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(72) Inventors:
• **VIVIAN, Michele**
36063 MAROSTICA (VI) (IT)
• **ZAMPIERIN, Ilario**
36061 BASSANO DEL GRAPPA (VI) (IT)

(74) Representative: **Locas, Davide et al**
Cantaluppi & Partners S.r.l.
Piazzetta Cappellato Pedrocchi, 18
35122 Padova (IT)

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(71) Applicant: **Vimar S.p.A.**
36063 Marostica (VI) (IT)

(54) **ELECTRIC SWITCH**

(57) Electric switch (1) including: a main body (11), in which a commutation mechanism (2) is received, a movable contact (3) and a fixed contact (67). The commutation mechanism (2) is configured to move the movable contact (3) between an open position, in which the movable contact (3) is spaced apart from the fixed contact (67), and a closed position, in which the movable contact (3) is in contact with the fixed contact (67). The electric switch (1) includes a rocker button (5) which is connected to the main body (11) so as to be rotatable about a first rotation axis (A1). The electric switch (1) includes a lever (4) which is connected to the main body (11) and which

is rotatable about a second rotation axis (A2) which is parallel with the first rotation axis (A1), the lever (4) being rotatable by means of the rocker button (5) which abuts the lever (4) so that the rotation of the lever (4) activates the commutation mechanism (2). The lever (4) comprises a pushing portion (30) and a pulling portion (6), the pushing portion (30) being suitable for actuating the commutation mechanism (2) in such a manner that the movable contact (3) is placed in the closed position, the pulling portion (6) is suitable for actuating the commutation mechanism (2) in such a manner that the movable contact (3) is placed in the open position.

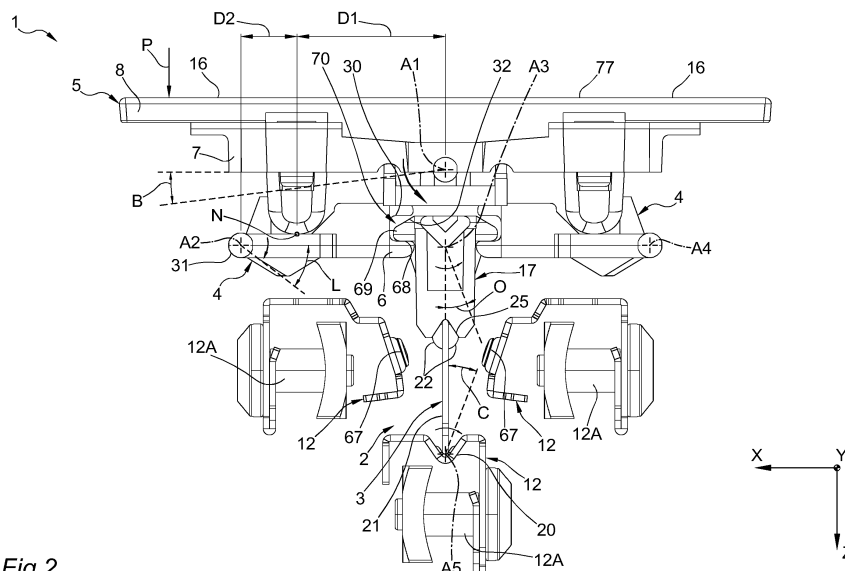


Fig.2

Description

[0001] The present invention relates to an electric switch of the type comprising a commutation mechanism, received inside a main body capable of controlling the opening and closing of an electric contact.

[0002] In the technical field of civil and industrial electric plants, switches of the electrical/mechanical type are commonly used, by means of which electric contacts are closed or commutated, for example, for switching on or off light points and/or for opening and closing shutters.

[0003] In one of the most common configurations thereof, the switches comprise a commutation mechanism which can be actuated by means of a manual pressing action which moves a movable contact between an open position, in which the movable contact is spaced apart from a fixed contact, and a closed position, in which the movable contact is in contact with the fixed contact. The interface with which a user interacts with the commutation mechanism for switches generally comprises a button.

[0004] In particular, the present invention relates to an electric switch of the rocker type. One example of this type of switch is described in the US patent US 5,436,421 which relates to a switch in which a rocker button moves the movable contact by means of the action of the commutation mechanism.

[0005] In a commutation mechanism for a switch of the rocker type, the button can rotate between a rest position and an operating position. By means of the rotation of the button, it is possible to interact with the commutation mechanism so as to move the movable contact between the open position and the closed position.

[0006] Generally, the commutation mechanisms of switches using rocker switches provide, between the button and the movable contact-carrying element, for an element which follows the rocking movement of the button and works to overcome a dead centre.

[0007] Such commutation mechanisms, although widespread, may have a great variety of disadvantages. It may be the case that the actuation of the commutation mechanism by means of the rocker button may not be very reliable and may become impeded, not carrying out the commutation of the electric contact despite the rocker button being actuated.

[0008] The electric switch can advantageously be configured as an electric module which can be connected to the support frame which can be installed on the wall. The support frame preferably comprises a plurality of insertion slots to which respective electric modules can be connected. The support frame is usually connected to a box which is inserted into a cavity of the wall. This box further has to receive electric elements, for example, electric wires which are connected to the electric modules. It may be the case that these electric wires are connected in a chaotic manner because the spaces available are limited.

[0009] Another possible disadvantage is connected

with the oscillating angle of the rocker button which may be quite high and may also require a specific actuation force of the button, giving a sensation which is not very pleasant for the users.

[0010] It is possible for the button of an electric switch of the rocker type to "depresses" on one side while "projects", on other side. This depression and this projection are accentuated by the length of the button, causing an actuation which is not very ergonomic for the user and aesthetically not very pleasant. One solution to this type of problem is proposed in the European Patent EP1732096, wherein it is described a switch comprising a pair of rocker buttons, each of which activates a lever which is suitable for interacting with a commutation mechanism. This lever allows a reduction in the oscillating angle of the rocker button. One disadvantage of this type of switch is that the kinematic actuation chain necessarily involves both levers. When the rocker button is pressed, in fact, the lever rotated by this button causes the commutation mechanism which interacts with the other lever as a result of the rotation to rotate. This involves the fact that, in order to be able to again rotate the commutation mechanism, it is necessary to interact with the other lever. The presence of two levers may make the mechanism complex and expensive. Furthermore, this type of switch operates in a snap-fitting manner and therefore does not allow a user to carry out extended pressing on the button in order to be able, for example, to regulate the intensity of the lighting of a light point or the degree of opening and closing of a shutter.

[0011] The technical problem addressed by the present invention is therefore to provide an electric switch which is structurally and functionally configured to overcome at least partially one or more of the disadvantages set out with reference to the cited prior art.

[0012] In the context of this problem, an object of the present invention is to provide an electric switch which is particularly reliable and which does not become impeded.

[0013] Another object is to provide an electric switch having particularly contained dimensions.

[0014] Another object is to provide an electric switch which can be connected to a support frame connected to a box which allows to obtain an arrangement of electric elements particularly orderly in said box.

[0015] Another object is to provide an electric switch which is particularly stable and resistant.

[0016] Another object is to provide an electric switch which is ergonomic and readily able to be operated by the user.

[0017] Another object is to provide an electric switch which is capable of regulating the activation of the device connected thereto by pressing the button in an extended manner.

[0018] This problem is solved and these objects are at least partially achieved by the invention by means of an electric switch including a commutation mechanism, a movable contact, a fixed contact, a rocker button and a

lever, the lever being rotatable by means of the rocker button which abuts the lever so that the rotation of the lever activates the commutation mechanism, the lever comprising a pushing portion and a pulling portion, the pushing portion being suitable for actuating the commutation mechanism in such a manner that the movable contact is placed in the closed position, the pulling portion being suitable for actuating the commutation mechanism in such a manner that the movable contact is placed in the open position. The open position is the position in which the movable contact is spaced apart from the fixed contact and the closed position is the position in which the movable contact is in contact with the fixed contact.

[0019] The presence of a lever comprising the pushing portion and the pulling portion allows simplification of the kinematic actuation chain of the switch because the same lever can be used to actuate the commutation mechanism in two different manners: a first manner in which, by means of the pushing portion of the lever, the commutation mechanism moves the movable contact into a closed position and a second manner in which, by means of the pulling portion of the lever, the commutation mechanism moves the movable contact into an open position. The lever also allows the activation of the device which is connected to the switch to be regulated by means of extended pressing of the button. For example, it is possible to regulate the degree of opening of a shutter by keeping the rocker button pressed for a longer or shorter time.

[0020] The rocker button can rotate between a rest position and an operating position. Preferably, when the rocker button is rotated from the rest position to the operating position, the commutation mechanism is actuated so that the movable contact moves into the closed position. Advantageously, when the rocker button is rotated from the operating position to the rest position, the commutation mechanism is actuated so that the movable contact moves into the open position.

[0021] Preferably, the electric switch may be of the single-pole or two-pole type. In other words, the switch can be used to interrupt both the electric connection of a single electric conductor, typically the phase, of a two-pole supply line, or both the electric conductors.

[0022] The electric switch can advantageously be configured as an electric module which can be connected to a support frame which can be fixed to a wall. The support frame can preferably comprise a plurality of insertion slots to which respective electric modules can be connected. The support frame may advantageously be connected to a box which can be inserted in a cavity of the wall. Preferably, this box can receive electric elements, for example, electric wires which are connected to respective electric modules. Advantageously, these electric wires can be connected to terminal boards by the electric switch.

[0023] Preferably, the electric switch comprises a main body, in which the commutation mechanism is received, the movable contact and the fixed contact.

[0024] Advantageously, the rocker button is connected to the main body so as to be rotatable about a first rotation axis.

[0025] Advantageously, the main body is in the form of a box-shaped body. Preferably, the main body can be connected to the support frame. Preferably, the main body comprises a support for a button and lower body. Advantageously, the rocker button is connected to the button support.

[0026] Preferably, the main body defines a main housing in which there are inserted the commutation mechanism, the lever, the movable contact and the fixed contact. Advantageously, the fixed contact is fixed to a terminal board which is also inserted in the main housing.

[0027] In a Cartesian coordinate system associated with the main body, it is advantageously possible to define a longitudinal direction, a transverse direction and a height direction. These directions are perpendicular to each other. The first rotation axis is parallel with the transverse direction.

[0028] The rocker button is advantageously rotatable by applying a pressure thereto. This pressure is preferably directed towards the main body in the height direction.

[0029] Preferably, the lever is connected to the main body and is rotatable about a second rotation axis. Advantageously, the second rotation axis is parallel with the first rotation axis. Preferably, the lever is rotatable by means of the rocker button which abuts the lever so that the rotation of the lever causes the oscillating device to rotate and positions it in the second position.

[0030] Preferably, when the rocker button is in a rest position, it is aligned with a plane parallel with the plane defined by the longitudinal direction and the transverse direction. Advantageously, when the rocker button is in an operating position, it is misaligned with respect to the plane. Preferably, the rocker button defines an inclination angle by moving between the rest position and the operating position.

[0031] The lever allows the inclination angle of the rocker button to be limited, limiting the dimensions of the electric switch particularly in the height direction. If the electric switch is connected to the support frame which is connected to the box which can be inserted in the cavity of the wall, the reduction of the dimensions of the switch allows more space to be made available in the box. This space can be used, for example, to receive electric elements, for example, electric wires, in an ordered manner.

[0032] By limiting the inclination angle of the rocker button, the actuation thereof is facilitated, making the electric switch more ergonomic.

[0033] Preferably, the commutation mechanism comprises an oscillating device which can be rotated about a third rotation axis which is parallel with the first rotation axis. Advantageously, said oscillating device is rotatable by means of the pulling portion of the lever in a first position, in which the movable contact is in an open position, and is rotatable by means of the pushing portion of the

lever in a second position, in which the movable contact is in the closed position.

[0034] Using the oscillating device allows the electric switch to be particularly reliable in terms of the actuation thereof and the commutation mechanism to be prevented from becoming impeded.

[0035] Preferably, the oscillating device is positioned in the second position when the rocker button is in an operating position and is positioned in the first position when the rocker button is in a rest position. Advantageously, the rotation of the rocker button from the rest position to the operating position causes the rotation of the lever in a rotation direction so that the pushing portion of the lever rotates the oscillating device into a second position. Preferably, by rotating in the opposite rotation direction, the lever causes the rotation of the oscillating device into a first position by means of the pulling portion. Advantageously, the pushing portion rotates the oscillating device in one rotation direction and the pulling portion rotates it in the opposite direction.

[0036] Preferably, the oscillating device comprises a fulcrum element which is supported on a support portion of the main body so as to be able to rotate about the third rotation axis.

[0037] It is thereby possible to obtain a particularly stable oscillation of the oscillating device. Advantageously, the support portion is formed so as to have a form which complements the form of the fulcrum element.

[0038] Preferably, the movable contact is interposed between the oscillating device and a lower abutment element. Advantageously, said lower abutment element is configured as a fulcrum, about which the movable contact is rotatable so that, when the oscillating device is rotated in one direction, the movable contact is rotated in the opposite direction. If, for example, the oscillating device rotates in a counterclockwise direction, the movable contact rotates in a clockwise direction, and vice versa.

[0039] By means of this configuration, it is possible to laterally limit the dimension of the electric switch in the height direction. This allows, if the electric switch is connected to the support frame which is connected to the box which can be inserted in the cavity of the wall, more space to be made available in the box in which it is possible to arrange electric elements in a particularly ordered manner. Furthermore, it is thereby possible to prevent the switch from projecting excessively towards the exterior with respect to the frame.

[0040] Advantageously, the lower abutment element defines a fifth rotation axis about which the movable contact is rotatable. Preferably, this fifth rotation axis is parallel with the first axis.

[0041] Preferably, the first, third and fifth rotation axes are contained in a plane which is parallel with the one defined by the transverse direction and by the height direction. This allows activation of the commutation mechanism which is particularly stable to be obtained because the forces transmitted are particularly balanced.

[0042] Preferably, when the movable contact is in an

open position, this movable contact is arranged along a plane parallel with the plane defined by the transverse direction and the height direction. Preferably, when the movable contact is in a closed position, it is inclined with respect to this plane.

[0043] Preferably, the electric switch comprises an additional lever which is rotatable about a fourth rotation axis which is parallel with the first rotation axis and which is connected to the main body so that the oscillating device is interposed between the levers. Advantageously, the additional lever is rotatable by means of the rocker button which abuts the additional lever so that the rotation of the additional lever rotates the oscillating device. Preferably, the oscillating device is rotatable into the first position by means of the pulling portion of the additional lever and is rotatable into a third position by means of the pushing portion of the additional lever.

[0044] Advantageously, when the oscillating device is in the third position, the movable contact is in an additional closed position, in which it is in contact with an additional fixed contact.

[0045] It is thereby possible to position the oscillating device in a central position of the main housing, further optimizing the spatial requirements.

[0046] Preferably, the additional lever is placed in the main housing. In a preferred embodiment, the two levers are connected to the main body so as to be opposite each other with respect to a plane of symmetry which passes centrally through the main body. Advantageously, the two levers are identical to each other.

[0047] Advantageously, the rotation of the rocker button from the rest position to an additional operating position causes the rotation of the additional lever, the pushing portion of which abuts the oscillating device and rotates it about the third rotation axis so as to arrange it in the third position. Preferably, the rotation of the rocker button from the additional operating position to the rest position causes the rotation of the additional lever, the pulling portion of which abuts the oscillating device and rotates it about the third rotation axis so as to arrange it in the third position.

[0048] Depending on the direction of rotation of the rocker button, the lever or the additional lever is advantageously actuated. Preferably, depending on which lever applies the thrust, it is possible to rotate the oscillating device about the third rotation axis in a clockwise or counterclockwise direction.

[0049] Advantageously, the rocker button comprises a first and a second lateral portion. For example, by applying pressure to the first lateral portion, the rocker button is rotated in a clockwise direction and the lever is rotated in a counterclockwise direction, the oscillating device is rotated in a clockwise direction and the movable contact rotates in a counterclockwise direction; vice versa, by applying pressure to the second lateral portion, the rocker button is rotated in a counterclockwise direction, the additional lever is rotated in a clockwise direction, the oscillating device is rotated in a counterclockwise direction

and the movable contact rotates in a clockwise direction. It is advantageously possible to associate a specific action with each lateral portion, for example, by pressing on the first lateral portion it is possible to raise a shutter and by pressing on the second lateral portion it is possible to lower the shutter, or vice versa.

[0050] Preferably, between the pushing portion and the pulling portion is provided a first housing which is suitable for receiving a first longitudinal protuberance of the oscillating device. Advantageously, this first longitudinal protuberance includes an upper receiving portion and a lower receiving portion. Preferably, this upper receiving portion is suitable for abutting the pushing portion of the lever and this lower receiving portion is suitable for abutting the pulling portion of the lever. By means of this configuration, it is possible to reduce the dimensions in the main housing particularly in the longitudinal direction because the first protuberance is received in the first housing.

[0051] The first housing is preferably formed so as to prevent the rotation of the lever from being pushed directly by the rocker button. In this manner, it is possible to limit the pressure to be applied to the rocker button and therefore to facilitate the actuation of the rocker button. For example, in a preferred embodiment, the first housing preferably has a concave shape, with curvature which is configured so as to prevent the contact between the oscillating device which is rotating and the pushing portion of the lever from being pushed by the rocker button.

[0052] Preferably, the rotation of the rocker button from the rest position to the operating position rotates the lever, the pushing portion of which abuts the upper receiving portion of the oscillating device so as to position the movable contact in a closed position. Advantageously, the oscillating device is positioned in the second or third position depending on which lever is rotated by means of the rocker button. Preferably, the pulling portion is suitable for abutting the lower receiving portion of the oscillating device so as to rotate the oscillating device by positioning it in the first position.

[0053] The oscillating device preferably comprises a pair of first longitudinal protuberances which are opposite each other in the longitudinal direction. Each of these first longitudinal protuberances may comprise respective upper and lower receiving portions.

[0054] Preferably, the lever comprises a first end and a second end. Advantageously, the second end is opposite the first end and is the end furthest away from the oscillating device. Advantageously, the first end includes the pushing portion and the pulling portion. Preferably, the lever comprises a fulcrum portion which is connected to the main body and which is positioned on the second end.

[0055] This type of lever allows a particularly balanced distribution of the spatial requirements in the main housing to be obtained. It is thereby possible to contain the dimensions of the main body. In particular, it is possible

to limit the dimensions laterally in the main housing.

[0056] Preferably, the pushing portion is in the form of a second longitudinal protuberance and the pulling portion is in the form of a third longitudinal protuberance. Advantageously, the first housing is placed between the second longitudinal protuberance and third longitudinal protuberance.

[0057] Preferably, the first housing, the second and third protuberance are positioned at the first end of the lever. Advantageously, the first end has a C-shaped configuration. In other words, the first housing, the second and third longitudinal protuberance form a C-shaped configuration. By means of this configuration, it is possible to obtain a rotation of the oscillating device which is reliable because a particularly stable engagement is ensured with the oscillating device.

[0058] Advantageously, the longitudinal protuberances have a rounded edge. In this manner, it is possible to limit possible friction which could lead to damage to the lever and the oscillating device.

[0059] Preferably, the upper receiving portion comprises a first channel which is suitable for receiving the pushing portion of the lever.

[0060] Advantageously, this first channel is delimited by lateral walls which are suitable for limiting possible movements of the pushing portion in the transverse direction. Preferably, this first channel is delimited by a front wall which is suitable for limiting possible movements of the pushing portion in the longitudinal direction. It is thereby possible to increase the stability of the abutment between the lever and oscillating device.

[0061] Preferably, the pulling portion comprises a second channel which is suitable for receiving a lower wall of the oscillating device. Advantageously, this lower wall extends from the lower receiving portion towards the movable contact. It is thereby possible to limit possible movements of the lever in the transverse direction, increasing the stability of the lever which abuts the oscillating device. Advantageously, the lower wall has dimensions which substantially correspond to those of the second channel so that the lower wall can slide in the second channel without there being any friction between them.

[0062] Preferably, the rocker button comprises a rocker body and a rocker button cover.

[0063] Preferably, the rocker button comprises a projecting portion which projects from the rocker button and is suitable for abutting the lever in order to move it in rotation.

[0064] By means of this projecting portion, it is possible to further limit the inclination angle of the rocker button. In fact, a greatest inclination angle of the lever will correspond to a specific inclination angle of the rocker button. It is thereby advantageously possible to further limit the dimensions of the electric switch in the height direction.

[0065] Advantageously, the projecting portion abuts an intermediate portion of the lever, this intermediate portion being interposed between the first and second ends of

the lever. Preferably, the rocker body comprises the projecting portion. Preferably, the rocker button cover comprises a connection element. Advantageously, this connection element is connected to an opening of the rocker button. Preferably, this opening is positioned at the projecting portion of the rocker button.

[0066] It is possible by means of this connection to obtain a reduction of the dimensions of the switch, particularly in the height direction.

[0067] Preferably, the electric switch comprises a return mechanism which is configured to move the rocker button into a rest position. Advantageously, the return mechanism includes a first resilient element which is suitable for abutting the lever so that the rotation of the lever moves the rocker button into a rest position. The first resilient element is preferably in the form of a helical spring.

[0068] A resilient force of the first resilient element advantageously urges the lever in order to rotate it. During this rotation, the lever abuts the rocker button rotating it from the operating position to the rest position. During this rotation of the lever, the pulling portion of the lever can abut the oscillating device by rotating it into the first position. This rotation of the lever has the opposite direction with respect to the rotation of the lever when the rocker button rotates from the rest position to the operating position. The rotation of the oscillating device into the first position is advantageously carried out by means of abutment of the pulling portion of the lever with the lower receiving portion of the oscillating device.

[0069] The rocker button can rotate from the rest position to the operating position when the pressure which is applied to the rocker button is such as to overcome the resilient force of the first resilient element.

[0070] The rocker button may remain in an operating position and therefore the movable contact may remain in the closed position as long as the pressure applied to the button is such as to overcome the resilient force of the first resilient element. When the pressure is no longer such as to overcome the resilient force, the return mechanism advantageously rotates the button into a rest position and consequently the movable contact returns to an open position. In this manner, it may be possible to regulate the activation of the device which is connected to the switch by means of an extended pressure of the button. For example, it is possible to regulate the degree of opening of a shutter by keeping the button pressed in an operating position for more time or less time. Once the button is released, it advantageously returns to the rest position and the shutter closes because the movable contact is placed in an open position.

[0071] During the release of the rocker button, the pulling portion of the lever allows a rotation of the oscillating device which is particularly gradual to be obtained, safeguarding the integrity of the switch and reducing the risk of possible breakages. The term "release" is intended to be understood to be the step in which the pressure applied to the rocker button, which therefore returns to a

rest position as a result of the return mechanism, is interrupted. The return mechanism may comprise an additional first resilient element which acts on the additional lever so as to move the rocker button into a rest position.

Therefore, the return mechanism advantageously comprises two first resilient elements which abut respective levers. If the respective first resilient element acts on each lever, the pulling portions of both the levers can abut respective lower receiving portions of the oscillating device. In this manner, the oscillating device is advantageously kept in equilibrium in the first position.

[0072] It is preferable for the return mechanism to bring back the rocker button to a rest position in such a manner that the button is aligned with a plane parallel with the plane defined by the longitudinal direction and the transverse direction. This allows the user to activate the button more easily because both the first lateral portion and the second lateral portion will be positioned at the same height by means of the return mechanism, that is to say, they will be aligned with the parallel plane. Vice versa, if the button were to be misaligned, it would be more difficult for the user to activate one of the two lateral portions.

[0073] In the alternative embodiment in which a single lever is provided, the oscillating device can be kept in equilibrium, on the one hand, by the thrust of the lever as a result of the first resilient element and, on the other hand, for example, by means of abutment of the first longitudinal protuberance with a fixed support.

[0074] Preferably, the first resilient element includes a first end. Advantageously, the lever comprises a first blind cavity, in which the first end of the first resilient element moves into abutment.

[0075] The presence of the first blind cavity allows the stability of the return mechanism to be increased, limiting the movement of the first end of the first resilient element.

[0076] Advantageously, the first resilient element has a second end in abutment with the main body, even more advantageously with the lower body. The main body may comprise a second blind cavity which is suitable for receiving the second end of the first resilient element. The presence of the blind cavities allows the stability of the return mechanism to be increased.

[0077] Preferably, the first cavity is defined by a tubular wall which may, for example, have a circular cross-section. Preferably, the second cavity is defined by a tubular wall which may, for example, have a circular cross-section.

[0078] A longitudinal axis of the first cavity is preferably in line with a longitudinal axis of the second cavity. It is thereby possible to obtain an actuation and release of the button which is particularly gradual.

[0079] In the embodiment which comprises two levers, each lever may preferably comprise a first cavity. In this case, it may further be preferable for the main body, more advantageously the lower body, to comprise two second cavities. If there are present two first resilient elements, each of the first resilient elements may preferably abut the first and the second cavity, respectively, as described

above.

[0080] In some embodiments, the electric switch may comprise a lighting device, by means of which it is possible to back-light the button. Preferably, the lighting device comprises an LED. Advantageously, the lighting device may carry out back-lighting of the button which is centred and/or off-centre. By means of the lighting device, for example, it is possible to back-light any symbols which are present on the rocker button.

[0081] In some embodiments, the terminal boards comprise actuation sections for opening/closing the terminal board, which are preferably formed by threaded connections. Preferably, the main body has openings which are configured to actuate the actuation sections for opening and/or closing, for example, by means of a screwdriver.

[0082] The openings are preferably arranged in a rear zone of the electric switch with respect to the rocker button, at opposite sides of the electric switch with respect to a longitudinal direction.

[0083] In this manner, there may be ensured access to the terminal boards even if there are present additional electric modules which are beside the switch of the present invention because the presence of the additional modules does not cover the relevant openings.

[0084] The features and additional advantages of the invention will be better appreciated from the following detailed description of a preferred though non-exclusive embodiment thereof which is illustrated by way of non-limiting example with reference to the appended drawings, in which:

Figure 1 is a perspective view of the electric switch of the present invention;

Figure 2 is a front view of the switch without the main body and the return mechanism;

Figure 3 is a perspective view of the support for a button of the switch;

Figure 4 is a perspective view of the lower body of the switch;

Figure 5 is a perspective view of the rocker button in which the rocker button cover is separated from the rocker body;

Figure 6 is a perspective upper view of the lever;

Figure 7 is a perspective lower view of the lever;

Figure 8 is a perspective upper view of the oscillating device; and

Figure 9 is a perspective lower view of the oscillating device.

[0085] With reference to the Figures, an electric switch is generally designated 1.

[0086] It will be appreciated that, in the present embodiment, the switch 1 is configured as an electric module which can be connected to a support frame which can be fixed to a wall. The support frame may advantageously be connected to a box which can be inserted into a cavity of the wall. Preferably, this box can receive electric ele-

ments, for example, electric wires which are connected to respective electric modules.

[0087] The electric switch 1 includes a commutation mechanism 2, a movable contact 3, a fixed contact 67, a rocker button 5 and a lever 4. This lever 4 is rotatable by means of the rocker button 5 which abuts the lever 4 so that the rotation of the lever 4 actuates the commutation mechanism 2. The lever 4 is rotatable about a second rotation axis A2 which is parallel with the first rotation axis A1. The lever 4 comprises a pushing portion 30 and a pulling portion 6. The pushing portion 30 is suitable for actuating the commutation mechanism 2 so that the movable contact 3 is positioned in a closed position and the pulling portion 6 is suitable for actuating the commutation mechanism 2 so that the movable contact 3 is positioned in an open position. The open position is the position in which the movable contact 3 is spaced part from the fixed contact 67 and the closed position is the position in which the movable contact 3 is in contact with the fixed contact 67.

[0088] The rocker button 5 may comprise a rocker body 7 and a rocker button cover 8.

[0089] The electric switch 1 comprises a main body 11, in which the commutation mechanism 2, the movable contact 3 and the fixed contact 67 are received. Advantageously, the rocker button 5 is connected to the main body 11 so as to be rotatable about a first rotation axis A1.

[0090] The main body 11 defines a main housing in which there is inserted the commutation mechanism 2, the movable contact 3 and the fixed contact 67. The fixed contact 67 is fixed to a terminal board 12 which is also inserted in the main housing.

[0091] Advantageously, the main body 11 is in the form of a box-shaped body. The main body 11 may comprise a button support 14 and a lower body 15. Preferably, the rocker body 7 is connected to the button support 14. The main body may be connectable to the support frame. Advantageously, the main body 11 comprises fixing portions 13 which are provided for connecting the electric switch 1 to the support frame. The fixing portions 13 can be present on the button support 14. Preferably, the lower body 15 comprises first connection portions 58 which can be inserted in respective second connection portions 59 of the button support 14.

[0092] In a Cartesian coordinate system XYZ which is associated with the main body 11, it is advantageously possible to define a longitudinal direction X, a transverse direction Y and a height direction Z. These directions are perpendicular to each other. The first rotation axis A1 is parallel with the transverse direction Y.

[0093] The rocker button 5 can rotate about the first rotation axis A1 between a rest position and an operating position. When the rocker button 5 is in the rest position, an upper surface 77 thereof can advantageously be aligned with a plane parallel with the plane defined by the longitudinal direction X and the transverse direction Y. By rotating between the rest position and the operating position, the rocker button 5 defines an inclination angle

B. The inclination angle B of the rocker button 5 is illustrated in Figure 2. The rocker button 5 may comprise two lateral portions 16. Preferably, the rocker button 5 is rotatable by applying a pressure to one of the lateral portions 16 thereof. Depending on which lateral portion 16 is pressed, the rocker button 5 can rotate in one direction or in the opposite direction.

[0094] In some embodiments, the terminal boards comprise actuation sections for opening/closing the terminal board, which are preferably formed by screw heads of threaded connections 12A.

[0095] As may be observed in Figure 4, the main body has openings 12B which are configured to actuate the actuation sections for opening and/or closing, for example, by means of a screwdriver.

[0096] The openings are preferably arranged in a rear region of the electric switch with respect to the rocker button, at opposite sides of the electric switch with respect to a longitudinal direction X.

[0097] Again with reference to Figure 2, advantageously the device comprises three pairs of terminal boards 12, making the switch 1 suitable for being used both as a commutator and as a one-pole switch or two-pole switch, depending on the electrical connections used.

[0098] The commutation mechanism 2 may comprise an oscillating device 17 which is rotatable about a third rotation axis A3 which is parallel with the first rotation axis A1 so as to move the movable contact 3. Advantageously, the oscillating device 17 is rotatable by means of the pulling portion 6 of the lever 4 into a first position, in which the movable contact 3 is in an open position, and is rotatable by means of the pushing portion 30 of the lever 4 into a second position, in which the movable contact 3 is in a closed position.

[0099] The switch 1 may comprise an additional lever 4 which is rotatable about a fourth rotation axis A4 which is parallel with the first rotation axis A1 and which is connected to the main body 11 so that the oscillating device 17 is interposed between the levers 4. The additional lever 4 is advantageously rotatable by means of the rocker button 7 which abuts the additional lever 4 so that the rotation of the additional lever 4 rotates the oscillating device 17. The oscillating device 17 is rotatable by means of the pulling portion 6 of the additional lever 4 into the first position and is rotatable by means of the pushing portion 30 of the additional lever 4 into a third position, in which the movable contact 3 is in another closed position, in which it is in contact with an additional fixed contact 67. In accordance with which lateral portion 16 of the rocker button 5 is pressed, the oscillating device 17 is rotatable in one direction or in the opposite direction.

[0100] The oscillating device 17 can be placed centrally in the main housing so as to be positioned between the two levers 4. The two levers 4 are advantageously positioned laterally in the main housing and are opposite each other. Preferably, the two levers 4 are identical to each other and are mounted so as to be symmetrical with

respect to a plane of symmetry. This plane of symmetry is advantageously defined by the transverse direction Y and by the height direction Z and passes through the first rotation axis A1. On the basis of the direction of rotation with which the rocker button 5 is rotated, the lever 4 or the additional lever 4 can be caused to rotate. Each lever 4 can abut the oscillating device 17.

[0101] The rocker button 5 is advantageously connected to the main body 11 by means of a pair of transverse pins 61 which can be inserted in respective seats 62 of the main body 11. Preferably, these transverse pins 61 are on the rocker body 7 and these seats 62 are on the button support 14.

[0102] The oscillating device 17 may comprise a fulcrum element 18 which is supported on a support portion 19 of the main body 11 so that an interface between the fulcrum element 18 and the support portion 19 is positioned on the third rotation axis A3. Preferably, the support portion 19 has a shape which complements the shape of the fulcrum element 18. The fulcrum element 18 advantageously has a V-shaped form. Preferably, the support portion 19 is on the button support 15. In the embodiment illustrated in Figures 8 and 9, the oscillating device 17 comprises a pair of fulcrum elements 18 which are aligned along the third rotation axis A3 and which can be received in respective support portions 19 of the main body 11.

[0103] The movable contact 3 can be interposed between the oscillating device 17 and a lower abutment element 20. Preferably, the lower abutment element 20 is configured as a fulcrum, about which the movable contact 3 is rotatable so that, when the oscillating device 17 is rotated in one direction the movable contact 3 is rotated in the opposite direction. The lower abutment element 20 advantageously defines a fifth rotation axis A5, about which the movable contact 3 is rotatable. Preferably, this fifth rotation axis A5 is parallel with the first rotation axis A1. The lower abutment element 20 may be on the terminal board 12.

[0104] The movable contact 3 may comprise a contact-carrying element 21 and a contact portion 22. Preferably, the contact portion 22 is the movable contact portion 3 suitable for abutting the fixed contact 67 when the movable contact 3 is in the closed position. The movable contact 3 may comprise an additional contact portion 22. The contact portions 22 are advantageously positioned on opposite lateral surfaces of the contact-carrying element 21. Preferably, there are present two fixed contacts 67 which are suitable for receiving respective contact portions 22 depending on the rotation direction of the oscillating device 17.

[0105] The contact-carrying element 21 can be in the form of a plate. The contact-carrying element 21 is advantageously rectilinear. Preferably, the contact-carrying element 21 is interposed between the oscillating device 17 and the lower abutment element 20. The contact-carrying element 21 may comprise a lower end which abuts the lower abutment element 20 and an upper end which

interfaces with the oscillating device 17. The lower end may be wider than the upper end. The contact portion 22 is advantageously positioned at the upper end of the contact-carrying element 21.

[0106] The oscillating device 17 may comprise a transverse element 33 which extends in the transverse direction Y. Preferably, the fulcrum element 18 extends transversely from the transverse element 33.

[0107] The lower abutment element 20 advantageously has a V-shaped form which is formed so that the lower end of the contact-carrying element 21 is arranged in a plane parallel with the plane defined by the transverse direction Y and the height direction Z.

[0108] The oscillating device 17 may comprise a hollow body 29 which extends from the transverse element 33 towards the height direction Z. Advantageously, this hollow body 29 defines a second housing 28 which is suitable for receiving a third resilient element (not depicted). This third resilient element is suitable for pushing the movable contact 3 towards the lower abutment element 20. This third resilient element advantageously abuts the upper end of the contact-carrying element 22. The third resilient element is preferably in the form of a helical spring.

[0109] The oscillating device 17 may comprise a lower edge 24 which defines a lower opening 23. The lower edge 24 may include a first lower recess 25 which is suitable for receiving the upper end of the contact-carrying element 21. Advantageously, there are present a pair of first lower recesses 25 which are opposite each other. The first lower recess 25 preferably has a V-shape and is defined by oblique walls 26 which are formed so that an interface between the first lower recess 25 and the upper end of the contact-carrying element 21 is parallel with the transverse direction Y. The V-shape of the first lower recess 25 ensures a specific inclination angle C of the movable contact 3 when it is rotated into the closed position. Preferably, the contact-carrying element 21 moves into abutment against one of the oblique walls 26 when the movable contact is in the closed position. The first lower recess 25 allows a commutation mechanism which is particularly stable and balanced to be obtained both when the movable contact is in the closed position and when it is in the open position.

[0110] The lower edge 24 may comprise a second lower recess 27 which is formed to receive the contact portion 22 when the movable contact 3 is in the closed position. This second lower recess 27 preferably has a form which complements the form of the contact portion 22. Advantageously, there are present a pair of second lower recesses 27 which are opposite each other. In this manner, the second lower recesses 27 can receive the respective contact portion 22 depending on the direction of rotation of the movable contact 3.

[0111] The third rotation axis A3 and the fifth rotation axis A5 can be arranged in a plane which is parallel with the plane defined by the transverse direction Y and the height direction Z. Therefore, the contact-carrying ele-

ment 21 is also advantageously arranged along this plane when the movable contact 3 is in an open position. Preferably, the first rotation axis A1 is also contained in this plane. This configuration allows the device to be particularly stable and balanced.

[0112] In the embodiment shown in Figures 8 and 9, the oscillating device 17 comprises a pair of hollow members 29 which extend in the height direction Z and which are aligned with each other in the transverse direction Y. Each hollow body 29 preferably comprises a lower edge 24 which includes respective lower recesses 25, 27. In this embodiment, there may be present a pair of lower abutment elements 20 which are aligned along the fifth rotation axis A5; there may further be present a pair of movable contacts 3 which are positioned between respective lower abutment elements 20 and respective lower recesses 25.

[0113] There may be present between the pushing portion 30 and the pulling portion 6 a first housing 70 which is suitable for receiving a first longitudinal protuberance 69 of the oscillating device 17. This first longitudinal protuberance 69 preferably includes an upper receiving portion 32 and a lower receiving portion 68. The upper receiving portion 32 is suitable for abutting the pushing portion 30 of the lever 4 and the lower receiving portion 68 is suitable for abutting the pulling portion 6 of the lever 4.

[0114] The oscillating device 17 preferably comprises a pair of first longitudinal protuberances 69 which are opposite each other in the longitudinal direction X. These first longitudinal protuberances 69 may comprise respective upper receiving portions 32 and lower receiving portions 68.

[0115] The first housing 70 is preferably formed so as to prevent the rotation of the lever 4 from directly being pushed by the rocker button 5. In the examples of Figures 2, 6 and 7, it is shown that the first housing 70 has a concave shape, with curvature which is configured so as to prevent contact between the oscillating device 17 which is rotating and the pushing portion 30 of the right lever 4 from being pushed by the rocker button 5. In the embodiment shown in Figure 2, there is shown an embodiment of the rocker button 5 in which there is applied a pressure P to the left lateral portion 16 of the rocker button 5. This pressure P causes the rotation of the rocker button 5 in the counterclockwise direction and a resultant rotation of the left lever 4 in a clockwise direction which in turn causes a rotation in the counterclockwise direction of the oscillating device 17. This rotation of the oscillating device 17 causes the lifting of the right, upper receiving portion 32 which, in the absence of this first housing 70, could abut the right lever 4 or the lever 4 is not rotated directly by the rocker button 5. As a result of the first housing 70, therefore, it is possible to prevent this abutment which could cause excessive pressure to be applied to the rocker button 5, and therefore difficulty in actuating the rocker button 5.

[0116] The pushing portion 30 may be in the form of a second longitudinal protuberance 72 and the pulling por-

tion 6 may be in the form of a third longitudinal protuberance 73. The first housing 70 is preferably positioned between the second longitudinal protuberance 72 and the third longitudinal protuberance 73.

[0117] The longitudinal protuberances 69, 72, 73 may have a rounded formation.

[0118] The upper receiving portion 32 may comprise a first channel 34 which is suitable for receiving the pushing portion 30 of the lever 4. Advantageously, this first channel 34 is delimited by lateral walls 35 which are suitable for limiting possible movements of the pushing portion 30 in the transverse direction Y. Preferably, this first channel 34 is delimited by a front wall 36 which is suitable for limiting possible movements of the pushing portion 30 in the longitudinal direction X.

[0119] The pulling portion 6 may comprise a second channel 71 which is suitable for receiving a lower wall 74 of the oscillating device 17. This lower wall 74 preferably extends from the lower receiving portion 68 towards the movable contact 3.

[0120] Both the lower wall 74 and the second channel 71 extend mainly in the longitudinal direction X and height direction Z. The second channel 71 and the lower wall 74 preferably have dimensions which substantially correspond. The oscillating device 17 may comprise a pair of lateral walls 74 which are longitudinally opposite. Each of these lateral walls 74 can be inserted in the channel of a respective lever 4.

[0121] The lever 4 may comprise a first end 38 and a second end 39, wherein the second end 39 is opposite the first end 38 and is the one furthest away from the oscillating device 17. The first end 38 preferably includes the pushing portion 30 and the pulling portion 6. The lever 4 advantageously comprises a fulcrum portion 31 which is connected to the main body 11 and which is positioned on the second end 39.

[0122] The fulcrum portion 31 may comprise a pair of pins 63 which can be received in a pair of housings 64 of the lower body 15.

[0123] The rocker button 5 may comprise a projecting portion 40 which projects from the rocker button 5 and which is suitable for abutting the lever 4 in order to move it in rotation. Advantageously, the projecting portion 40 projects from the rocker body 7. The projecting portion 40 preferably abuts an intermediate portion 41 of the lever 4. The intermediate portion 41 is advantageously interposed between the two ends 38, 39 of the lever 4. The intermediate portion 41 is preferably planar. The projecting portion 40 is advantageously rounded so as to prevent possible damage to the lever 4.

[0124] By means of the interaction between the lever 4 and projecting portion 40, it may be possible to further limit the inclination angle B of the rocker button 5. An inclination angle L of the lever 5 corresponds to the inclination angle B of the rocker button 5. This inclination angle L of the lever 4 advantageously has a greater extent than the inclination angle B of the rocker button 5. This occurs because the distance D1 between the first rotation

axis A1 and the interface N between the rocker button 5 and the lever 4 is greater than the distance D2 between the second rotation axis A2 and the interface N between the rocker button 5 and the lever 4, as shown in Figure 2.

[0125] The projecting portion 40 can project in the height direction Z when the rocker button 5 is in the rest position. The rocker button 5 advantageously comprises four projecting portions 40.

[0126] The rocker button 5 preferably comprises an opening 51 which is suitable for receiving a respective connection element 52 of the rocker button cover 8. This opening 51 is advantageously positioned on the rocker button 7 at the projecting portion 40. By means of this connection, it is possible to obtain a reduction of the dimensions of the switch 1, particularly in the height direction Z.

[0127] Figure 2 schematically illustrates, for example, what happens by applying a pressure P to the left lateral portion 16 of the rocker button 5: this pressure P causes the rotation in a counterclockwise direction of the rocker button 5, with the inclination angle B from the rest position to the operating position; this rotation causes the rotation in the clockwise direction of the lever 4, with the inclination angle L; this rotation of the lever 4 in turn causes the rotation in a counterclockwise direction of the oscillating device 17 with an inclination angle O which in turn causes the rotation in the clockwise direction of the movable contact 3 from the rest position to the closed position with the inclination angle C.

[0128] The electric switch 1 may comprise a return mechanism which is configured to move the rocker button 5 into the rest position. Advantageously, the return mechanism (not depicted) includes a first resilient element which is suitable for abutting the lever 4 so that the rotation of the lever 4 moves the rocker button into a rest position.

[0129] The return mechanism may bring back the rocker button 5 into a rest position in such a manner that the button 5 is aligned with a plane parallel with the plane defined by the longitudinal direction X and the transverse direction Y, as can be seen in Figure 2. In this case, both the first and second lateral portions 16 are at the same height, that is to say, they will be aligned with the parallel plane.

[0130] A resilient force of the first resilient element advantageously urges the lever 4 in order to rotate it. During this rotation, the lever 4 abuts the rocker button 5 by rotating it from the operating position to the rest position. This rotation of the lever 4 has a direction counter to the rotation of the lever 4 when the rocker button 5 rotates from the rest position to the operating position. The rocker button 5 can rotate from the rest position to the operating position when the pressure applied to the rocker button 5 is such as to overcome the resilient force of the first resilient element. The first resilient element is preferably in the form of a helical spring. The return mechanism may comprise an additional first resilient element which acts on the additional lever 4 so as to move the rocker button

5 into a rest position. Therefore, the return mechanism advantageously comprises two first resilient elements which abut respective levers 4. There can act on each of these levers 4 a respective first resilient element and the pulling portions 6 of both levers 4 can abut respective lower receiving portions 68 of the oscillating device 17. In this manner, the oscillating device 17 is advantageously kept in equilibrium in the first position.

[0131] The lever 4 may comprise a first blind cavity 53, in which a first end of the first resilient element moves into abutment. This first blind cavity 53 is advantageously positioned near the first end 38 of the lever 4. The first resilient element has a second end which is preferably in abutment against the main body 11, even more preferably against the lower body 15. The lower body 15 may comprise a second blind cavity 57 which is suitable for receiving the second end of the first resilient element. The presence of the blind cavities 53, 57 allows the stability of the return mechanism to be increased.

[0132] In the example of Figure 7, the first cavity 53 is defined by a tubular wall with a circular cross-section. In the example of Figure 4, there are present two second cavities 57, each of which is defined by a tubular wall with a circular cross-section. A longitudinal axis of the first cavity 53 can be in line with a longitudinal axis of the second cavity 57.

[0133] In the embodiment shown in Figure 2, each lever 4 may comprise the first cavity 53 and the return mechanism may comprise two first resilient elements, each of which may preferably abut the first cavity 53 and the second cavity 57, respectively, as described above.

Claims

1. An electric switch (1) including:

a main body (11), in which a commutation mechanism (2) is received, a movable contact (3) and a fixed contact (67),
the commutation mechanism (2) being configured to move the movable contact (3) between an open position, in which the movable contact (3) is spaced apart from the fixed contact (67), and a closed position, in which the movable contact (3) is in contact with the fixed contact (67);
a rocker button (5) which is connected to the main body (11) so as to be rotatable about a first rotation axis (A1),
a lever (4) which is connected to the main body (11) and which is rotatable about a second rotation axis (A2) which is parallel with the first rotation axis (A1),
the lever (4) being rotatable by means of the rocker button (5) which abuts the lever (4) so that the rotation of the lever (4) activates the commutation mechanism (2),
the lever (4) comprising a pushing portion (30)

and a pulling portion (6),
the pushing portion (30) being suitable for actuating the commutation mechanism (2) in such a manner that the movable contact (3) is placed in the closed position,
the pulling portion (6) being suitable for actuating the commutation mechanism (2) in such a manner that the movable contact (3) is placed in the open position;
wherein the electric switch (1) comprises a return mechanism which is configured to move the rocker button (5) into a rest position, said return mechanism including a first resilient element which is suitable for abutting the lever (4) so that the rotation of the lever (4) moves the rocker button (5) into a rest position.

2. An electric switch (1) according to the preceding claim, wherein the commutation mechanism (2) comprises an oscillating device (17) which can be rotated about a third rotation axis (A3) which is parallel with the first rotation axis (A1), said oscillating device (17) being rotatable by means of the pulling portion (6) of the lever (4) in a first position, in which the movable contact (3) is in an open position, and being rotatable by means of the pushing portion (30) of the lever (4) in a second position, in which the movable contact (3) is in the closed position.

3. An electric switch (1) according to the preceding claim, comprising an additional lever (4), which is rotatable about a fourth rotation axis (A4) which is parallel with the first rotation axis (A1) and which is connected to the main body (11) in such a manner that the oscillating device (17) is interposed between the levers (4),

the additional lever (4) being rotatable by means of the rocker button (5) which abuts the additional lever (4) in such a manner that the rotation of the additional lever (4) causes the oscillating device (17) to rotate,
this oscillating device (17) being rotatable by means of the pulling portion (6) of the additional lever (4) in the first position and being rotatable by means of the pushing portion (30) of the additional lever (4) in a third position, in which the movable contact (3) is in an additional closed position, in which it is in contact with an additional fixed contact (67).

4. An electric switch (1) according to claim 2 or 3, wherein the oscillating device (17) comprises a fulcrum element (18) which is supported on a support portion (19) of the main body (11) so as to be able to rotate about the third rotation axis (A3).

5. An electric switch (1) according to any one of claims

2 to 4, wherein the movable contact (3) is interposed between the oscillating device (17) and a lower abutment element (20), said lower abutment element (20) being configured as a fulcrum, about which the movable contact (3) is rotatable so that, when the oscillating device (17) is rotated in one direction, the movable contact (3) is rotated in the opposite direction.

6. An electric switch (1) according to any one of claims 2 to 5, wherein there is provided between the pushing portion (30) and the pulling portion (6) a first housing (70) which is suitable for receiving a first longitudinal protuberance (69) of the oscillating device (17), said first longitudinal protuberance (69) including an upper receiving portion (32) and a lower receiving portion (68), said upper receiving portion (32) being suitable for abutting the pushing portion (30) of the lever (4) and said lower receiving portion (68) being suitable for abutting the pulling portion (6) of the lever (4).
7. An electric switch (1) according to the preceding claim, wherein the pushing portion (30) is in the form of a second longitudinal protuberance (72) and the pulling portion (6) is in the form of a third longitudinal protuberance (73), wherein the first housing (70) is placed between the second longitudinal protuberance (72) and third longitudinal protuberance (73).
8. An electric switch (1) according to claim 6 or 7, wherein the upper receiving portion (32) comprises a first channel (34) which is suitable for receiving the pushing portion (30) of the lever (4).
9. An electric switch (1) according to any one of claims 6 to 8, wherein the pulling portion (6) comprises a second channel (71) which is suitable for receiving a lower wall (74) of the oscillating device (17), said lower wall (74) extending from the lower receiving portion (68) towards the movable contact (3).
10. An electric switch (1) according to any one of the preceding claims, wherein the lever comprises a first end (38) including the pushing portion (30) and the pulling portion (6) and a fulcrum portion (31) which is connected to the main body (11) and which is positioned on a second end (39) of the lever (4) opposite the first end (38), said second end (39) being the end furthest away from the oscillating device (17).
11. An electric switch (1) according to any one of the preceding claims, wherein the rocker button (5) comprises a projecting portion (40) which projects from the rocker button (5) and which is suitable for abutting the lever (4) to rotate it.
12. An electric switch (1) according to the preceding claim, wherein the rocker button (5) comprises a

rocker button cover (8) which includes a connection element (52) which is connected to an opening (51) of the rocker button (5), said opening (51) being placed at the projecting portion (40).

13. An electric switch (1) according to any one of the preceding claims, wherein the first resilient element includes a first end and wherein the lever (4) comprises a first blind cavity (53), in which the first end of the first resilient element moves into abutment.
14. An electric switch (1) according to any one of the preceding claims, wherein the first resilient element includes a second end in abutment with the main body (11) and the main body (11) comprises a second blind cavity (57) which is suitable for receiving the second end of the first resilient element.
15. An electric switch (1) according to any one of the preceding claims, wherein the main body (11) is advantageously defined in a longitudinal direction (X), a transverse direction (Y) and a height direction (Z), which are perpendicular to each other, wherein the first rotation axis (A1) is parallel with the transverse direction (Y) and wherein the rocker button (5), when it is in a rest position, is aligned with a plane parallel with the plane defined by the longitudinal direction (X) and the transverse direction (Y).

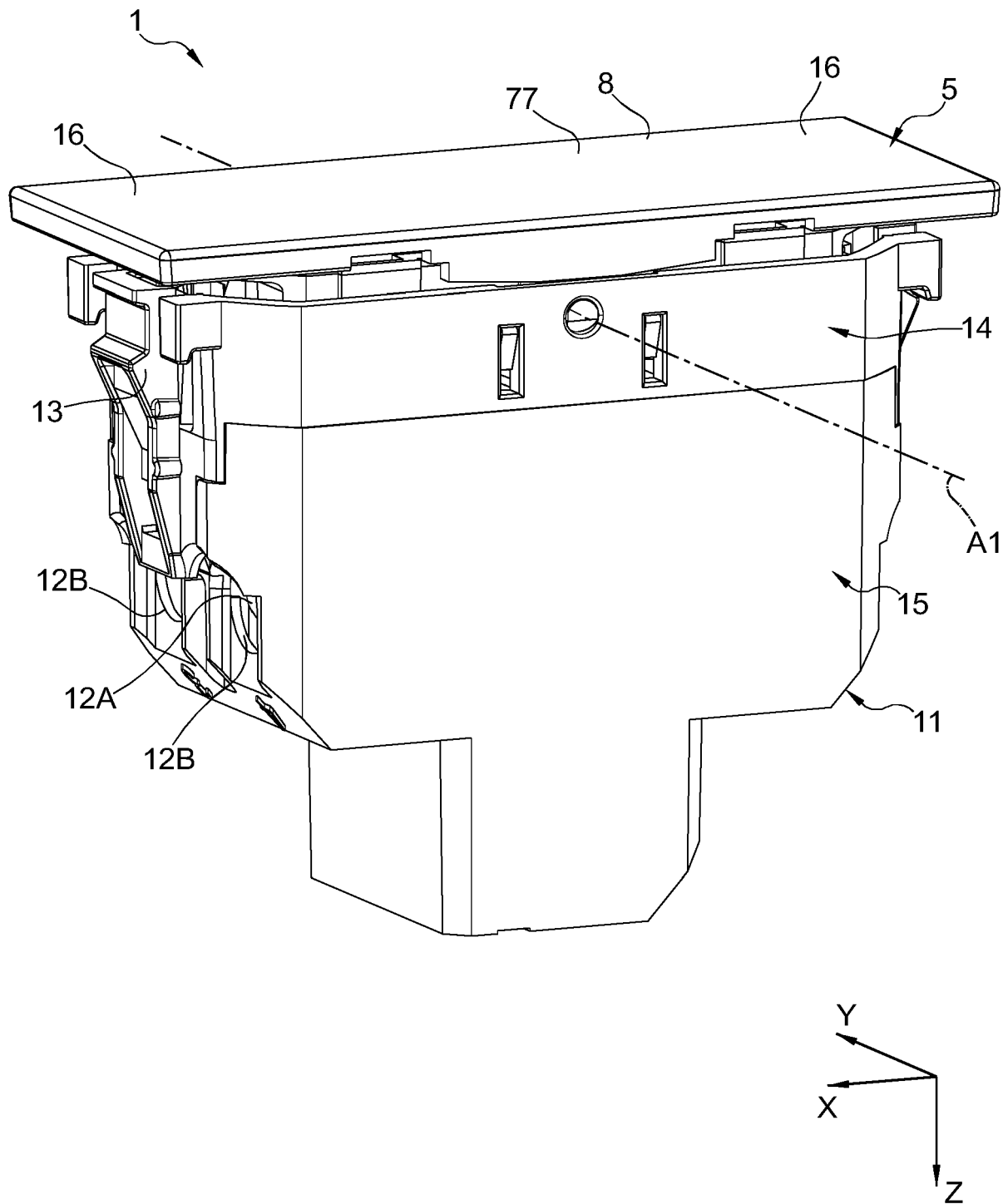


Fig.1

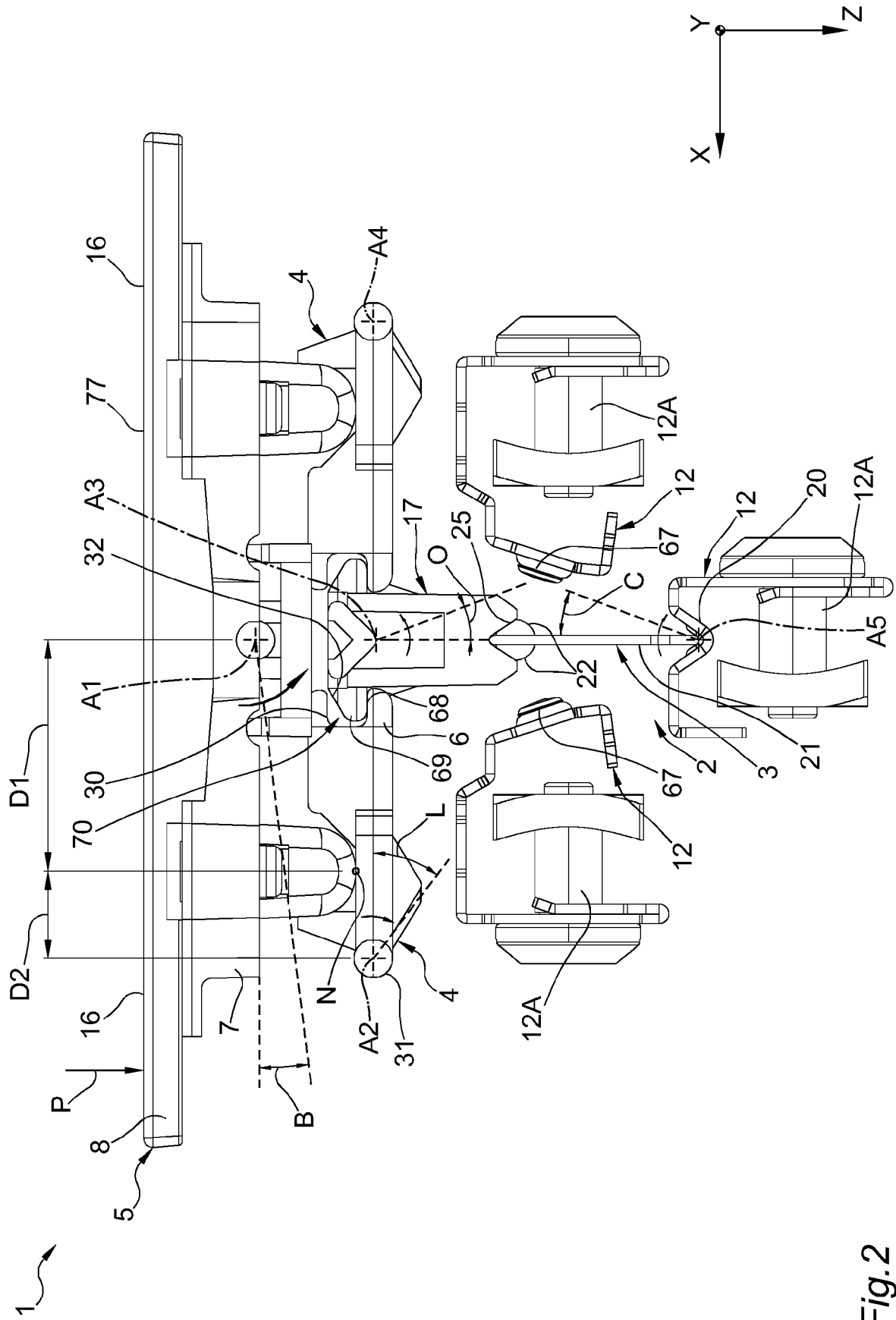


Fig.2

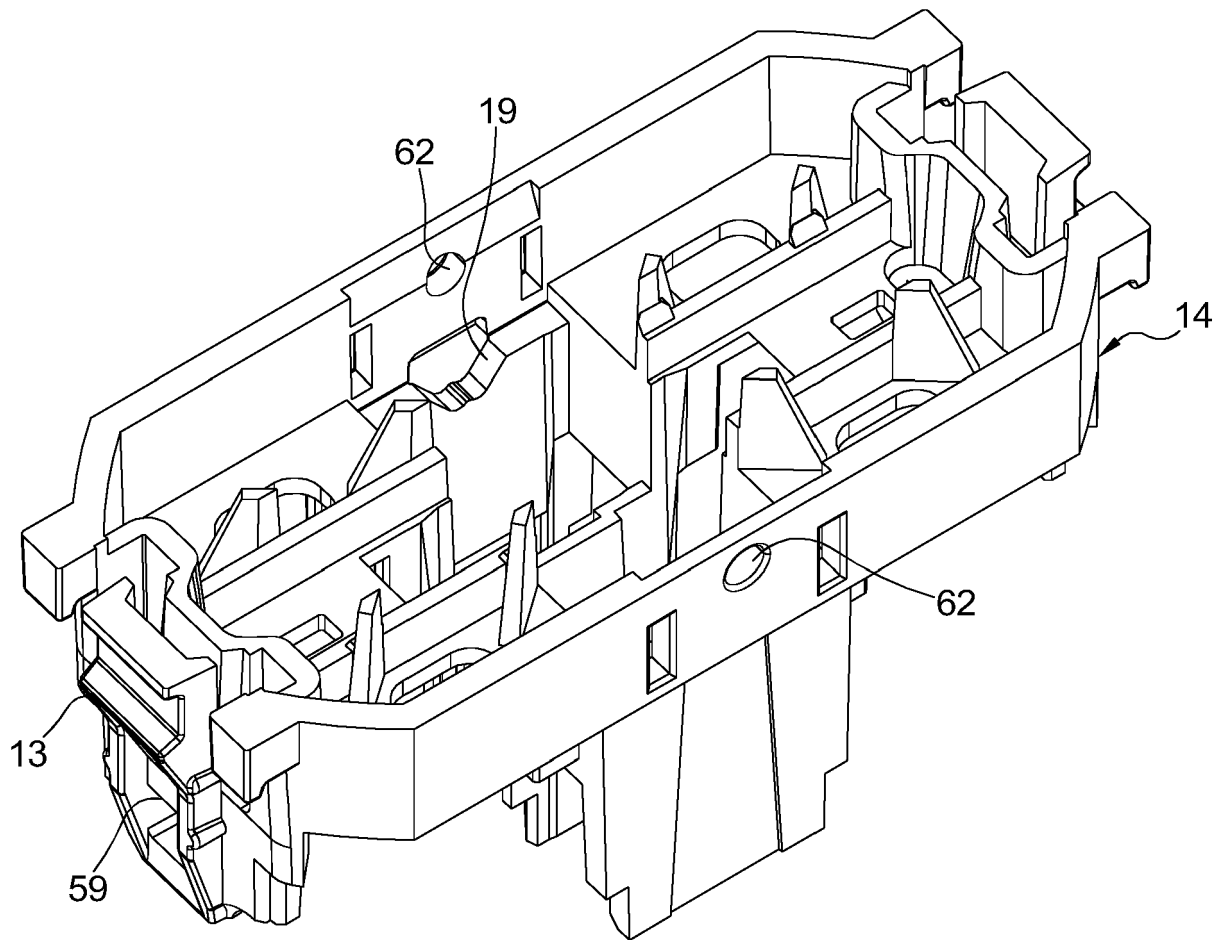


Fig.3

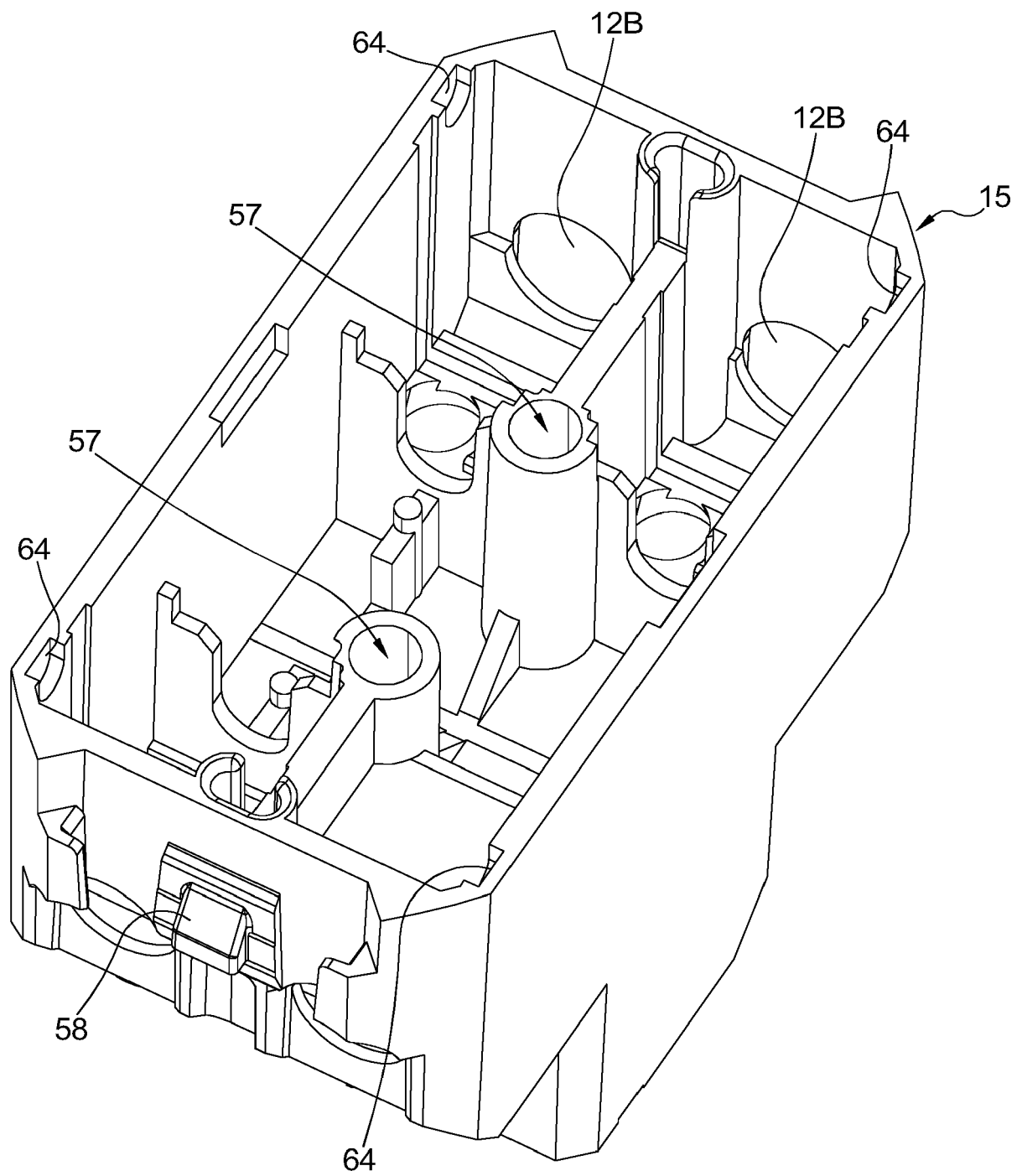


Fig.4

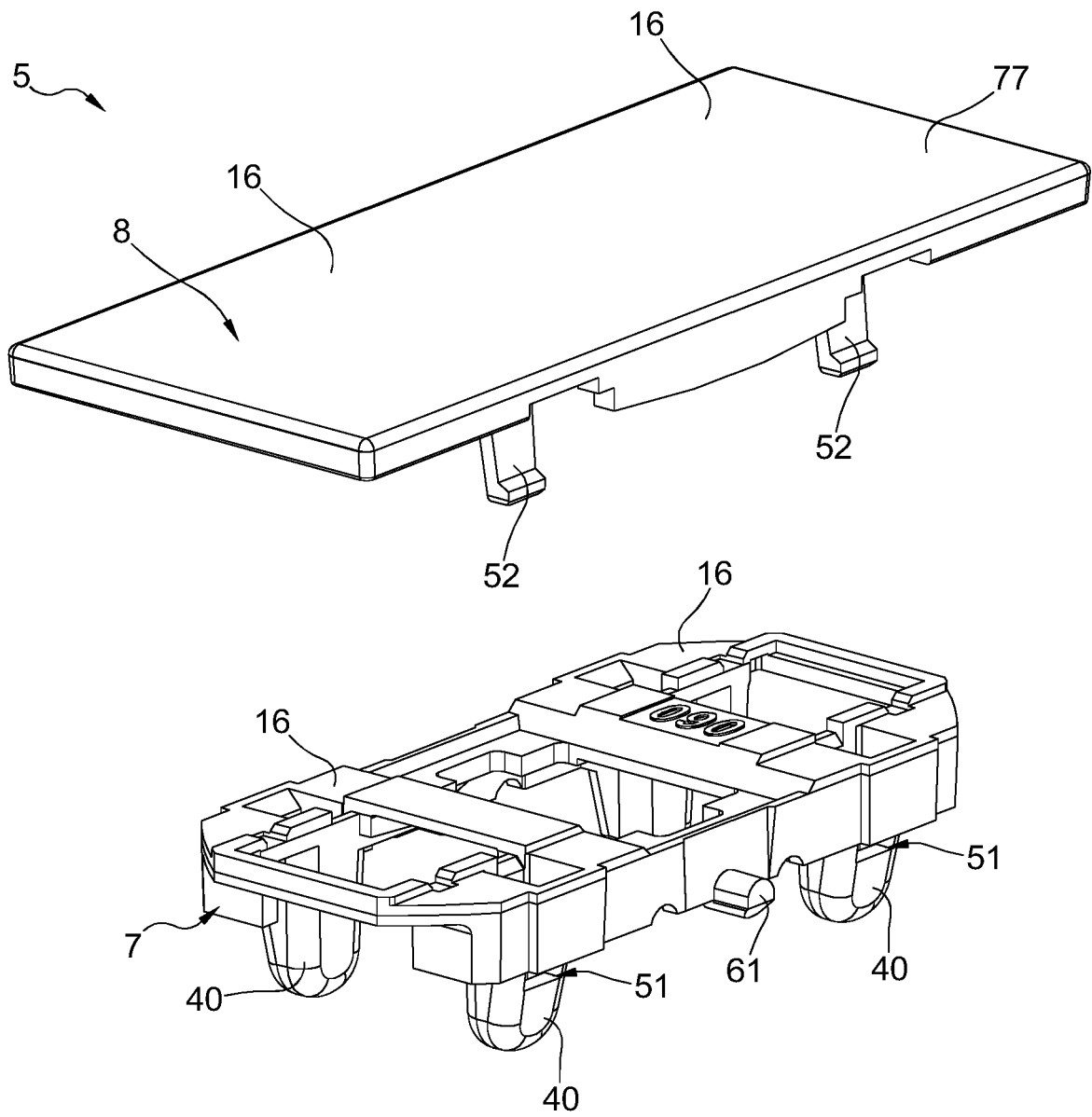


Fig.5

Fig.6

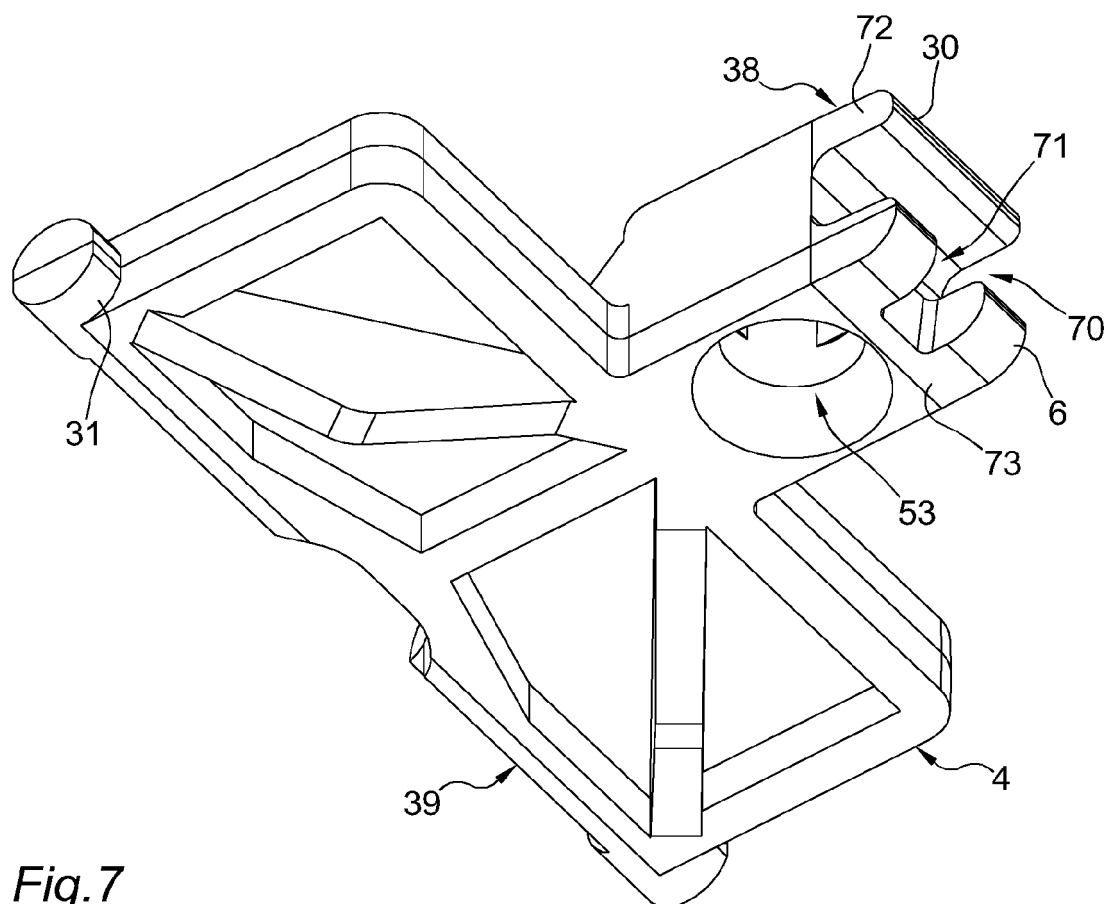
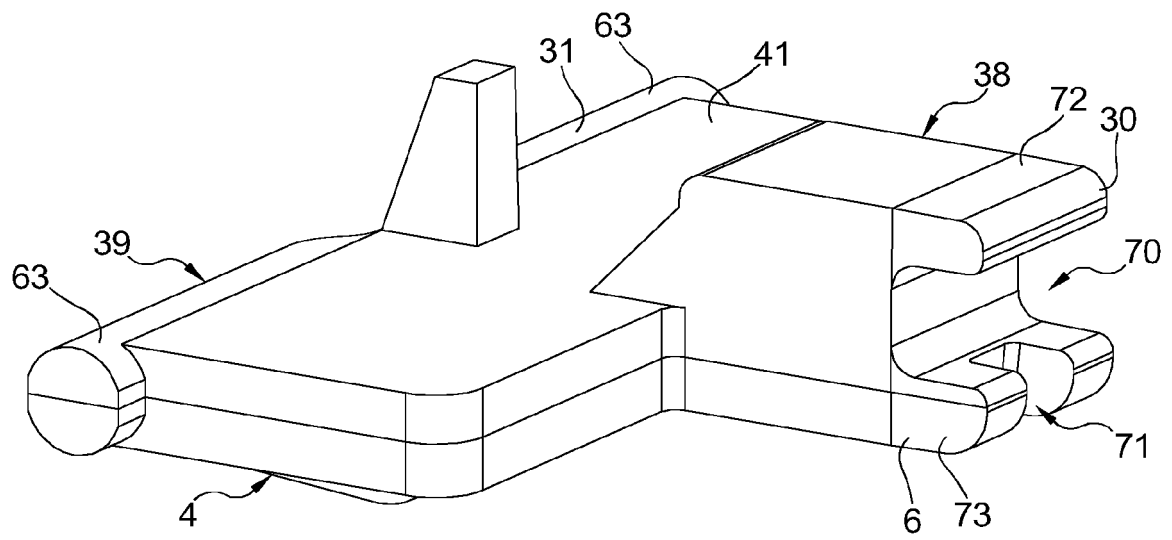


Fig.7

Fig.8

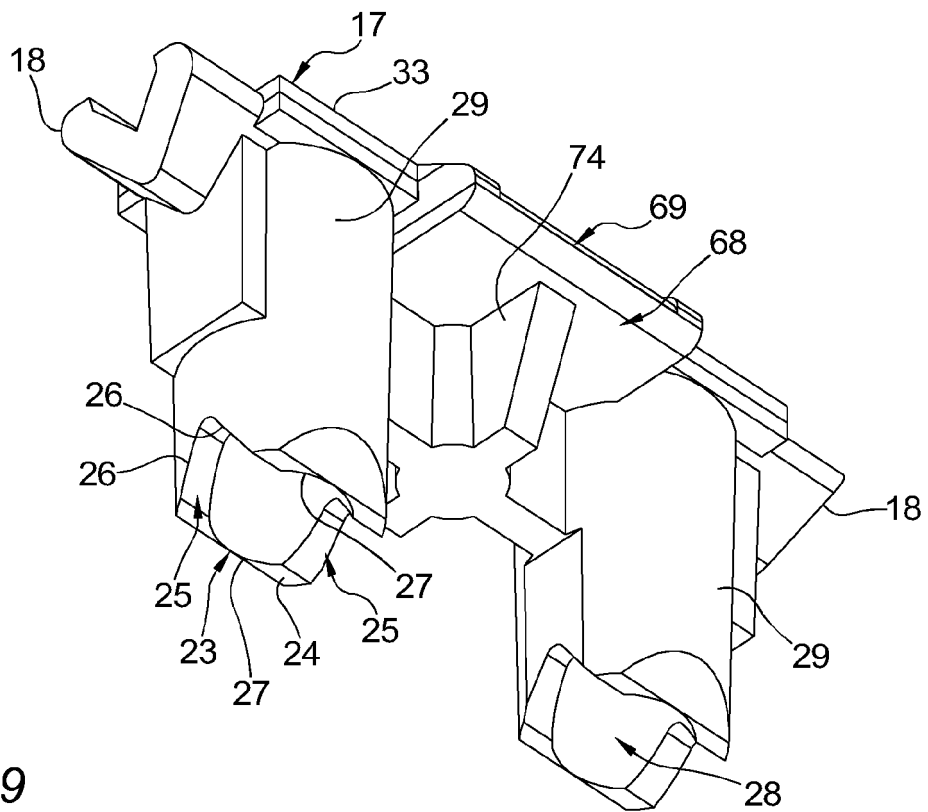
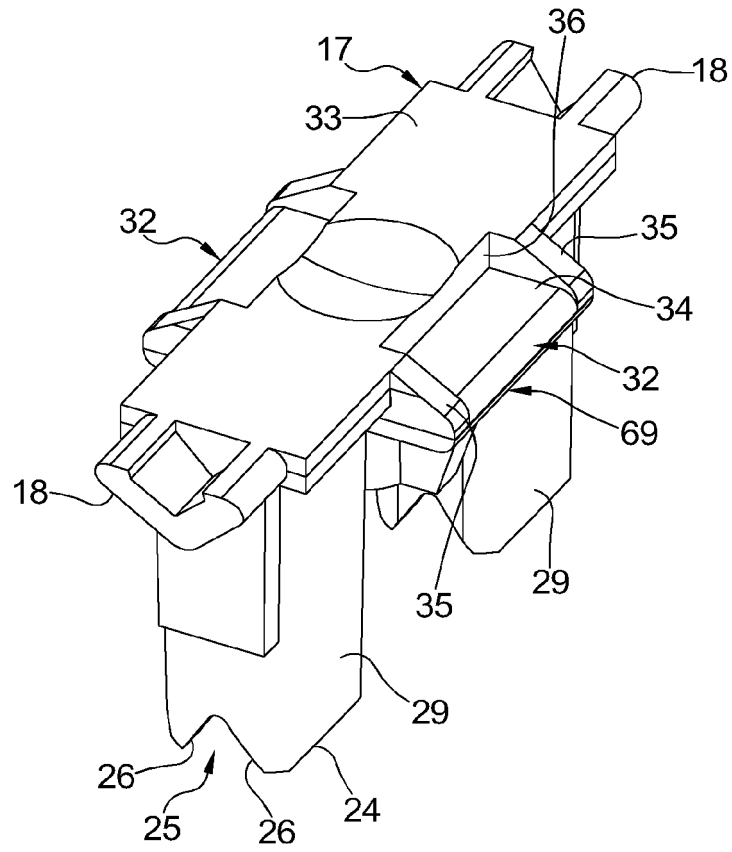


Fig.9



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Application Number

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Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
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A	WO 2019/159022 A1 (VIMAR SPA [IT]) 22 August 2019 (2019-08-22) * claims; figures * -----	1	
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			H01H
The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 19 August 2024	Examiner Findeli, Luc
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