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(54) SUPPORT

(57) A support for a panel of an in-wall retractable sliding door or a sliding door positioned close to the ceiling, which is constituted by a bracket (3), which can be associated with a recess (4) provided longitudinally with respect to the first upper surface (5) of the panel (2) proximate to a first lateral surface (6) thereof; the bracket (3) is slideably associable with a square first head (13) of a first screw (14) which is associable with a trolley (11) for the sliding of the door or with a ceiling support; the first head (13) interacts with a stop element (17) associated with the bracket (3) and with means adapted to eliminate the tolerance between the first head (13) and the bracket (3), which comprise an insert (18); means are provided for locking the position of the insert (18) with respect to the bracket (3).

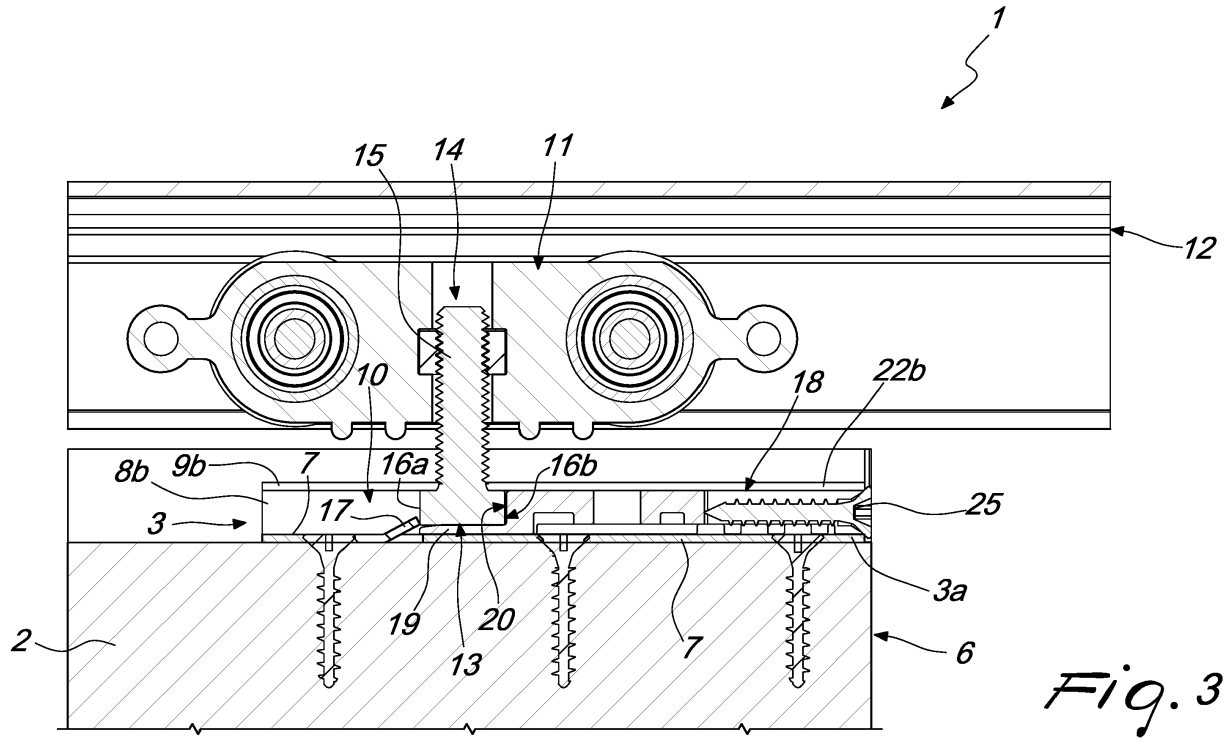

Fig. 3

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Description

[0001] The present invention relates to a support, particularly for a panel of an in-wall retractable sliding door or a sliding door positioned close to the ceiling.

[0002] Nowadays it is known to provide door frames which involve the use of an in-wall frame, positioned inside a wall, in which a door or a panel is slideably associated and which is also known as an "in-wall retractable door".

[0003] Such solution makes it possible to reduce the encumbrances of the door in a room thanks to the possibility of sliding it into the in-wall frame: thus one can use the space adjacent to the door, which would otherwise be occupied by doors of the type that are hinged laterally to a casement.

[0004] Trolleys coupled to the upper edge of the door are slideably integrated in a rail in order to enable the sliding of the door into and out of the in-wall frame.

[0005] A drawback suffered by such known art consists in that it is not possible to position the panel very close to the rail or to the ceiling, so that gaps occur which have to be hidden with covers that are unsightly and which weigh down the structure and increase its cost overall.

[0006] Furthermore, as the distance between the panel and the rail increases, the levels of play between the various components also increase, with the possibility that the panel may be subject to lifting and oscillations that compromise its correct operation.

[0007] The aim of the present invention is therefore to resolve the above mentioned technical problems, eliminating the drawbacks in the cited known art and hence providing a support according to the invention that makes it possible to fix a panel of a sliding door as close as possible to a rail or to the ceiling.

[0008] Within this aim, an object of the invention is to provide a support according to the invention that makes it possible to keep the panel stably and securely associated with the rail.

[0009] Another object is to provide a support according to the invention that makes it possible to keep the panel in position while preventing any lifting or oscillations.

[0010] Another object is to provide a support according to the invention that is structurally simple, can be provided with conventional systems and machines, and is low cost.

[0011] This aim and these and other objects which will become better apparent hereinafter, are achieved by a support, particularly for a panel of an in-wall retractable sliding door or a sliding door positioned close to the ceiling, characterized in that it is constituted by a bracket, which can be associated with a recess provided longitudinally with respect to the first upper surface of said panel proximate to a first lateral surface thereof, with which a square first head of a first screw is slideably associable, said screw being associable with a trolley for the sliding of said door or with a ceiling support, said first head interacting with a stop element associated with said bracket and with means adapted to eliminate the tolerance between said first head and said bracket which comprise an insert, means being provided for locking the position of said insert with respect to said bracket.

[0012] Further characteristics and advantages of the support according to the invention will become better apparent from the detailed description of a particular, but not exclusive, embodiment, which is illustrated by way of non-limiting example in the accompanying drawings wherein:

Figures 1 and 1a are respectively a perspective view and an exploded view of a support according to the present invention in two embodiments;

Figures 2 and 2a are front elevation views of the support in Figures 1 and 1a, associated with a panel of a sliding door;

Figures 3 and 3a are cross-sectional views of the support in Figures 1 and 1a, taken along the line III-III in Figures 2 and 2a;

Figures 4, 5 and 6 are respectively a perspective view, a side view and a front elevation view of a different embodiment for the bracket in Figure 1;

Figure 7 is a partially cross-sectional perspective view of the insert in Figure 1, showing the presence of a cylinder within it;

Figure 7a shows the insert in Figure 1a;

Figure 8 is a perspective view of the pin in Figure 1a;

Figures 9 and 10 are respectively a side view and a view from above of the pin in Figure 1a;

Figure 11 shows a variation of what is shown in Figure 1a.

[0013] In the exemplary embodiments illustrated, individual characteristics shown in relation to specific examples may in reality be interchanged with other, different characteristics, existing in other exemplary embodiments.

[0014] With reference to the figures, the reference numeral 1 generally designates a support, particularly for a panel 2 of an in-wall retractable sliding door or a sliding door positioned close to the ceiling.

[0015] The support 1 is constituted by a bracket 3 which can be associated, by way of adapted means such as screws, with a recess 4 provided longitudinally with respect to the first upper surface 5 of the panel 2 proximate to a first lateral surface 6 thereof.

[0016] The bracket 3 has a desired length and is positioned in the recess 4 so as to arrange one of its ends 3a substantially flush with the first lateral surface 6 of the panel 2.

[0017] The bracket 3 has, in a transverse cross-section, an Ω (omega)-like shape, so as to define a base 7 which is substantially as wide as the recess 4 and from which two arms 8a, 8b branch off vertically which are slightly less high than the depth of the recess 4 and are followed by two first tabs 9a, 9b which are arranged parallel to the base 7 for part of the width of the recess 4.

[0018] In this way a channel 10 is defined which is di-

rected toward the ceiling or toward an adapted trolley 11 which is associated slideably with an adapted rail 12.

[0019] Inside the channel 10 the square first head 13 of a first screw 14 can be slideably associated; the threaded first shank 15 of such first screw can be associated with the trolley 11 in order to achieve the sliding of the panel 2 of the door either on the trolley 11 or on the ceiling.

[0020] One of the second lateral surfaces 16a, 16b of the first head 13, particularly the lateral surface 16a directed away from the first lateral surface 6 of the panel 2, interacts with a stop element 17 which is constituted by a strip provided, for example by cutting, on the base 7 of the bracket 3 and protruding partially therefrom in the direction of the trolley 12; the stop element 17 prevents the axial sliding of the first head 13 within the bracket 3 beyond a given preset position.

[0021] The stop element 17 can also be constituted by a boss that is cut in half, as shown in Figures 4, 5 and 6; such boss is shaped substantially like a quarter of a sphere and defines a very robust stop element.

[0022] The second lateral surface 16b of the first head 13 which is directed toward the first lateral surface 6 of the panel 2 interacts instead with an insert 18, which is shaped substantially like a parallelepiped and is adapted to eliminate the tolerance between the first head 13 and the bracket 3.

[0023] The insert 18 is slideably and axially insertable within the channel 10 of the bracket 3; the insert 18 has substantially the same width and height as the channel 10 and a length equal to the distance between the end 3a of the bracket 3 and the stop element 17.

[0024] The insert 18 is provided with means adapted to eliminate the tolerance between the first head 13 and the bracket 3, such means being constituted by a second tab 19 which protrudes at an end of the insert 18 which is directed toward the stop element 17 and interacts therewith, the second tab 19 being thinner than the insert 18 and lying on a plane adjacent to the base 7 of the bracket 3.

[0025] The second tab 19 is arrangeable below the first head 13 and is adapted to propel the first head 13 upwardly, until it interacts in abutment against the two first tabs 9a, 9b of the bracket 3, and is adapted to arrange the step-like discontinuity 20 which forms between the second tab 19 and the insert 18 adjacent to and in contact with the second lateral surface 16b of the first head 13.

[0026] In this way the tolerance is eliminated between the square first head 13 of the screw 4 and the bracket 3, which is expressly provided in order to make one element slide in the other without impediment, while preventing the panel 2 from being lifted and therefore from oscillating; furthermore the screw 4 is locked in a fixed position.

[0027] Furthermore, means are provided for locking the position of the insert 18 with respect to the bracket 3.

[0028] On the end of the insert 18 adjacent to the first lateral surface 6 of the panel 2, there is a longitudinal notch 21 which is adapted to define two wings 22a, 22b which can be splayed elastically.

[0029] On the lateral surfaces of the wings 22a, 22b which are directed toward the two arms 8a, 8b of the bracket 3 there are teeth 23a, 23b which interact with complementarily-shaped grip means constituted by seats or holes 24 provided on each one of the two arms 8a, 8b.

[0030] With reference to the embodiment in Figure 1, at the notch 21 provided at the insert 18 there is present a hollow cylinder 26, which is molded integrally with the insert 18 and the function of which is to keep the second screw 25 parallel to the insert 18.

[0031] By tightening the screw 25, the cylinder 26 yields sufficiently for the insert 18 to be splayed and be locked in position; indeed, the cylinder 26 increases the contrasting thickness, thus improving the locking.

[0032] With reference to the embodiment in Figure 1a, the second shank 27 of a pin 28 can be axially associated at the notch 21; the second shank 27 is adapted to splay the two wings 22a, 22b until the teeth 23a, 23b are arranged within the holes 24.

[0033] The pin 28 is substantially T-shaped overall so as to define the second shank 27 and a square-shaped second head 29.

[0034] The second shank 27 has a main body 30 with a circular cross-section, the ends 31a, 31b of which have a smaller diameter than the central part 32; furthermore there are, externally with respect to the main body 30 at the lateral surface of the central part 32 and according to mutually parallel directrices, a pair of lateral wings 33a, 33b, each of which has a substantially semicircular cross-section.

[0035] Each one of the lateral wings 33a, 33b branches off at one end from the second head 29 and extends along the second shank 27 along part of its length.

[0036] There is furthermore, externally with respect to the main body 30 and at the lateral surface of the central part 32 which is not affected by the lateral wings 33a, 33b, an upper wing 34 with a substantially square cross-section which branches off at one end from the second head 29 and extends along the second shank 27 for part of its length, advantageously to a greater extent than that of the pair of lateral wings 33a, 33b.

[0037] At the third lateral surfaces 35a, 35b of the notch 21 provided at the insert 18, a pair of half-cylinders 36a, 36b protrude, facing each other and molded in one piece with the insert 18, the function of which is to keep the second shank 27 of the pin 28 parallel to the insert 18 and to improve the locking of the latter to the bracket 3.

[0038] When the second shank 27 of the pin 28 is positioned in the notch 21, its central part 32, since it has a greater diameter than that of the ends 31a, 31b, exerts a pressure on the wings 22a, 22b and therefore on the teeth 23a, 23b, splaying them and making them interact with the holes 24 of the bracket 3.

[0039] The particular shape structure of the second shank 27 of the pin 28, tapered at the free end 31a facing away from the second head 29, facilitates the insertion

within the insert 18, while the tapering of the second shank 27 determines, proximate to the second head 29, a narrower region that makes it possible to achieve the locking of the pin 28 within the insert 18.

[0040] The bulge of the central part 32 of the main body 30 of the second shank 27 prevents, owing to the presence of the lateral wings 33a, 33b and of the upper wing 34, the rotation of the pin 28, further contributing to the locking thereof.

[0041] Figure 11 shows a possible different embodiment for the pin 28 in which the pairs of lateral wings 33a, 33b are not present on the second shank 27, and instead, externally with respect to the main body 30 and at the lateral surface of the central part 32 and according to mutually parallel directrices, a pair of flattened-out features are obtained that reduce the lateral space occupation of the main body 30 and extend along the second shank 27 for part of its length.

[0042] Thus it has been found that the invention fully achieves the intended aim and objects, a support having been devised which, applied to a panel of a sliding door, makes it possible to fix it as close as possible to a rail or to the ceiling.

[0043] Furthermore the support makes it possible to keep the panel stably and securely associated with the rail, preventing it from being subjected to possible lifting or oscillations.

[0044] The insert 18 further acts as a plug and therefore as a finishing at the first lateral surface 6 of the panel 2.

[0045] It has further been found that the particular tapered shape structure of the second shank 27 of the pin 28 facilitates the insertion within the insert 18 and creates a narrower region in order to achieve the locking of the position of the pin 28.

[0046] It has also been found that the bulge of the central part 32 of the main body 30 of the second shank 27, owing to the presence of the lateral wings 33a, 33b and of the upper wing 34, prevents the rotation of the pin 28, further contributing to the locking thereof.

[0047] Last but not least, the support is structurally simple and low cost.

[0048] The support according to the invention is susceptible of numerous modifications and variations, all of which are within the scope of the appended claims.

[0049] The materials used as well as the dimensions of the individual components of the invention may be more pertinent according to specific requirements.

[0050] The various means of achieving certain different functions certainly need not coexist only in the embodiment shown, but may be present in many embodiments, even if they are not shown. The characteristics indicated above as advantageous, convenient or the like, may also be missing or be substituted by equivalent characteristics.

[0051] The disclosures in Italian Patent Applications No. MI2014A002275 (102014902319637) and 102015000061432 (UB2015A004675) from which this application claims priority are incorporated herein by reference.

[0052] Where technical features mentioned in any claim are followed by reference signs, those reference signs have been included for the sole purpose of increasing the intelligibility of the claims and accordingly, such reference signs do not have any limiting effect on the interpretation of each element identified by way of example by such reference signs.

Claims

1. A support (1) for a panel (2) of an in-wall retractable sliding door or a sliding door positioned close to the ceiling, **characterized in that** it is constituted by a bracket (3), which can be associated with a recess (4) provided longitudinally with respect to the first upper surface (5) of said panel (2) proximate to a first lateral surface (6) thereof, with which a square first head (13) of a first screw (14) is slideably associable, said screw being associable with a trolley (11) for the sliding of said door or with a ceiling support, said first head (13) interacting with a stop element (17) associated with said bracket (3) and with means adapted to eliminate the tolerance between said first head (13) and said bracket (3) which comprise an insert (18), means being provided for locking the position of said insert (18) with respect to said bracket (3).

2. The support according to claim 1, **characterized in that** said bracket (3) is arranged in said recess (4) so as to arrange an end (3a) thereof substantially flush with said first lateral surface (6) of said panel (2), said bracket (3) having, in a transverse cross-section, an Ω (omega)-like shape, so as to define a base (7) which is substantially as wide as said recess (4) and from which two arms (8a, 8b) branch off vertically which are slightly less high than the depth of said recess (4) and are followed by two first tabs (9a, 9b) which are arranged parallel to said base (7) for part of the width of said recess (4) so as to define a channel (10) directed toward the ceiling or toward an adapted trolley (11) associated slideably with an adapted rail (12).

3. The support according to one or more of the preceding claims, **characterized in that** said square first head (13) of a first screw (14) is slideably associable within said channel (10), the threaded first shank (15) of said first screw being associable with said trolley (11) in order to achieve the sliding of said panel (2) of said door either on the trolley (11) or on the ceiling, one of the second lateral surfaces (16a, 16b) of said first head (13), particularly the lateral surface (16a) directed away from said first lateral surface (6) of said panel (2), interacting with a stop element (17) which is constituted by a strip provided on said base

(7) of said bracket (3) and protrudes partially therefrom in the direction of said trolley (12), said stop element (17) preventing the axial sliding of said first head (13) within said bracket (3) beyond a given preset position.

4. The support according to one or more of the preceding claims, **characterized in that** the second lateral surface (16b) of said first head (13) which is directed toward said first lateral surface (6) of said panel (2) interacts with an insert (18), which is shaped substantially like a parallelepiped and is adapted to eliminate the tolerance between said first head (13) and said bracket (3), said insert (18) being slideably and axially insertable within said channel (10) of said bracket (3), said insert (18) having substantially the same width and height as said channel (10) and a length equal to the distance between said end (3a) of said bracket (3) and said stop element (17).

5. The support according to one or more of the preceding claims, **characterized in that** said insert (18) is provided with means adapted to eliminate the tolerance between said first head (13) and said bracket (3), said means being constituted by a second tab (19) which protrudes at an end of said insert (18) which is directed toward said stop element (17) and interacts therewith, said second tab (19) being thinner than said insert (18) and lying on a plane adjacent to said base (7) of said bracket (3), said second tab (19) being arrangeable below said first head (13) and being adapted to propel said first head (13) upwardly, until it interacts in abutment against said two first tabs (9a, 9b) of said bracket (3), and being adapted to arrange the step-like discontinuity (20) which forms between said second tab (19) and said insert (18) adjacent to and in contact with said second lateral surface (16b) of said first head (13).

6. The support according to one or more of the preceding claims, **characterized in that** said means for locking the position of said insert (18) with respect to said bracket (3) comprise said insert (18), on the end thereof which is adjacent to said first lateral surface (6) of said panel (2) there is a longitudinal notch (21) which is adapted to define two wings (22a, 22b) which can be splayed elastically, on the lateral surfaces of said wings (22a, 22b) which are directed toward said two arms (8a, 8b) of said bracket (3) there being teeth (23a, 23b) which interact with complementarily-shaped grip means constituted by seats or holes (24) provided on each one of said two arms (8a, 8b).

7. The support according to one or more of the preceding claims, **characterized in that** the shank of a second screw (25) can be screwed at said notch (21), said second screw being adapted to splay said two wings (22a, 22b) until said teeth (23a, 23b) are arranged within said holes (24).

8. The support according to one or more of the preceding claims, **characterized in that** said stop element (17) is constituted by a boss that is cut in half and is shaped substantially like a quarter of a sphere.

9. The support according to one or more of the preceding claims, **characterized in that** at said notch (21) provided at said insert (18) there is a hollow cylinder (26), which is molded integrally with said insert (18) and the function of which is to keep said second screw (25) parallel to said insert (18) and to improve the locking of the latter to said bracket (3).

10. The support according to one or more of the preceding claims, **characterized in that** the second shank (27) of a pin (28) can be axially associated at said notch (21), said second shank (27) being adapted to splay the two wings (22a, 22b) until the teeth (23a, 23b) are arranged within the holes (24).

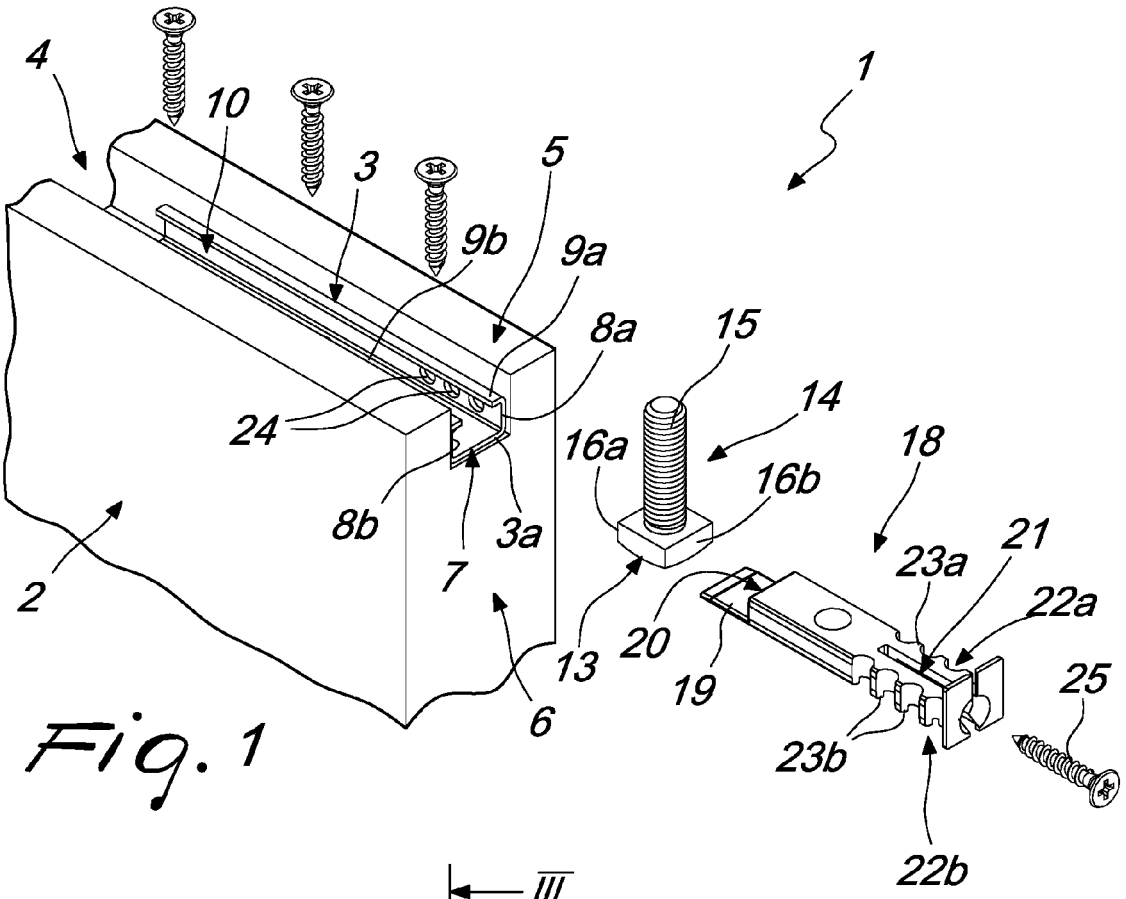
11. The support according to one or more of the preceding claims, **characterized in that**, at the third lateral surfaces (35a, 35b) of said notch (21) provided at said insert (18), a pair of half-cylinders (36a, 36b) protrude, facing each other and molded in one piece with said insert (18), the function of which is to keep said second shank (27) of said pin (28) parallel to said insert (18) and to improve the locking of the latter to said bracket (3).

12. The support according to one or more of the preceding claims, **characterized in that** said pin (28) is substantially T-shaped overall so as to define said second shank (27) and a square-shaped second head (29), said second shank (27) having a main body (30) with a circular cross-section, the ends (31a, 31b) of which have a smaller diameter than the central part (32), there being further, externally with respect to said main body (30) and at the lateral surface of said central part (32) which is not affected by said lateral wings (33a, 33b), an upper wing (34) with a substantially square cross-section which branches off at one end from said second head (29) and extends along said second shank (27) for part of its length, to a greater extent than that of said pair of lateral wings (33a, 33b).

13. The support according to one or more of the preceding claims, **characterized in that** on said second shank (27) of said pin (28) there are, externally with respect to said main body (30) at the lateral surface of said central part (32) and according to mutually parallel directrices, a pair of lateral wings (33a, 33b), each of which has a substantially semicircular cross-section, each one of said lateral wings (33a, 33b)

branching off at one end from said second head (29) and extending along said second shank (27) for part of its length.

14. The support according to one or more of the preceding claims, **characterized in that** on said second shank (27) of said pin (28) there are, externally with respect to said main body (30) at the lateral surface of said central part (32) and according to mutually parallel directrices, a pair of flattened-out features that extend along said second shank (27) for part of its length.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9b
9a
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15
14
24
16a
18
16b
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22a
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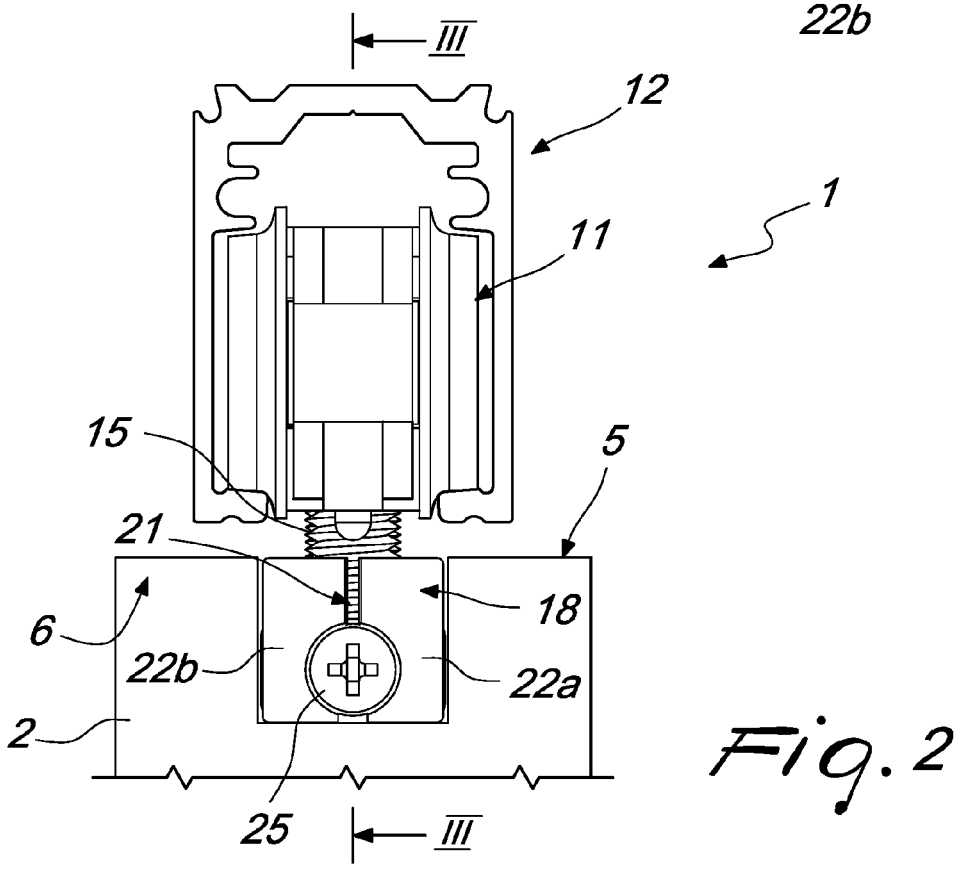
Fig. 1


III
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11
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21
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22b
22a
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25
III

Fig. 2

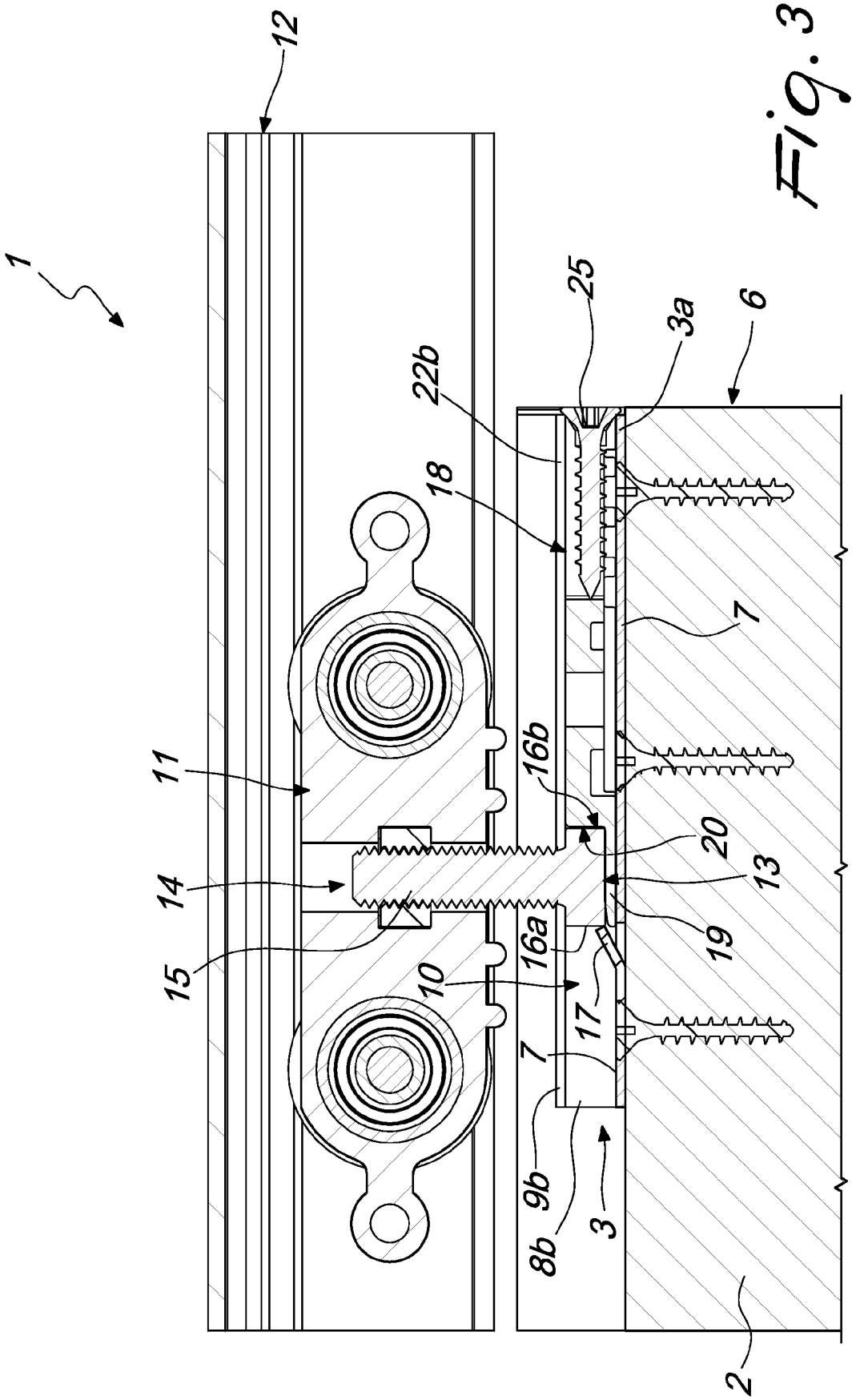


Fig. 3

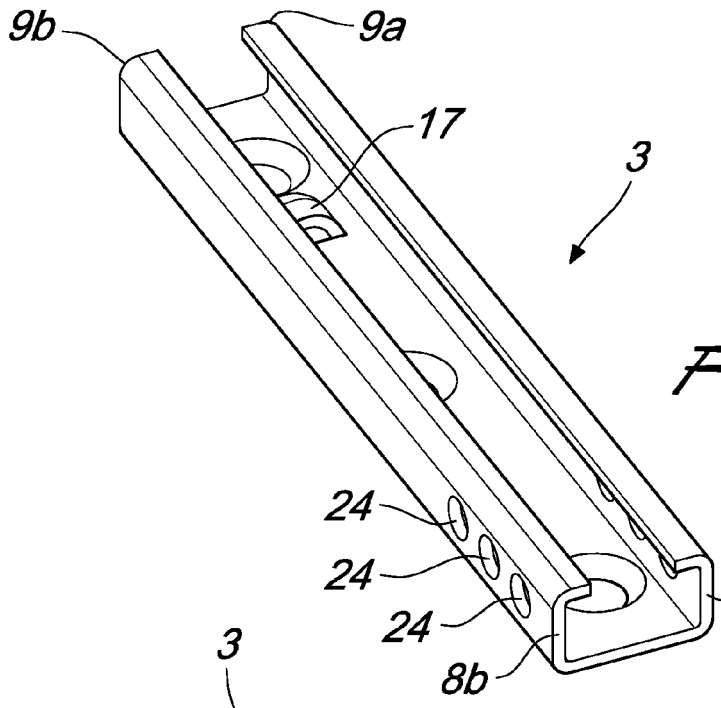


Fig. 4

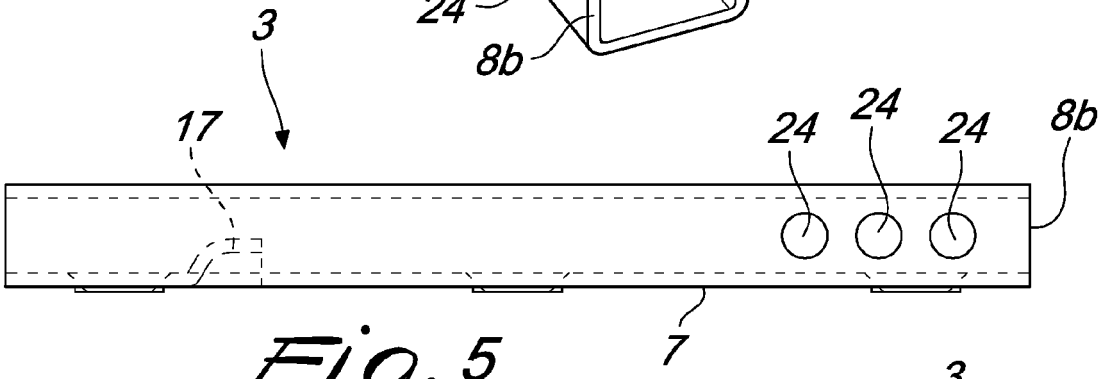


Fig. 5

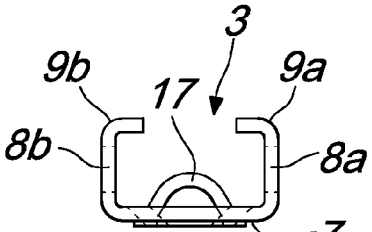


Fig. 6

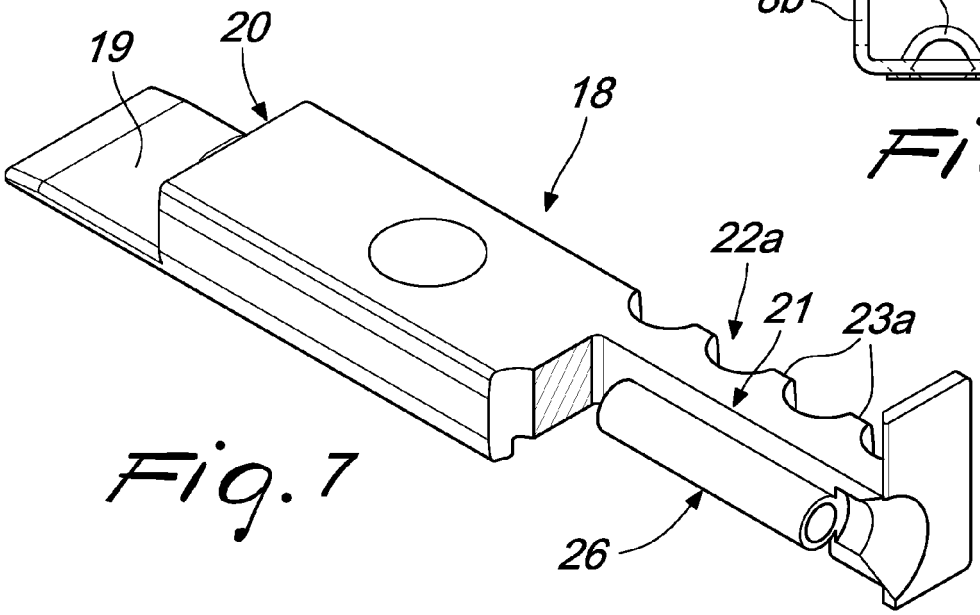
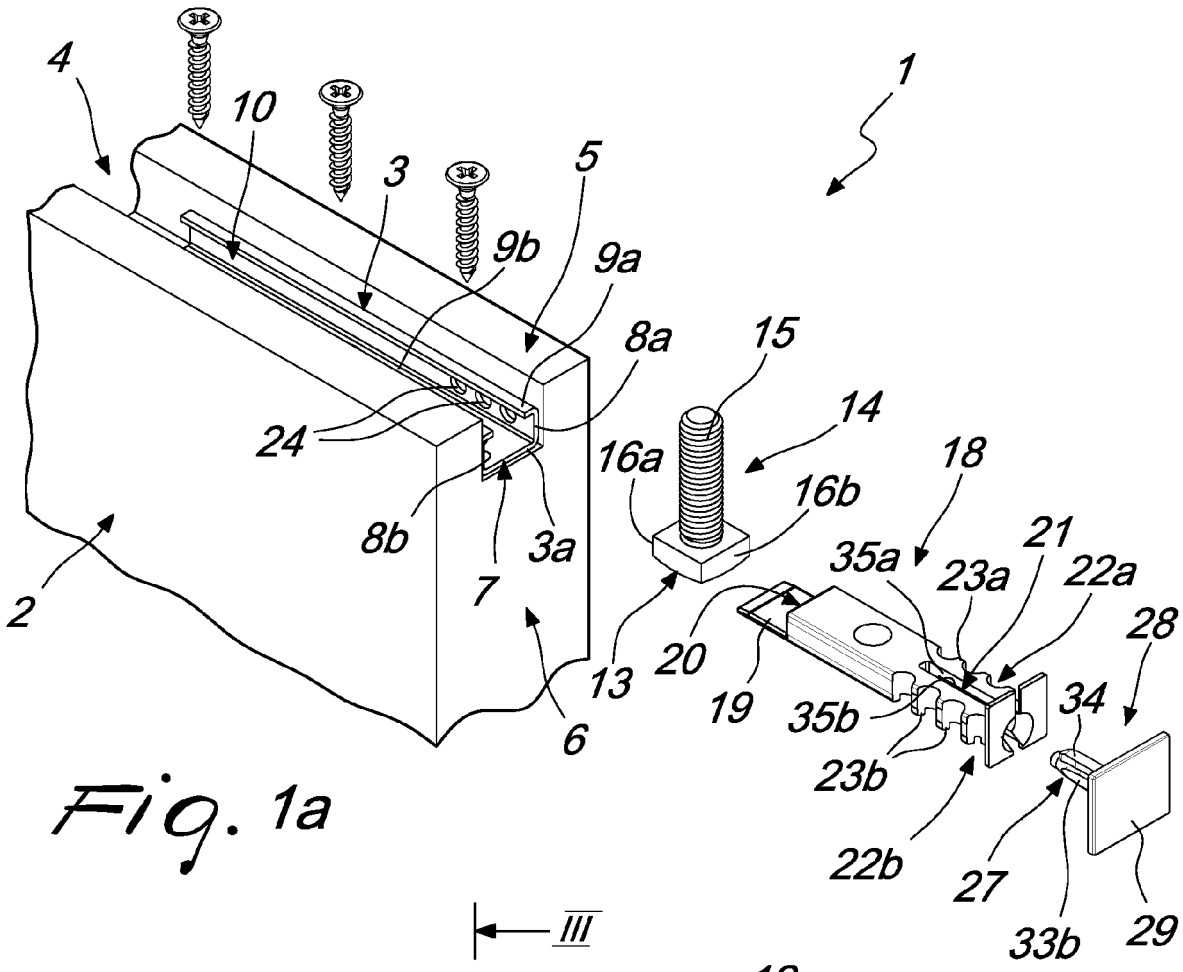


Fig. 7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23b
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33b
29

Fig. 1a

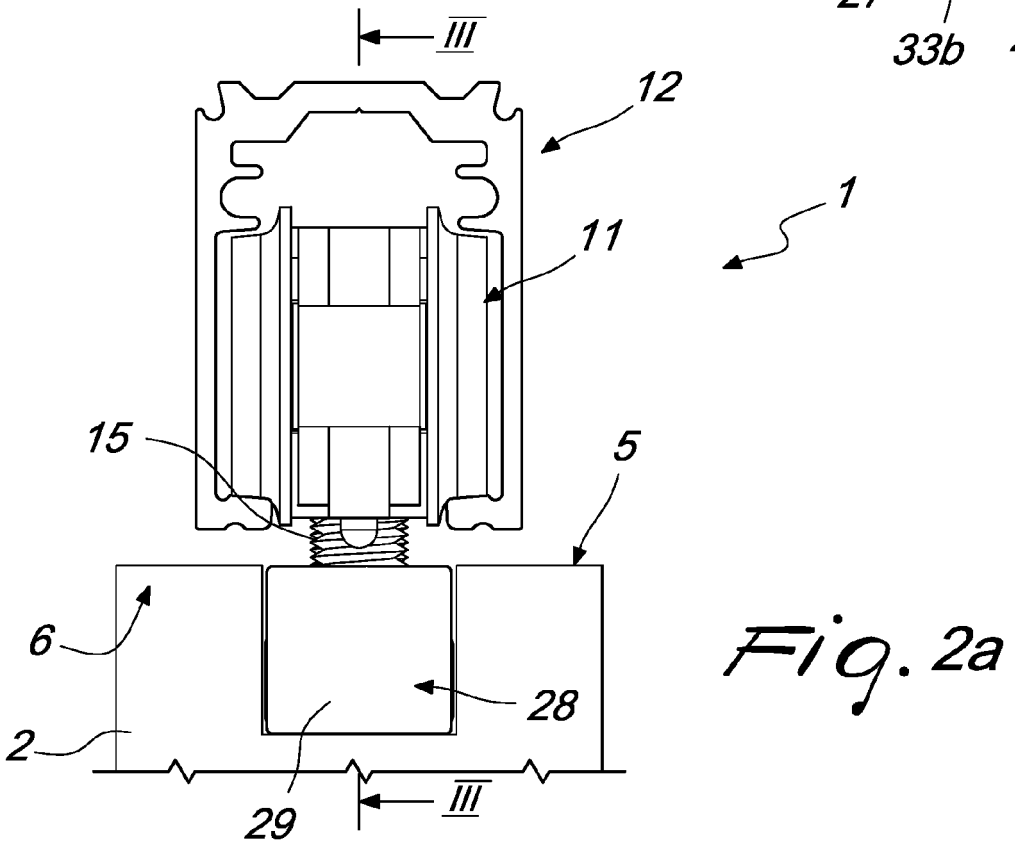
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Fig. 2a

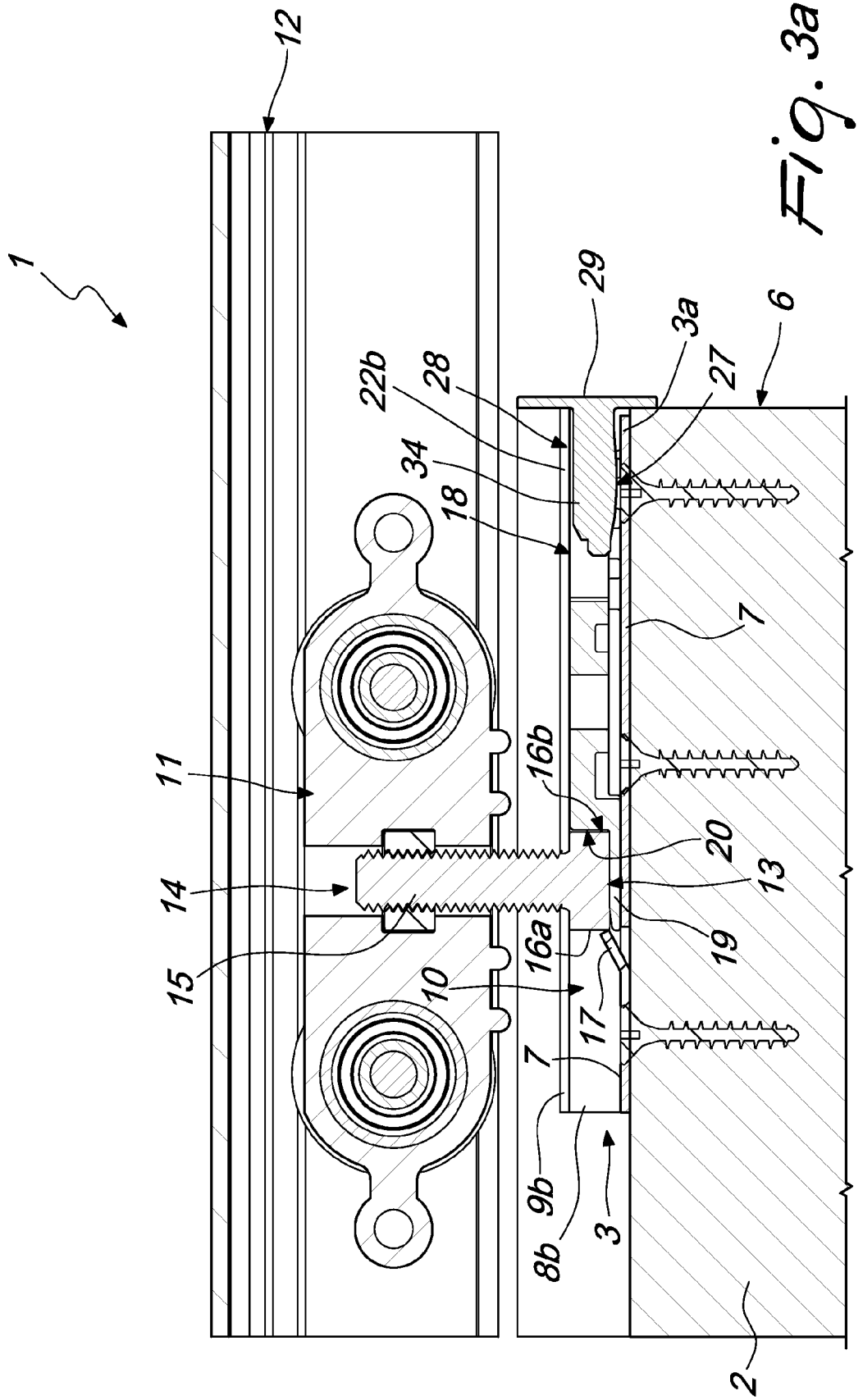

Fig. 3a

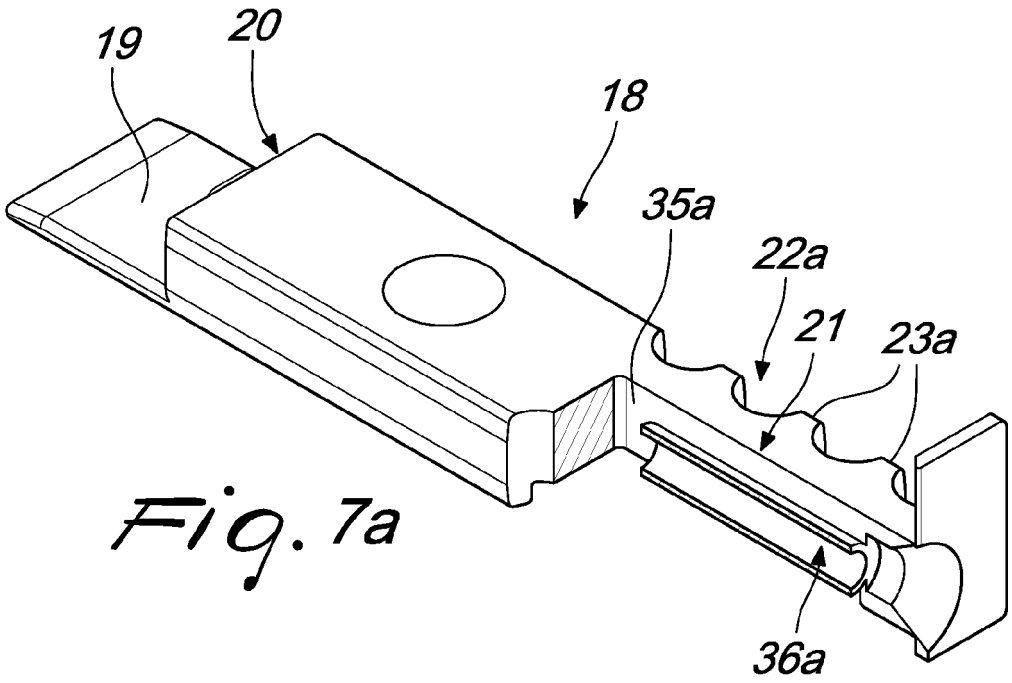

Fig. 7a

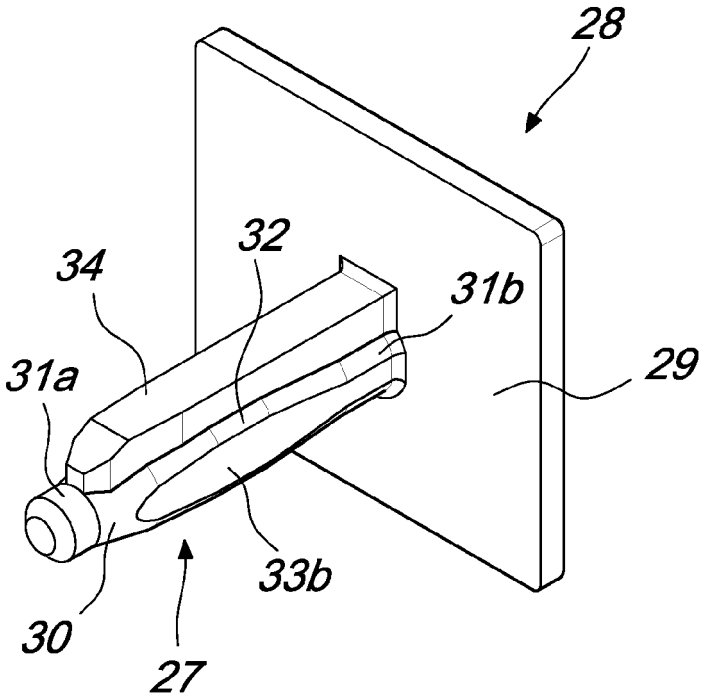

Fig. 8

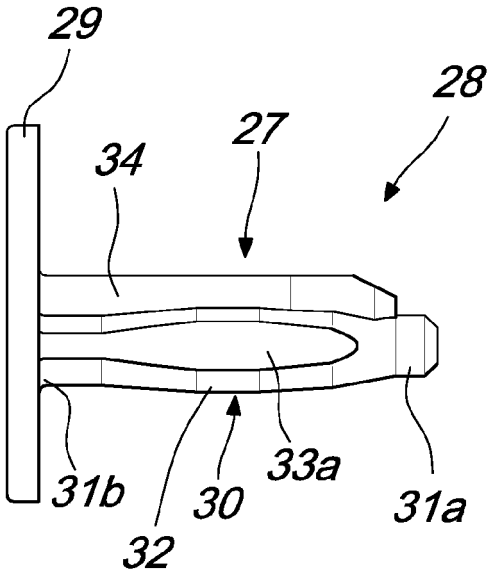

Fig. 9

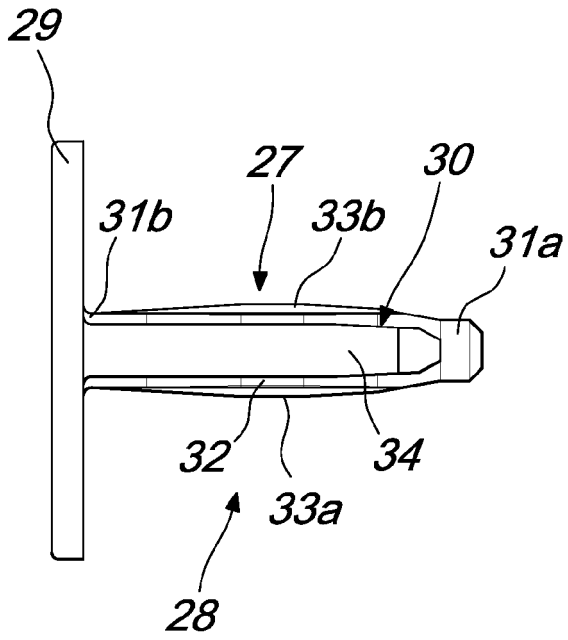

Fig. 10

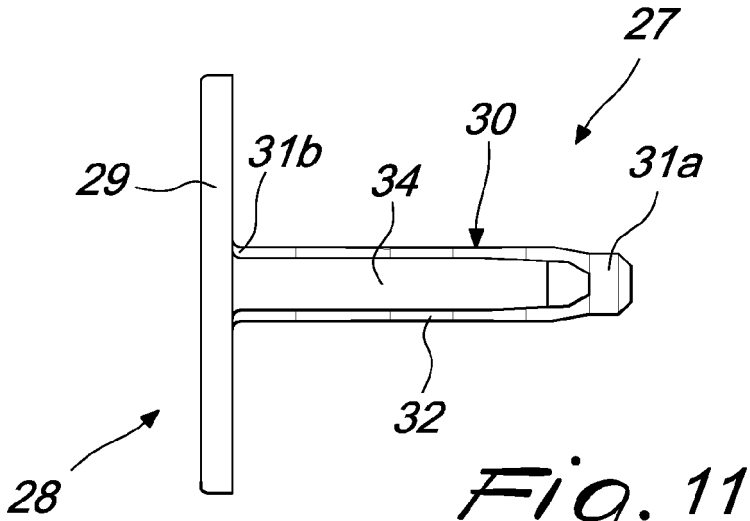

Fig. 11

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EUROPEAN SEARCH REPORT

Application Number
EP 15 20 2151

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Place of search	Date of completion of the search	Examiner
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