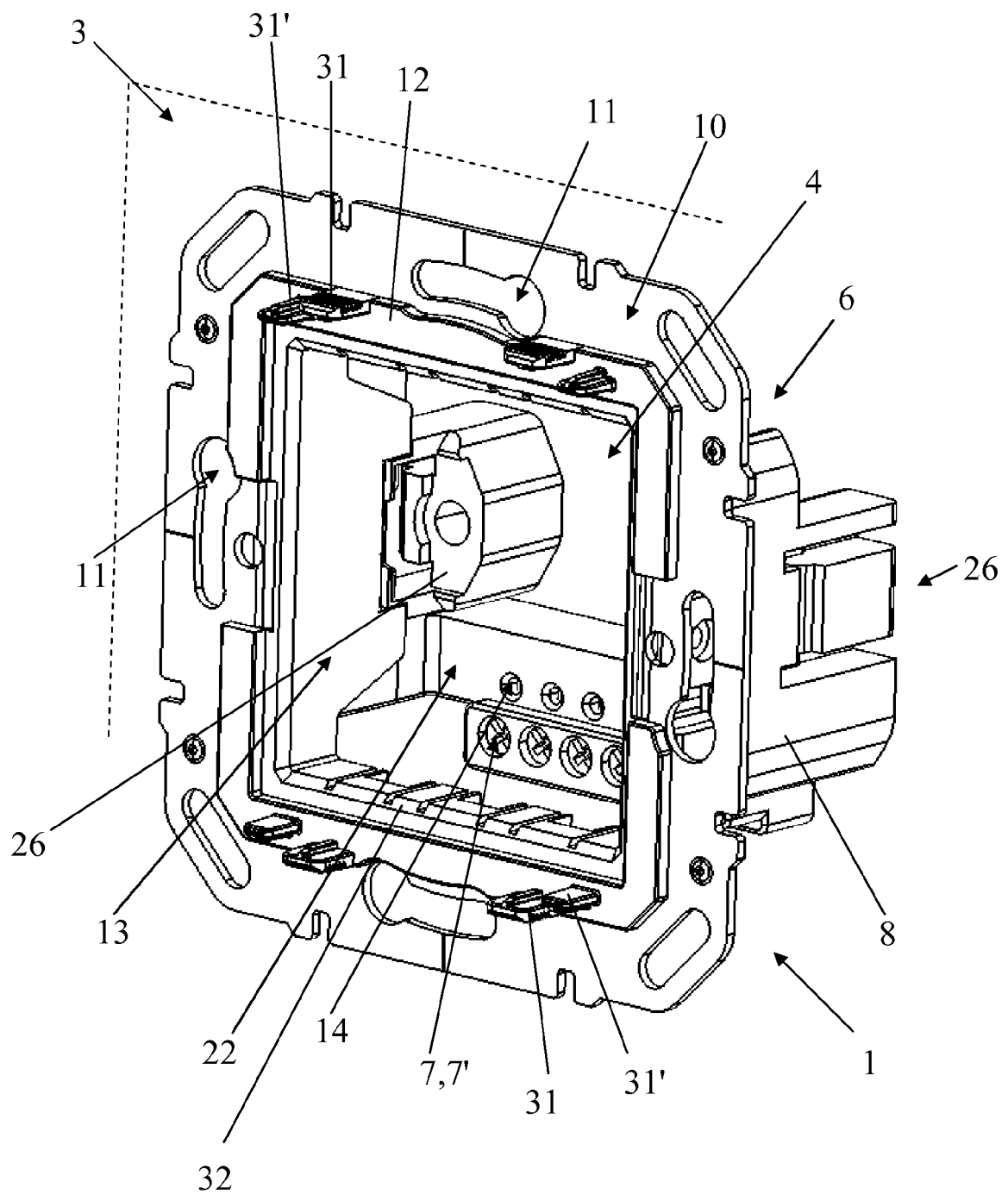


Fig. 4

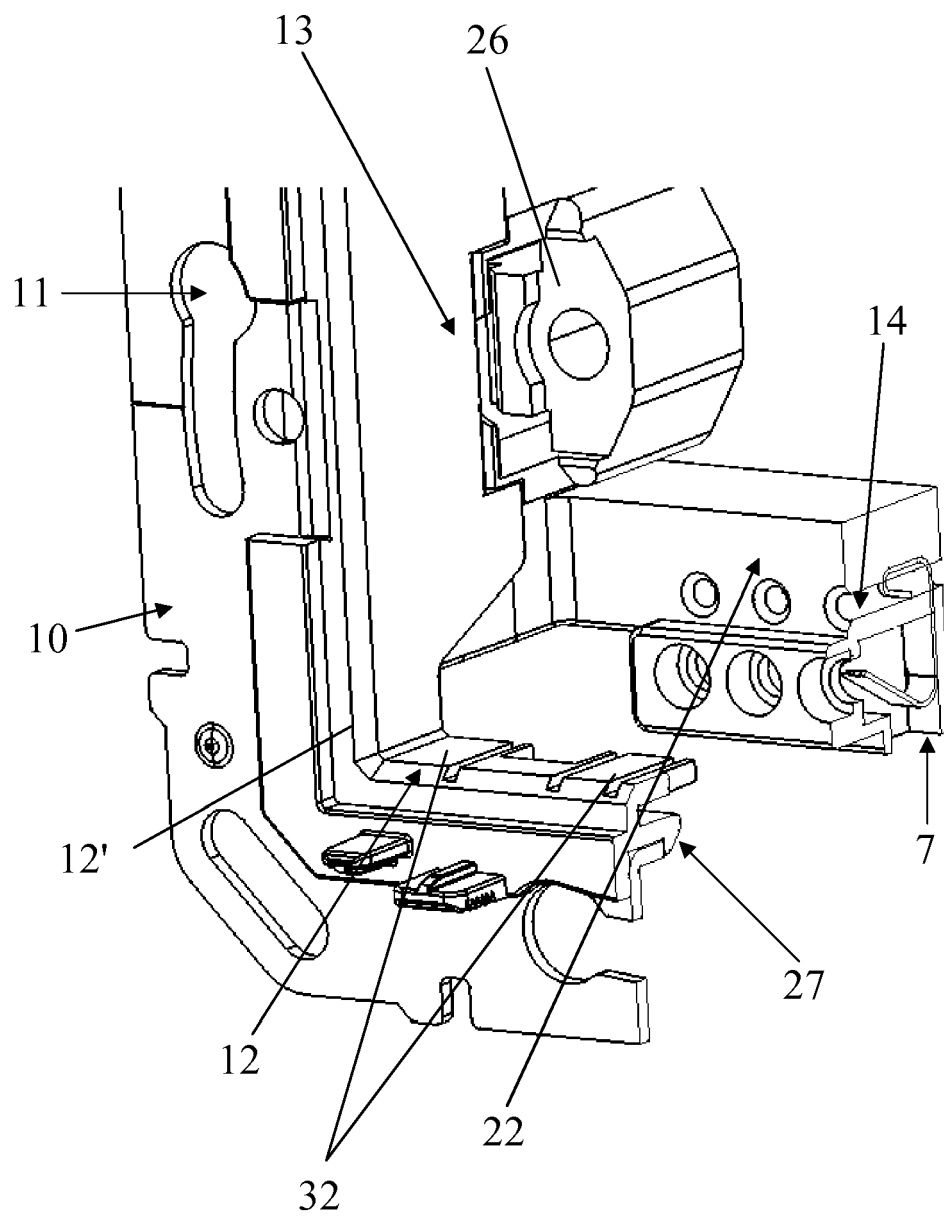


Fig. 5

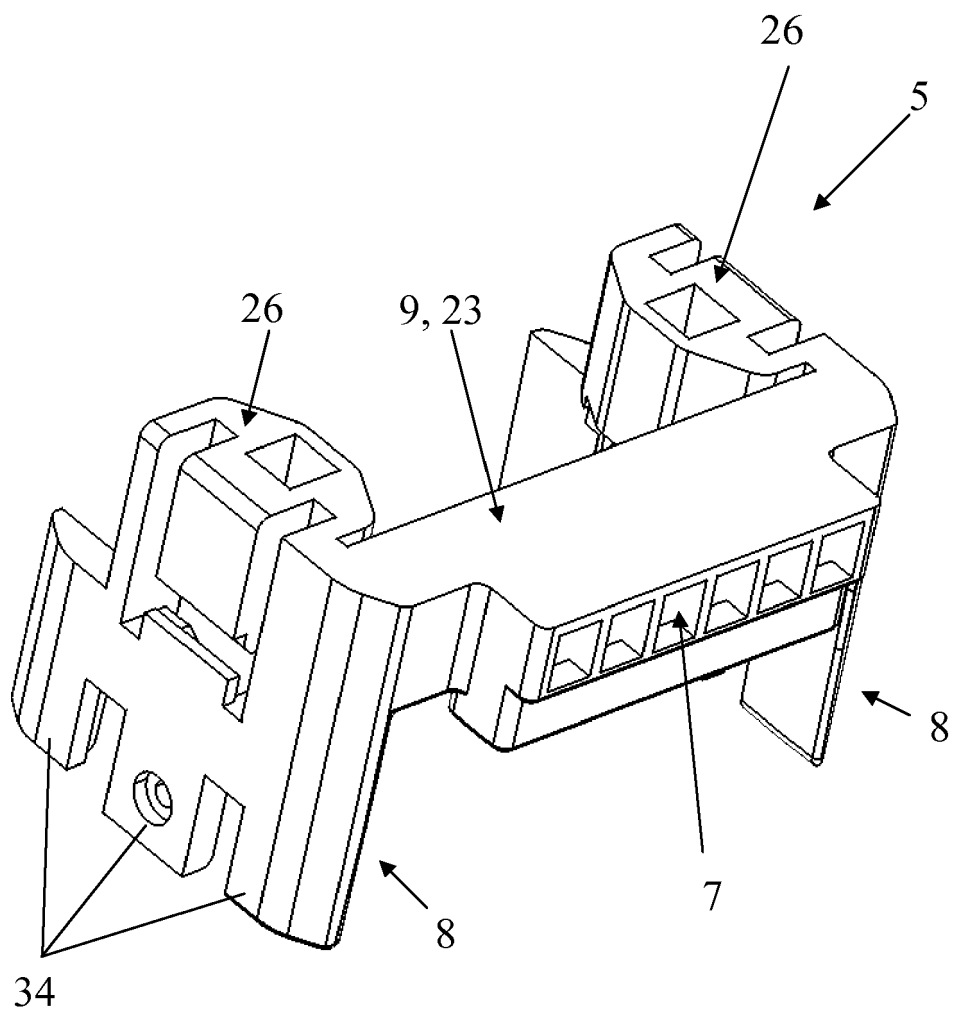


Fig. 6

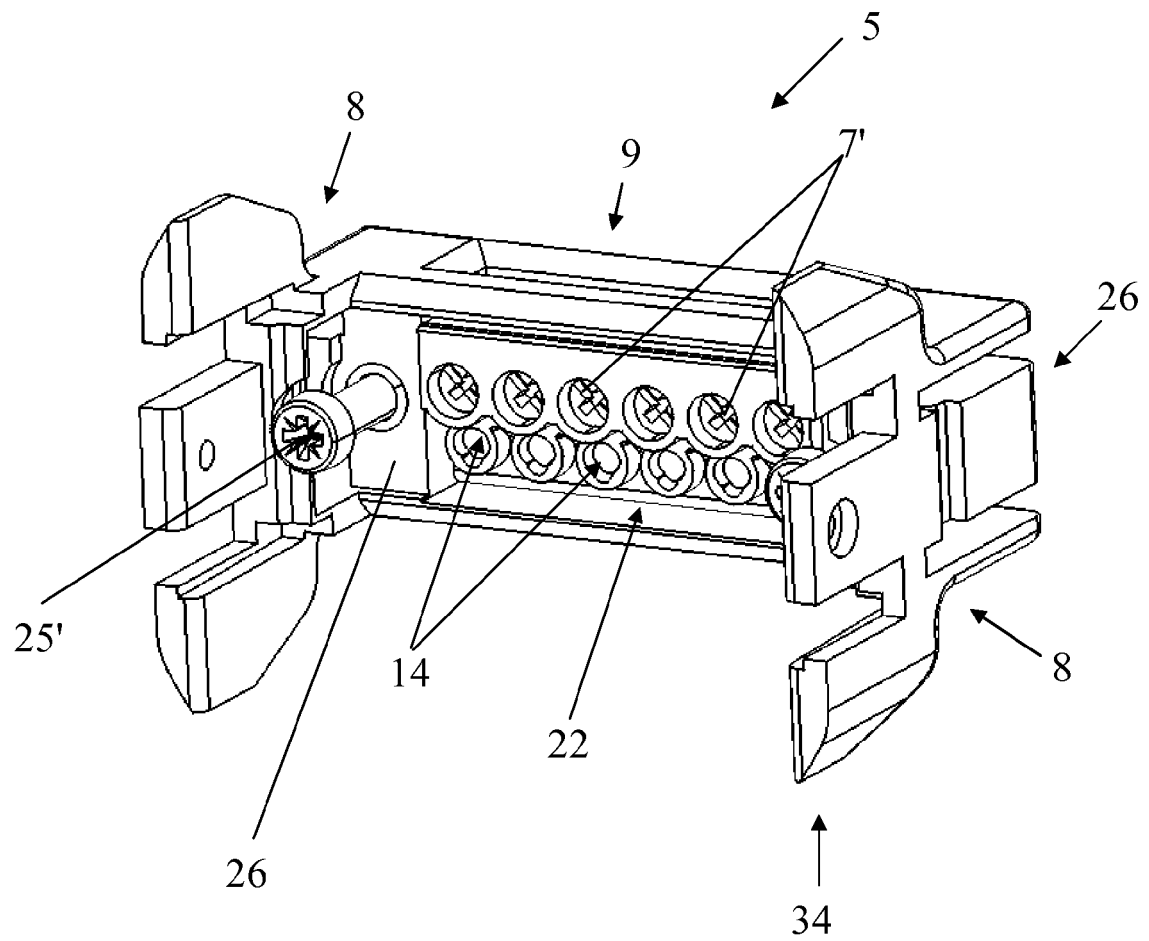


Fig. 7

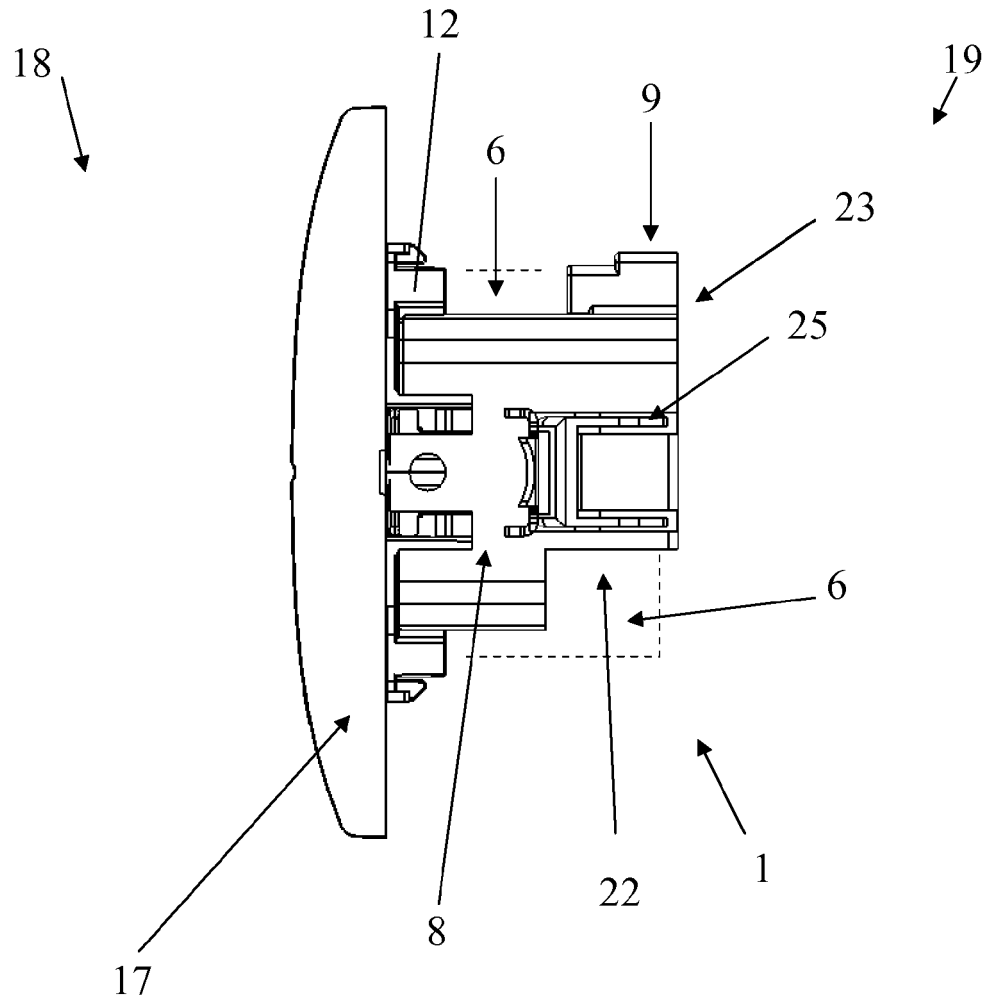


Fig. 8

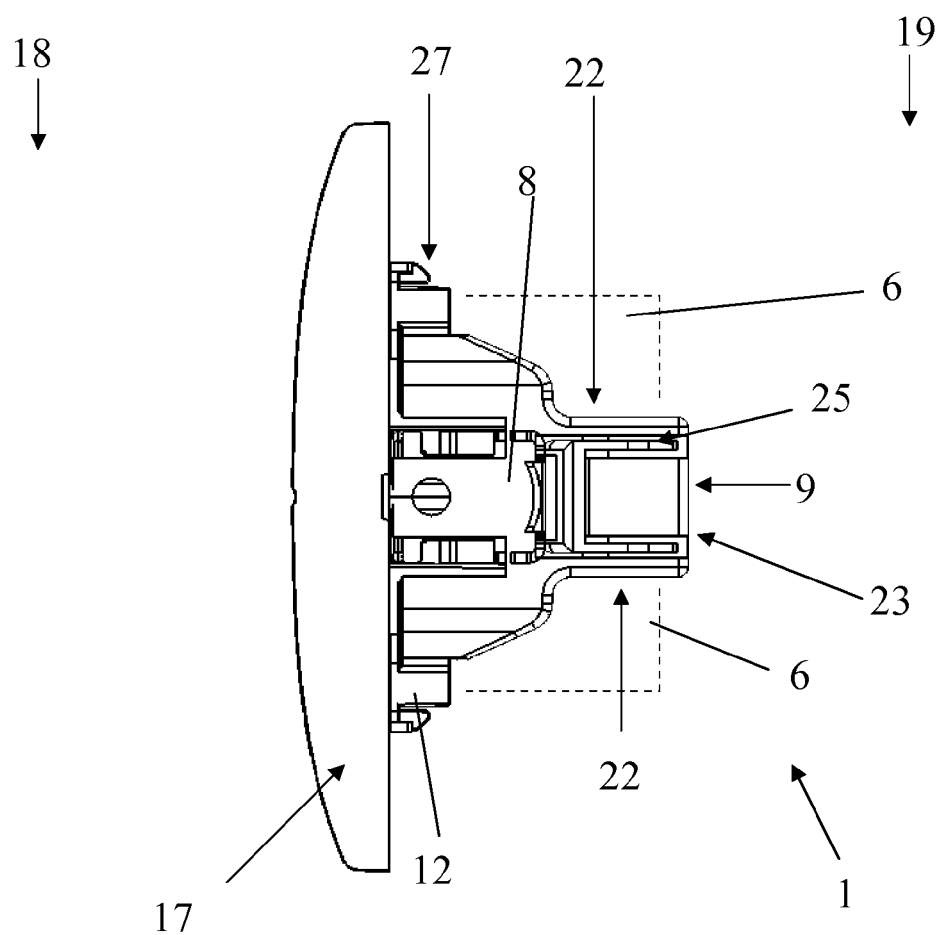


Fig. 9

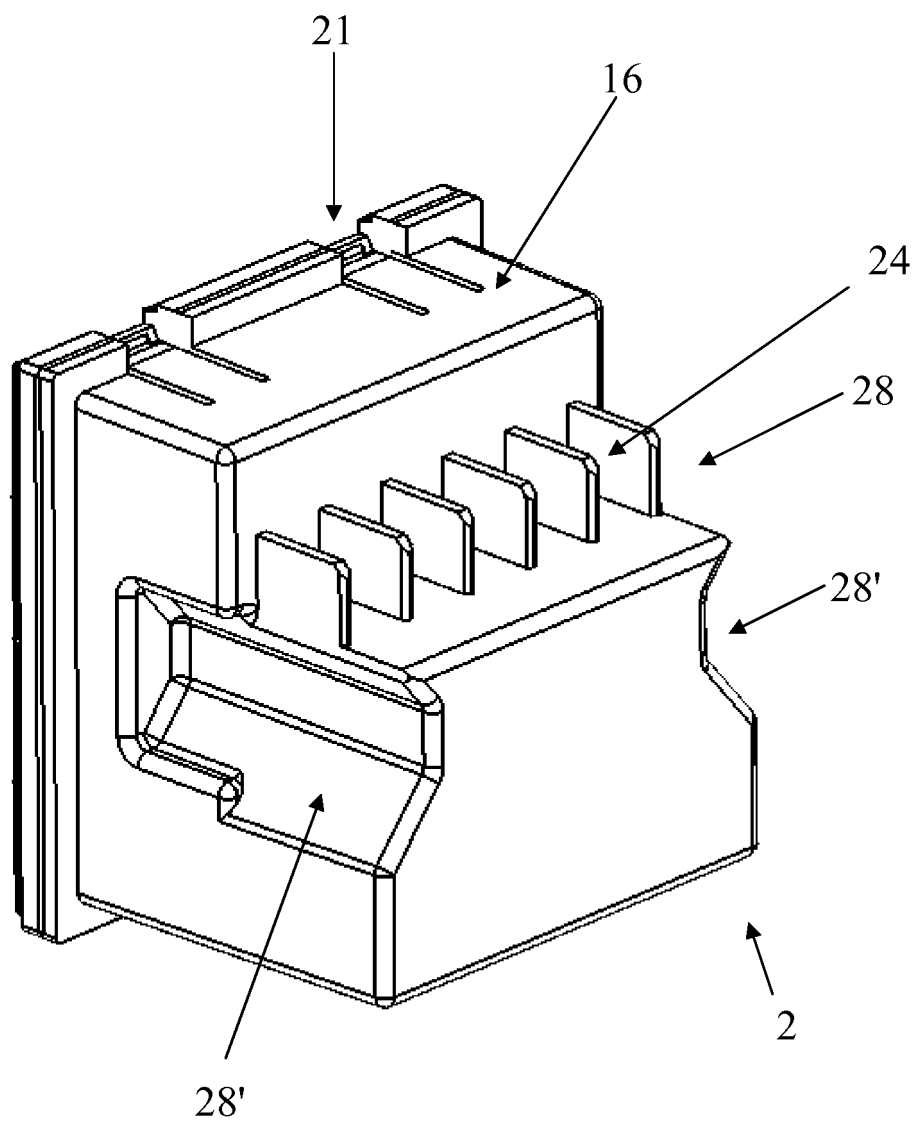


Fig. 10

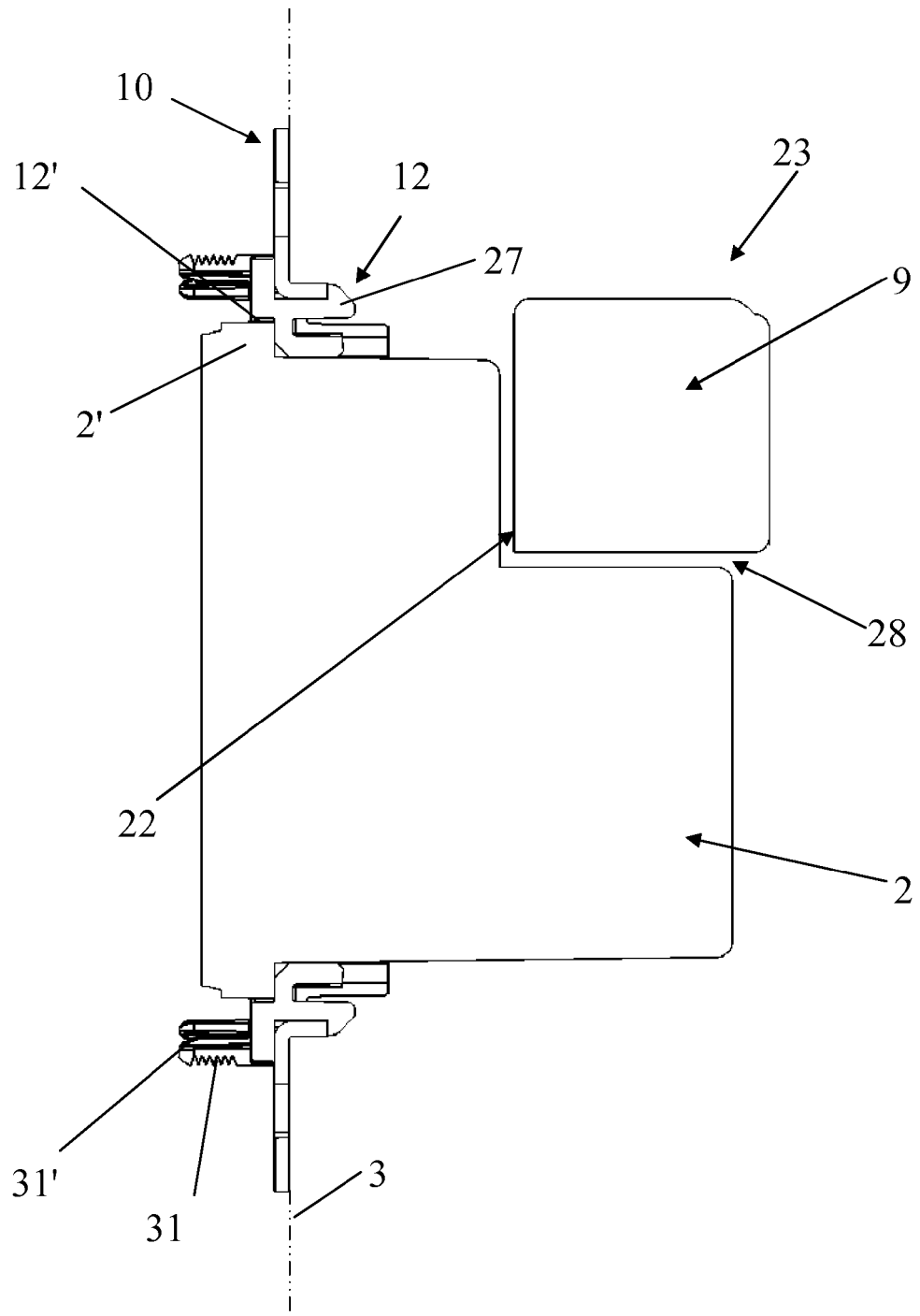


Fig. 11

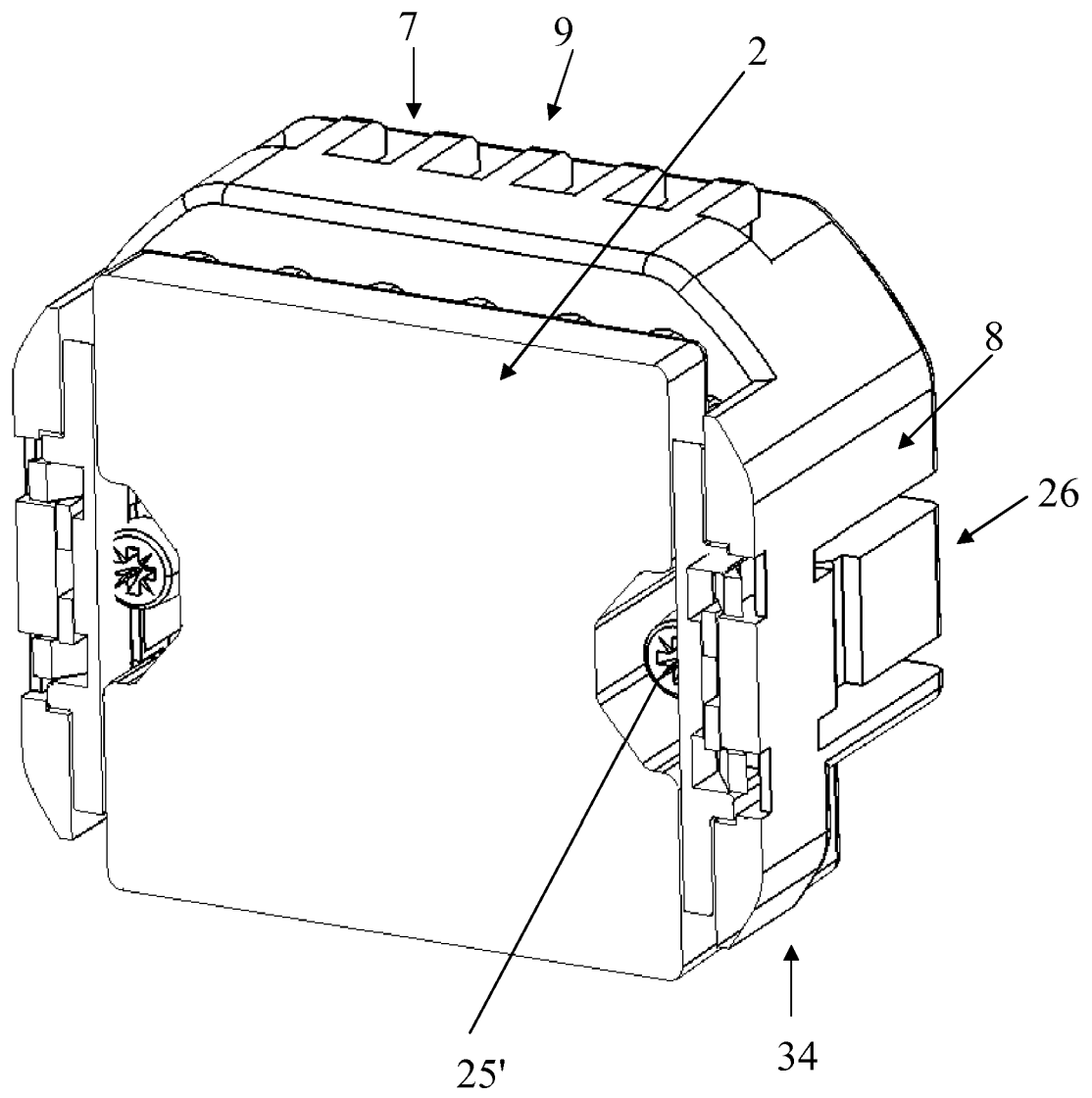


Fig. 12

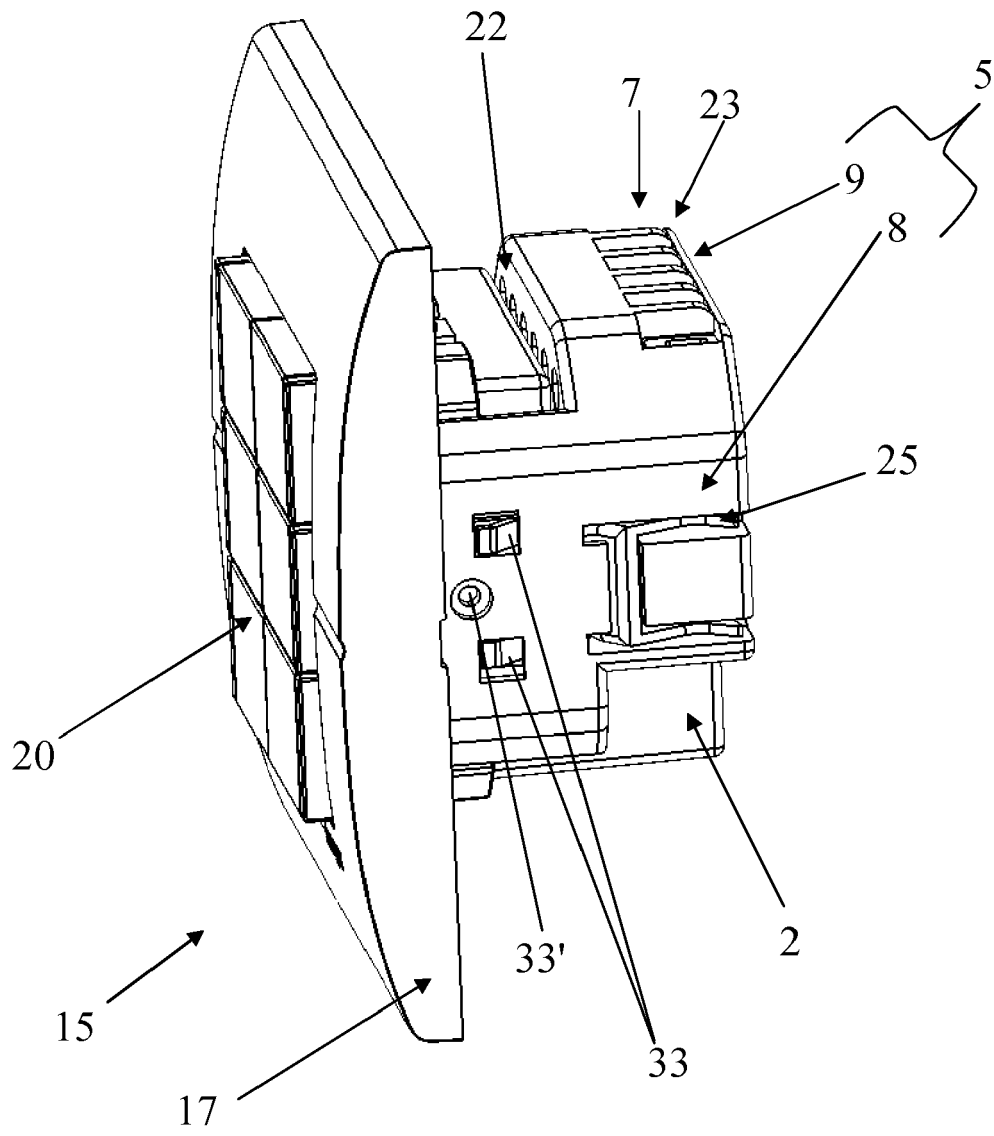


Fig. 13

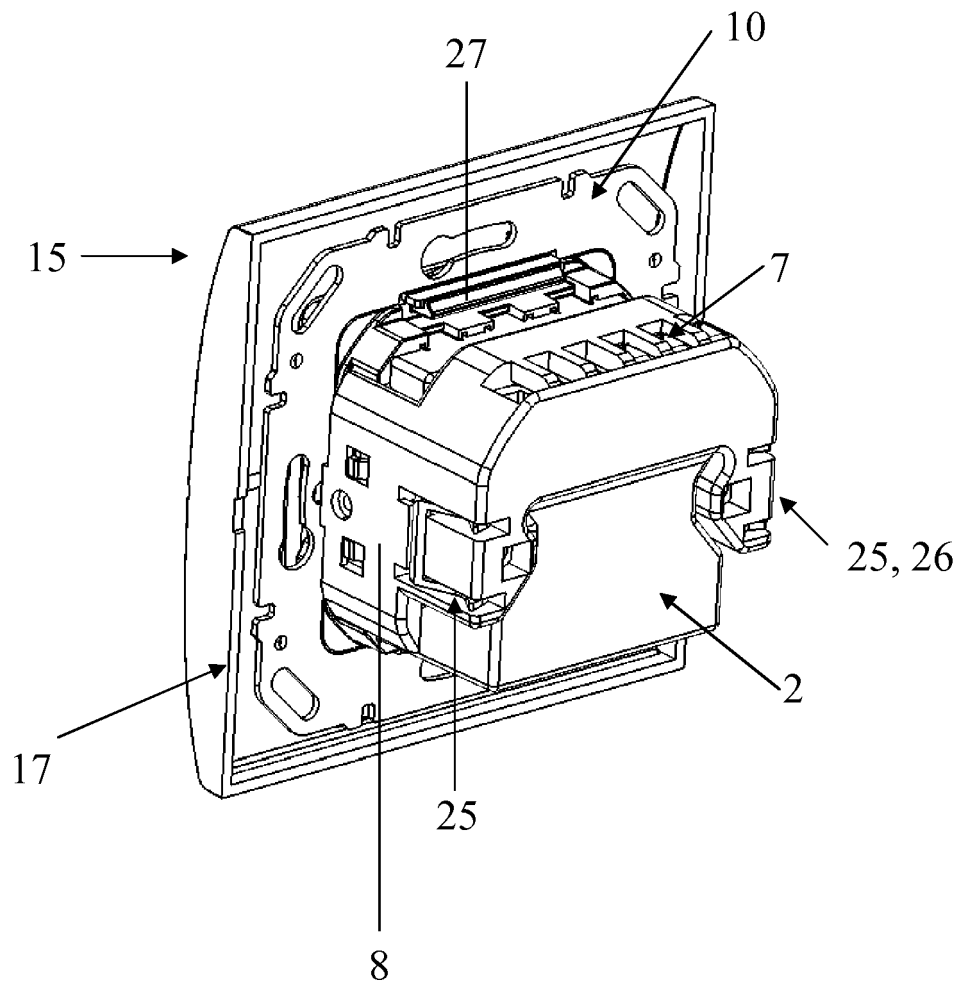


Fig. 14

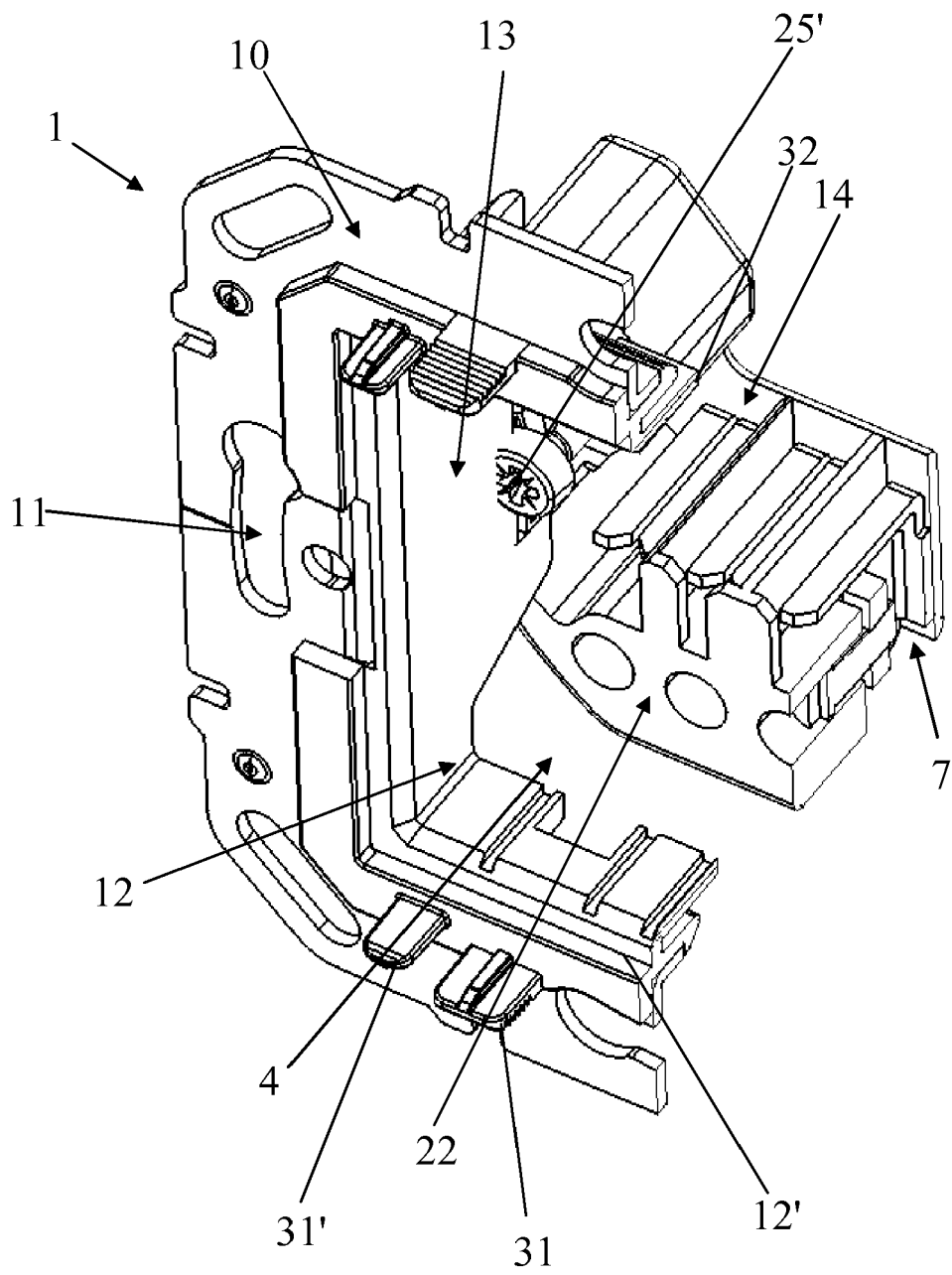


Fig. 15

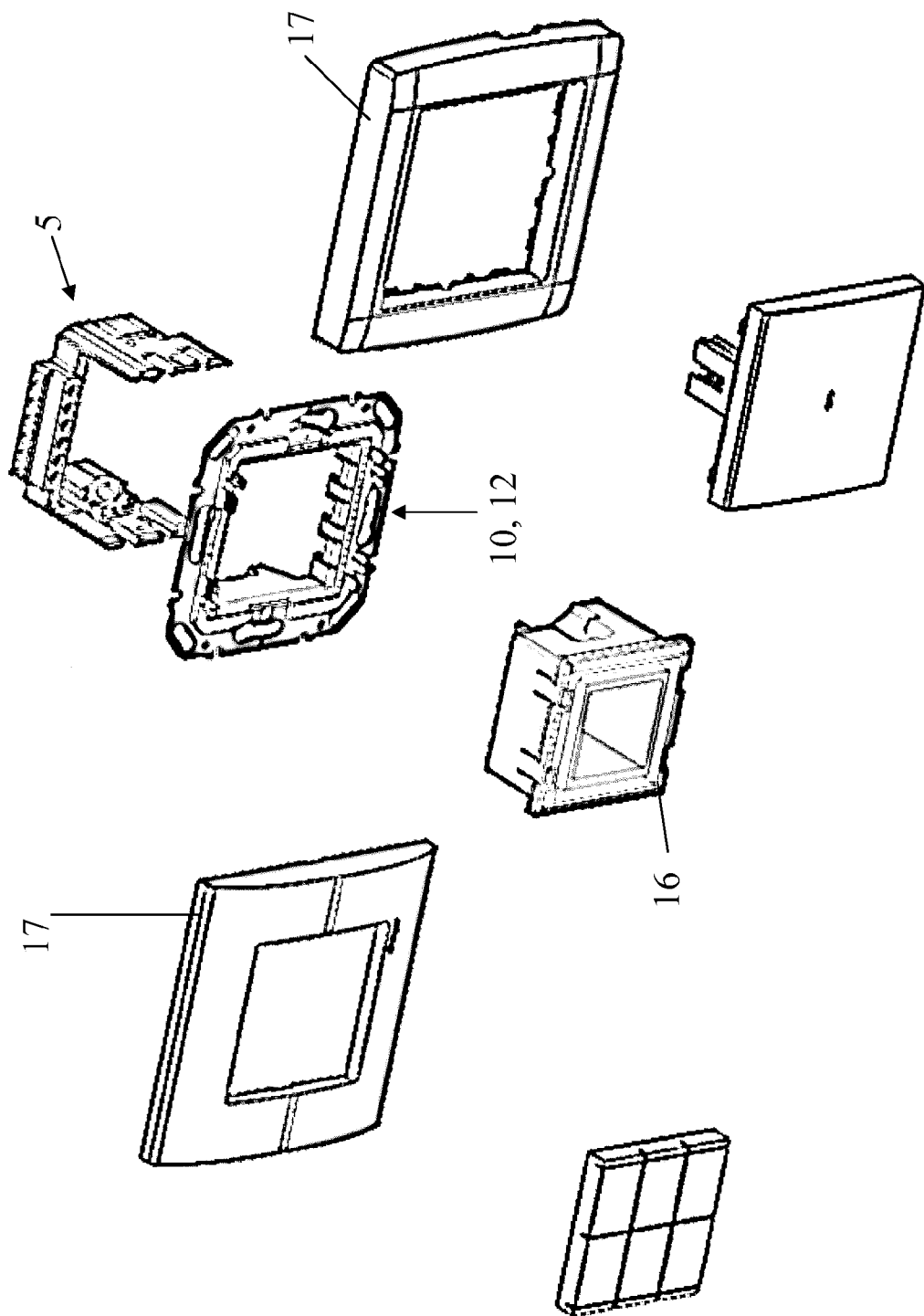


Fig. 16

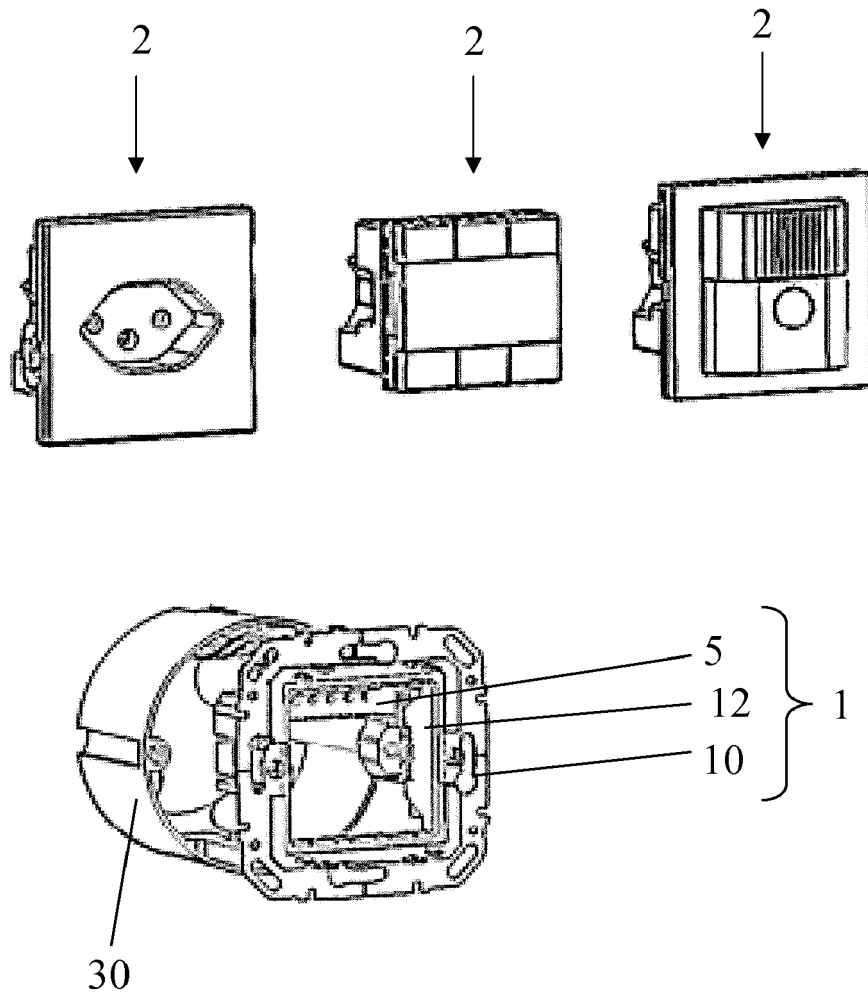


Fig. 17



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The present search report has been drawn up for all claims			
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The Hague		26 August 2014	López García, Raquel
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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			

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