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Remarks:
Amended claims in accordance with Rule 137(2) EPC.

(54) Carriage

(57) A carriage that comprises a body (3) to which an anchoring means (15) for a sliding door (4) is pivoted transversely and able to oscillate.

The pivots (27a, 27b) of two pairs of transverse wheels (28a, 28b, 29a, 29b), which are slideably associable with a rail (2), are pivoted axially to the ends of the body (3).

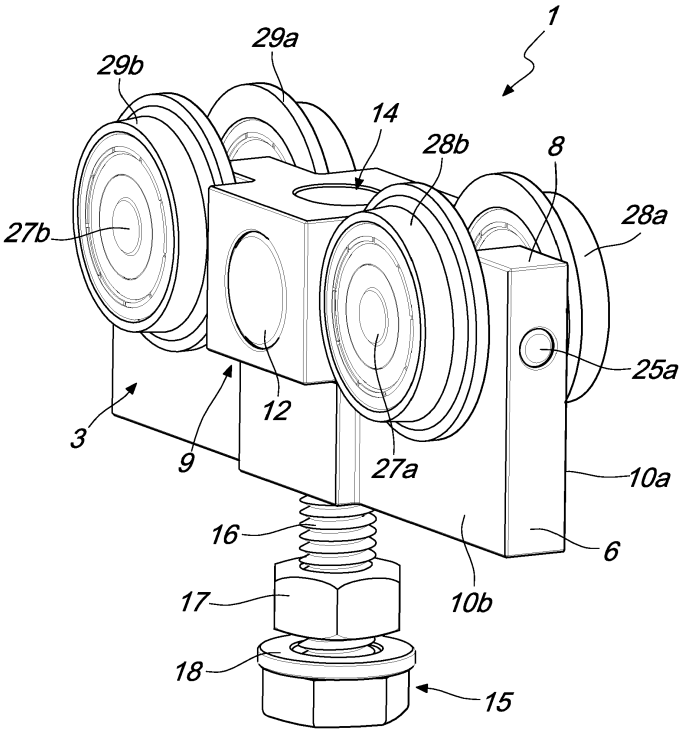

Fig. 1

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Description

[0001] The present invention relates to a carriage, particularly for sliding doors.

[0002] Nowadays it is known to provide door frames which involve the use of a casing, positioned inside a wall or for plasterboard applications, within which a door or a panel or a door leaf is slideably associated, and which is also known as a "retractable door".

[0003] Also known are door frames which involve the use of a single rail outside the wall.

[0004] Such solutions make it possible to reduce the encumbrances of the door within a room thanks to the possibility of making it slide into the casing. One can thus use the space around the door which would be otherwise occupied by doors of the type that are hinged laterally to a casement.

[0005] In the known art the casing embedded in the plasterboard or plaster wall usually comprises vertical uprights which define, together with lateral cross-members, a case for the containment of the panel or door. With the application of a net outside the containment case, the plaster can then be applied.

[0006] Above the case, along an axis which is longitudinal to the case and extends on the side opposite to the containment case, a rail protrudes which is hidden by a jamb or directly by the section of the wall.

[0007] Usually two carriages are associated within the rail, each one being a body that is basically parallelepiped in shape.

[0008] In a lower region and at right angles to the central body, in a central region, a rigid pin protrudes which has a head that is engaged with or fixed to a bracket, adjacent to the upper edge of the door or of a panel.

[0009] Pivoted transversely to the body, at the ends, are the pivots of two pairs of parallel wheels which can slide on the rail so as to enable the sliding thereof in and out of the casing of the door.

[0010] Such a solution is for example described in Italian patent no. 1,329,977 of October 23, 2011.

[0011] A problem that is encountered in the use of such conventional solutions consists in that often it happens that, because of installation errors or excessive tolerances in the assembly of the components that constitute the various existing sliding systems, the smoothness of sliding and the lifetime of the components are compromised.

[0012] In fact, sticking can occur in the sliding of the door which can even lead to the seizing thereof.

[0013] The aim of the present invention is therefore to resolve the above-mentioned technical problems, eliminating the drawbacks in the cited known art, by devising a carriage that makes it possible to permanently ensure an optimal sliding of the door leaf in suspension.

[0014] Within this aim, an object of the invention is to provide a carriage that makes it possible to obtain an optimal and constant sliding of the door leaf or of the door even in if the sliding rail fixed to the casing is not optimally installed.

[0015] Another object is to provide a carriage that makes it possible to achieve an optimal and constant sliding of the door leaf or of the door even in the presence of excessive tolerances in the assembly of the components of the sliding door.

[0016] Another object is to provide a carriage that makes it possible to obtain the optimal smoothness of the sliding of the door even if it has been installed by people with no special training.

[0017] Another object is to provide a carriage that is structurally simple and can be provided with the normal plants and machines and is low-cost.

[0018] This aim and these and other objects which will become more evident hereinafter are achieved by a carriage, **characterized in that** it comprises a body 3 to which an anchoring means 15 for a sliding door 4 is pivoted transversely and able to oscillate, the pivots of two pairs of transverse wheels which are slideably associable with a rail 2 being pivoted axially to the ends of said body 3.

[0019] Further characteristics and advantages of the invention will become more apparent from the detailed description of a specific, but not exclusive, embodiment, illustrated by way of non-limiting example in the accompanying drawings wherein:

Figure 1 is a perspective view of a carriage according to the invention;
Figure 2 is an exploded view of the carriage according to the invention;
Figures 3, 4 and 5 are front views of the carriage in the conditions of the rail being transversely in axis and out of axis;
Figures 6, 7 and 8 are side views of the carriage with the rail partially sectional and in the conditions of the rail being longitudinally in axis and out of axis;
Figure 9 is a perspective view of the carriage associated with the rail which is partially sectional;
Figures 10, 11, 12 and 13 are perspective views of the carriage with the body in different shapes.

[0020] In the embodiments illustrated, individual characteristics shown in relation to specific examples may in reality be interchanged with other, different characteristics, existing in other embodiments.

[0021] With reference to the figures, the reference numeral 1 generally designates a carriage that can be associated with a rail 2, usually shaped like an upside-down U and hidden by a jamb or directly by the section of the wall, connected to a door leaf or door 4 of the retractable or slideable type.

[0022] The carriage 1 is constituted by a body 3, made preferably of metal and substantially plate-like in shape so as to be able to be slideably associated between the wings 5a and 5b of the rail 2.

[0023] The body 3 has a front wall 6, a rear wall 7 and an upper wall 8, which are advantageously flat and, in a central region, a shim 9 protruding at right angles from

both lateral surfaces 10a and 10b.

[0024] At the shim 9 there is transversely a first cylindrical hole 11 which accommodates a complementarily shaped cylinder 12, which can oscillate freely therein and in turn has a second hole 13 which is provided at right angles to its longitudinal axis and is threaded internally.

[0025] A longitudinal slot 14 is provided on the upper wall 8 of the body 3, at the expansion 9, and affects the entire height of the body 3 and the first hole 11.

[0026] An anchoring means is present for the retracting slideable door or leaf 4 which is constituted by a bolt 15 the shank 16 of which is threaded complementarily to the second hole 13 and is thus associable with the cylinder 12 which is free to rotate with respect to the axis of the first hole 11.

[0027] The bolt 15 can thus oscillate on the plane of arrangement of the plate-like body 3.

[0028] Advantageously associated with the shank 16 are a nut 17 and a washer 18 which are necessary for coupling to a bracket 19 which is associable with the upper edge 20 of the retractable sliding door or leaf 4.

[0029] This last item can thus maintain its correct position during opening and closure despite inclinations to which the rail 2 might be subjected on the longitudinal plane, as shown in Figures 7 and 8 .

[0030] Two U-shaped seats 23a and 23b are provided on the upper wall 8 of the body 3, so as to partially affect the height of the body 3 and proximate to the ends 21 and 22 of the body 3.

[0031] Third holes 24a and 24b are provided axially to the front wall 24 and the rear wall 7, at both wings of said seats 23a and 23b and so as to affect them, and accommodate respective complementarily shaped first pivots 25a and 25b.

[0032] The first pivots 25a and 25b are pivoted to two suitably transversely perforated sleeves 26a and 26b which penetrate into the seats 23a and 23b and can oscillate freely on a plane that is transverse to the body 3.

[0033] A pair of second pivots 27a and 27b protrude from the sleeves 26a and 26b axially or eccentrically, along the same axis, for the pivoting of two pairs of wheels 28a, 28b, 29a and 29b.

[0034] These two pairs of wheels 28a, 28b, 29a and 29b are arranged side by side but slightly spaced from the lateral surfaces 10a and 10b of the body 3 so as to affect substantially the interspace between the expansion 9 and the ends of the body 3 so that they can be associated slideably with the rail 2 and are free to oscillate with respect to the body 3, as shown in Figures 4 and 5.

[0035] In this manner the retractable sliding door or leaf 4 can maintain its correct position during opening and closure despite inclinations on the transverse plane to which the rail 2 can be subjected.

[0036] In practice it has been found that the invention has fully achieved the intended aim and objects, a carriage having been obtained that is horizontally pivoted so as to constantly ensure a smooth sliding of the door leaf in suspension thanks to the ability of the body 3, and thus of the door 4, to horizontally pivot in two directions with respect to the rail 2 so as to compensate for any non-optimal installation of the rail itself and even in the presence of excessive tolerances in the assembly of the components of the sliding door.

[0037] The carriage moreover has an optimal smoothness of sliding of the door even if it was not installed by people with special training.

[0038] Obviously the invention is susceptible of numerous modifications and variations, all of which are within the scope of the appended claims.

[0039] Thus the shape of the body 3 can vary and assume, in transverse cross-section, a shape that is substantially elliptical or teardrop-shaped, as shown in Figure 10, so as to improve the oscillation of the two pairs of wheels 28a, 28b, 29a and 29b by increasing the angle of inclination that these can perform without interacting with the adjacent lateral surfaces 10a and 10b of the body 3.

[0040] In the same way the shape of the body 3 can vary and assume, in transverse cross-section, a shape that is substantially elliptical or teardrop-shaped with a diverging lower footing 30, as shown in Figure 11.

[0041] In the same way the shape of the body 3 can vary and assume, in transverse cross-section, a shape that is substantially elliptical or teardrop-shaped but with contiguous flat surfaces which form an octagon, as shown in Figure 12.

[0042] In the same way the shape of the central body 3 can vary and assume, in transverse cross-section, a shape that is substantially elliptical or teardrop-shaped but with contiguous arc-like surfaces which form an octagon, with a diverging lower footing (30) as shown in Figure 13.

[0043] Obviously the materials used as well as the dimensions constituting the individual components of the invention can be more pertinent to specific requirements.

[0044] The various means for effecting certain different functions shall not in any way coexist only in the illustrated embodiment, but may be present per se in many embodiments, even if they are not illustrated. The characteristics indicated as advantageous, convenient or similar may also be missing or be substituted by equivalent characteristics.

[0045] The disclosures in Italian Patent Application No. TV2011A000149 from which this application claims priority are incorporated herein by reference.

[0046] 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 carriage, **characterized in that** it comprises a body (3) to which an anchoring means (15) for a sliding door (4) is pivoted transversely and able to oscillate, the pivots (27a, 27b) of two pairs of transverse wheels (28a, 28b, 29a, 29b) which are slideably associable with a rail (2) being pivoted axially to the ends of said body (3).

2. The carriage according to claim 1, wherein said body (3) has a substantially plate-like shape so as to be slideably associable between the wings (5a, 5b) of said rail (2), **characterized in that** said body (3) has a front wall (6), a rear wall (7) and an upper wall (8) which are advantageously flat and, in a central region, a shim (9) that protrudes at right angles from both lateral surfaces (10a, 10b), at said shim (9) a first cylindrical hole (11) being formed transversely which accommodates a complementarily shaped cylinder (12), which can oscillate freely therein and in turn has a second hole (13) which is provided at right angles to its longitudinal axis and is threaded internally.

3. The carriage according to claims 1 and 2, **characterized in that** a longitudinal slot (14) is provided in the upper wall (8) of said body (3), at said expansion (9), and affects the entire height of said body (3) and said first hole (11).

4. The carriage according to claims 1 and 3, **characterized in that** said anchoring means for said retractable sliding door or leaf (4) is constituted by a bolt (15) the shank (16) of which is threaded complementarily to said second hole (13) of said cylinder (12) and enters said slot (14), said stem (16) being free to rotate with respect to the axis of said first hole (11).

5. The carriage according to claims 1 and 4, **characterized in that** a nut (17) and a washer (18) are associated with said shank (16) of said bolt (15), which oscillates on the plane of arrangement of said plate-like body (3), for mating with a bracket (19) which can be associated with the upper edge (20) of said retractable sliding door or leaf (4) which maintains its correct position during opening and closure despite inclinations to which said rail (2) might be subjected on the longitudinal plane.

6. The carriage according to claims 1 and 5, **characterized in that** two U-shaped seats (23a, 23b) are provided in the upper wall (8) of said body (3), so as to partially affect the height of said body (3) and proximate to the ends (21, 22) of said body (3).

7. The carriage according to claims 1 and 6, **characterized in that** third holes (24a, 24b) are provided axially to said front wall (6) and said rear wall (7), at both wings of said seats (23a, 23b) and so as to affect them, and accommodate respective complementarily shaped first pivots (25a, 25b) to which two transversely perforated sleeves (26a, 26b) are pivoted which enter said seats (23a, 23b) and can oscillate freely on a plane that is transverse to said body (3), said pair of pivots (27a, 27b) protruding from said sleeves (26a, 26b) axially or eccentrically, along the same axis, for the pivoting of two pairs of wheels (28a, 28b, 29a, 29b).

8. The carriage according to claims 1 and 7, **characterized in that** said two pairs of wheels (28a, 28b, 29a, 29b) are arranged side by side but slightly spaced from said lateral surfaces (10a, 10b) of said body (3) so as to affect substantially the interspace between said expansion (9) and the ends of said body (3) so that they can be associated slideably with said rail (2) and are free to oscillate with respect to said body (3), said retractable sliding door or leaf (4) maintaining its correct position during opening and closure despite inclinations on the transverse plane to which said rail (2) can be subj ected.

9. The carriage according to claims 1 and 8, **characterized in that** the shape of said body (3), in a transverse cross-section thereof, is substantially elliptical or teardrop-shaped, according to arc-like surfaces or flat surfaces which are contiguous so as to form an octagon, with or without the presence of a diverging lower footing (30).

10. The carriage according to claim 1, **characterized in that** said anchoring means (15) oscillates on a plane that is substantially parallel to the plane of arrangement of said plate-like body (3), and **in that** said two pairs of wheels (28a, 28b, 29a, 29b), which are pivoted transversely to said body (3), oscillate with respect to an axis that is substantially longitudinal to said body (3).

Amended claims in accordance with Rule 137(2) EPC.

1. A carriage slidingly associable with a rail (2) for supporting a sliding door or panel (4), comprising a body (3) to which an anchoring means (15) for anchoring a sliding door or panel (4) is pivoted (11, 12) transversely to said body (3), said anchoring means being able to oscillate on the plane of arrangement of said body (3) along which the body (3) is arranged lengthways, and wheel pivots (27a, 27b) of two pairs of transverse wheels (28a, 28b, 29a, 29b) which are slideably associable with said rail (2) and are each pivoted by way of said wheel pivots (27a, 27b) to a

respective one of the ends (21, 22) of said body (3), **characterized in that** two U-shaped seats (23a, 23b) are provided on an upper wall (8) of the body (3) so as to partially extend over the height thereof, each said seat (23a, 23b) being proximate to a respective one of said ends (21, 22) of said body (3), holes (24a, 24b) being further provided axially to a front wall (6) and a rear wall (7) and along said plane of arrangement of said body (3), said holes (24a, 24b) extending through opposed wings of both said U-shaped seats (23a, 23b) and accommodating respective complementarily shaped pivots (25a, 25b) that are each pivoted to a respective one of two suitably transversely perforated sleeves (26a, 26b) which enter said seats (23a, 23b) so as to oscillate freely on a transverse plane that is transverse to said plane of arrangement of said body (3), said wheel pivots (27a, 27b) protruding from said sleeves (26a, 26b), axially or eccentrically and along the same axis, for the pivoting of said two pairs of wheels (28a, 28b, 29a, 29b), whereby said two pairs of wheels (28a, 28b, 29a, 29b) can freely oscillate with respect to the body (3) on said transverse plane.

2. The carriage according to claim 1, wherein said body (3) has a substantially plate-like shape, is slideably associable between the wings (5a, 5b) of said rail (2) and has said front wall (6), rear wall (7) and upper wall (8) which are advantageously flat and, in a central region, a shim (9) that protrudes at right angles from both lateral surfaces (10a, 10b) of said body (3), at said shim (9) a first cylindrical hole (11) being formed transversely which accommodates a complementarily shaped cylinder (12), which can oscillate freely therein and in turn has a second hole (13) which is provided at right angles to its longitudinal axis and is threaded internally.

3. The carriage according to claim 2, **characterized in that** a longitudinal slot (14) is provided in the upper wall (8) of said body (3), at said expansion (9), and affects the entire height of said body (3) and said first hole (11).

4. The carriage according to claim 3, **characterized in that** said anchoring means for said retractable sliding door or panel (4) is constituted by a bolt (15) the shank (16) of which is threaded complementarily to said second hole (13) of said cylinder (12) and enters said slot (14), said stem (16) being free to rotate with respect to the axis of said first hole (11).

5. The carriage according to claim 4, **characterized in that** a nut (17) and a washer (18) are associated with said shank (16) of said bolt (15), which oscillates on the plane of arrangement of said plate-like body (3), for mating with a bracket (19) which can be associated with the upper edge (20) of said retractable sliding door or panel (4) which maintains its correct position during opening and closure despite inclinations to which said rail (2) might be subjected on the longitudinal plane.

6. The carriage according to any of the claims 2 -5, **characterized in that** said two pairs of wheels (28a, 28b, 29a, 29b) are arranged side by side but slightly spaced from said lateral surfaces (10a, 10b) of said body (3) so as to affect substantially the interspace between said shim (9) and the ends of said body (3) so that they can be associated slideably with said rail (2) and to be free to oscillate with respect to said body (3), said retractable sliding door or leaf (4) maintaining its correct position during opening and closure despite inclinations on the transverse plane to which said rail (2) can be subjected.

7. The carriage according to any of the claim 2-6, **characterized in that** the shape of said body (3), in a transverse cross-section thereof, is substantially elliptical or teardrop-shaped, according to arc-like surfaces or flat surfaces which are contiguous so as to form an octagon, with or without the presence of a diverging lower footing (30).

8. The carriage according to claim 1, **characterized in that** said anchoring means (15) oscillates on a plane that is substantially parallel to the plane of arrangement of said plate-like body (3), and **in that** said two pairs of wheels (28a, 28b, 29a, 29b), which are pivoted transversely to said body (3), oscillate with respect to an axis that is substantially longitudinal to said body (3).

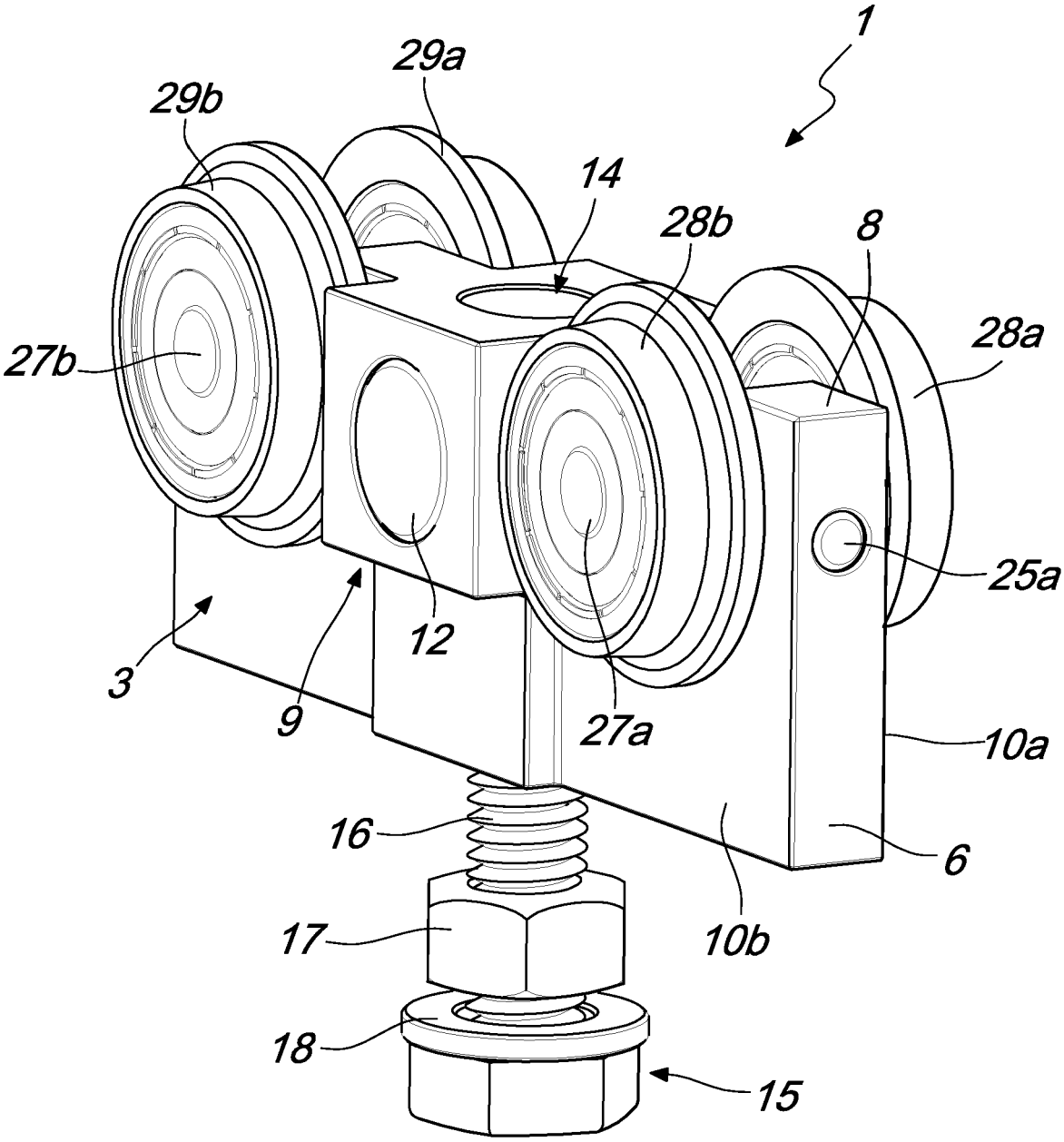

Fig. 1

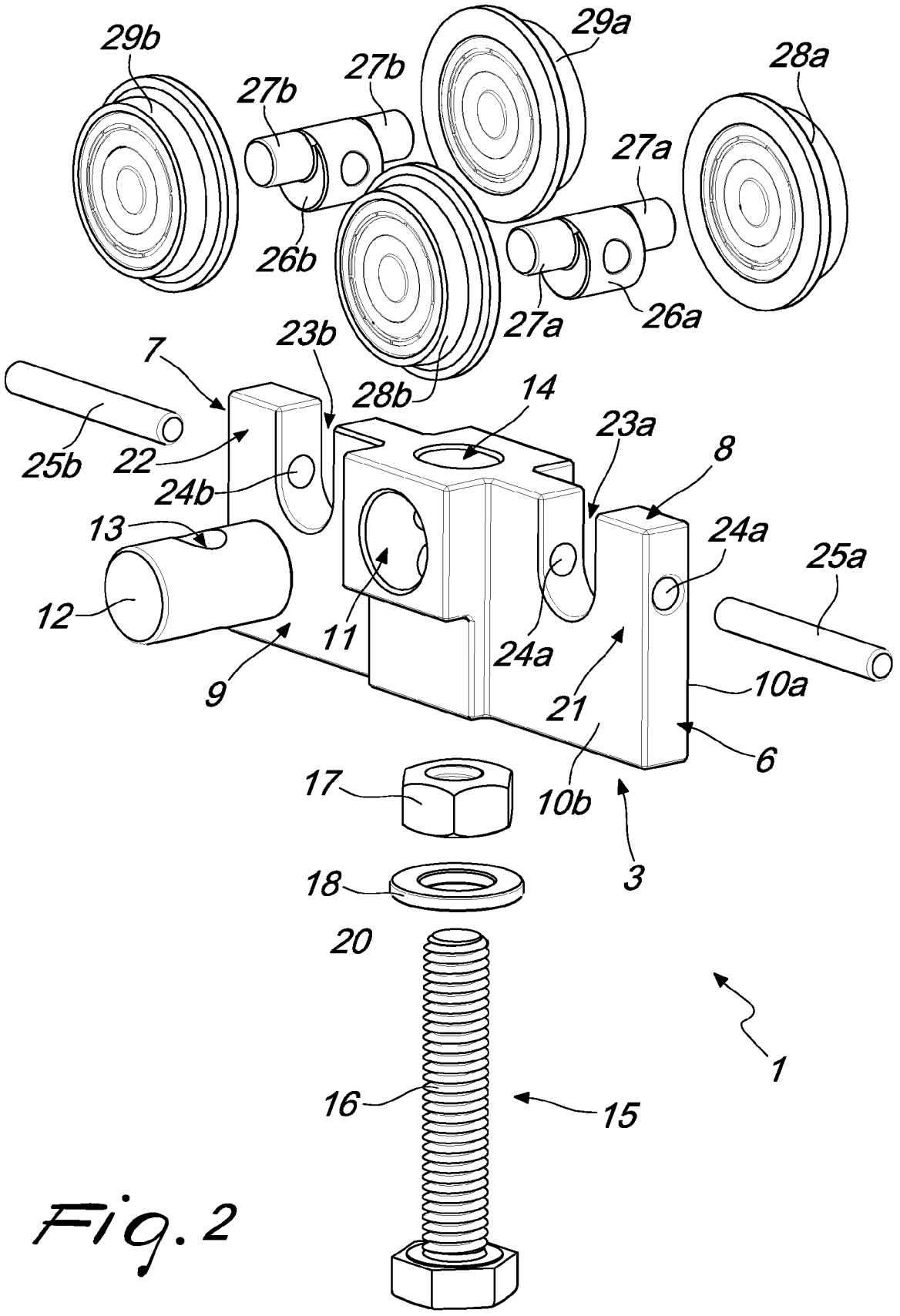
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Fig. 2

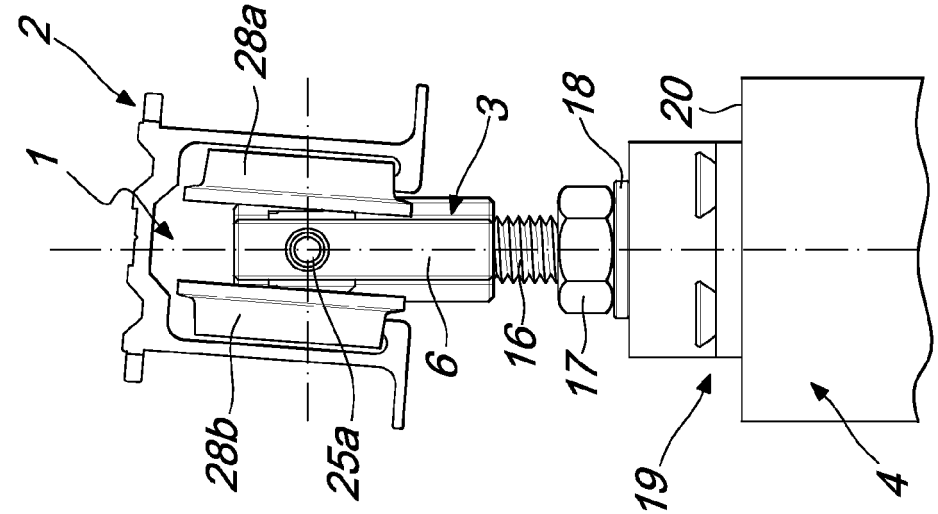


Fig. 5

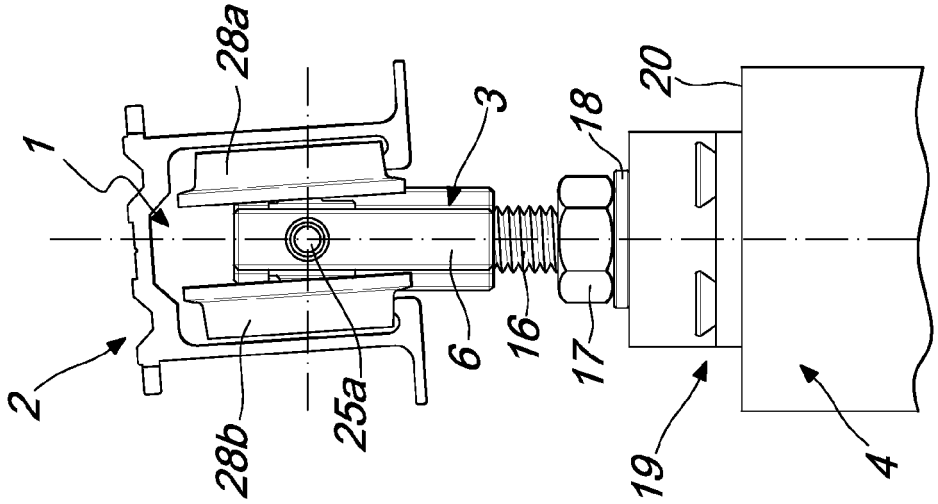


Fig. 4

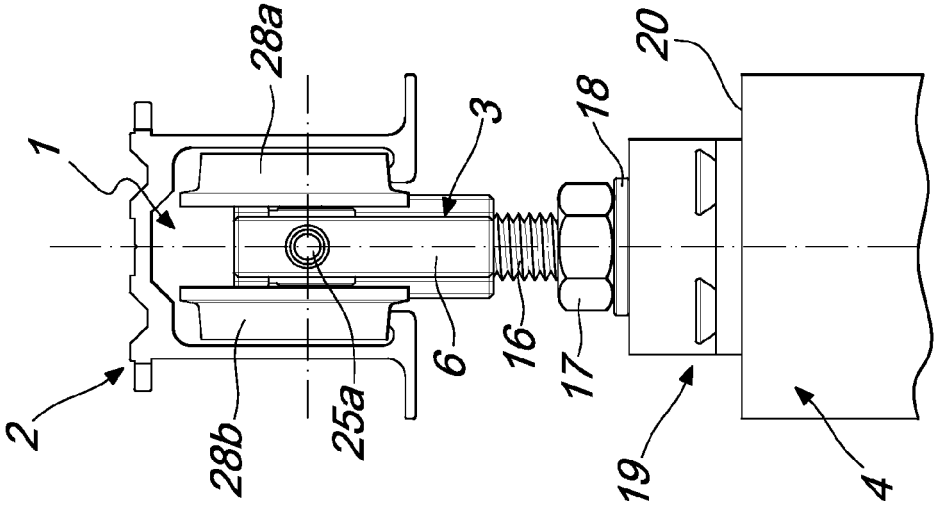


Fig. 3

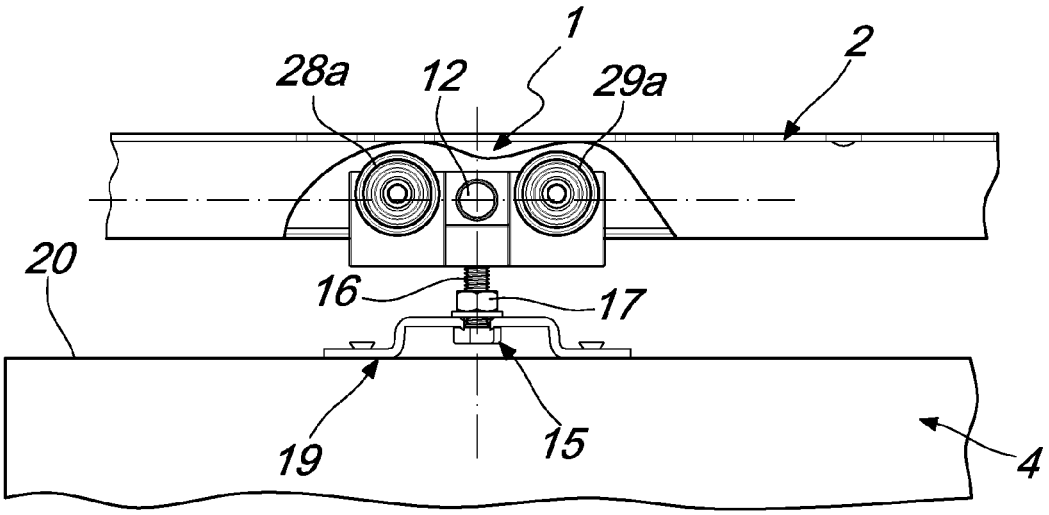


Fig. 6

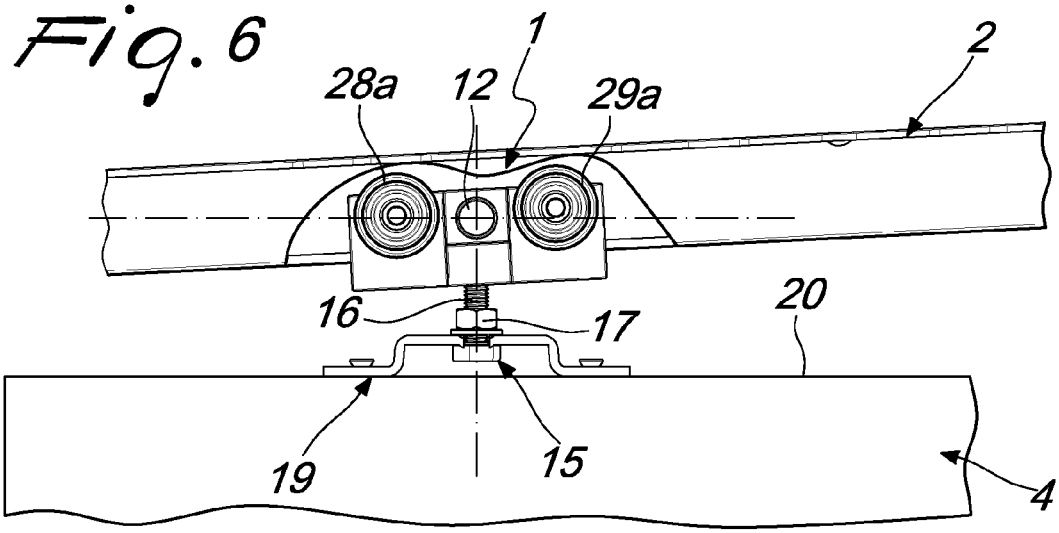


Fig. 7

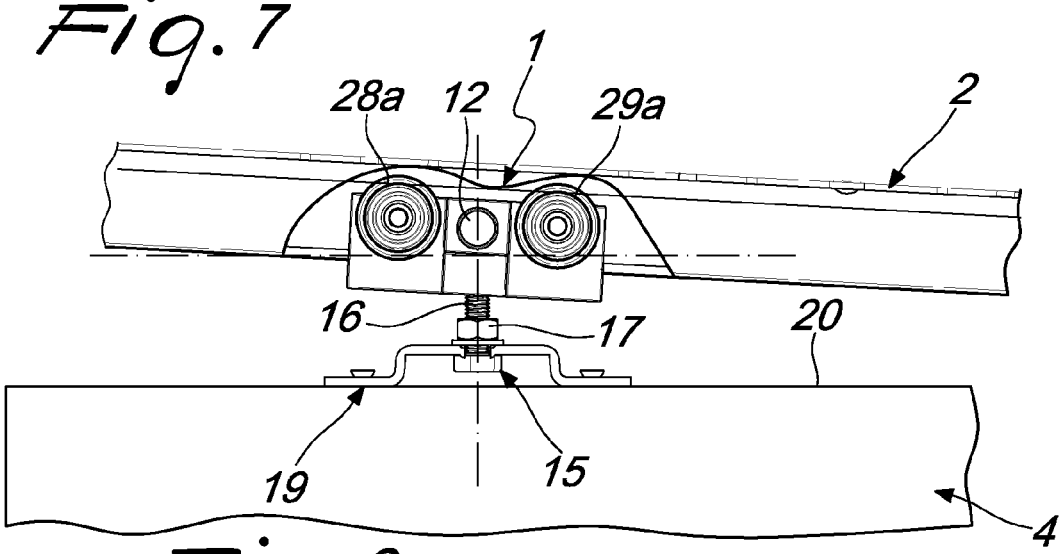


Fig. 8

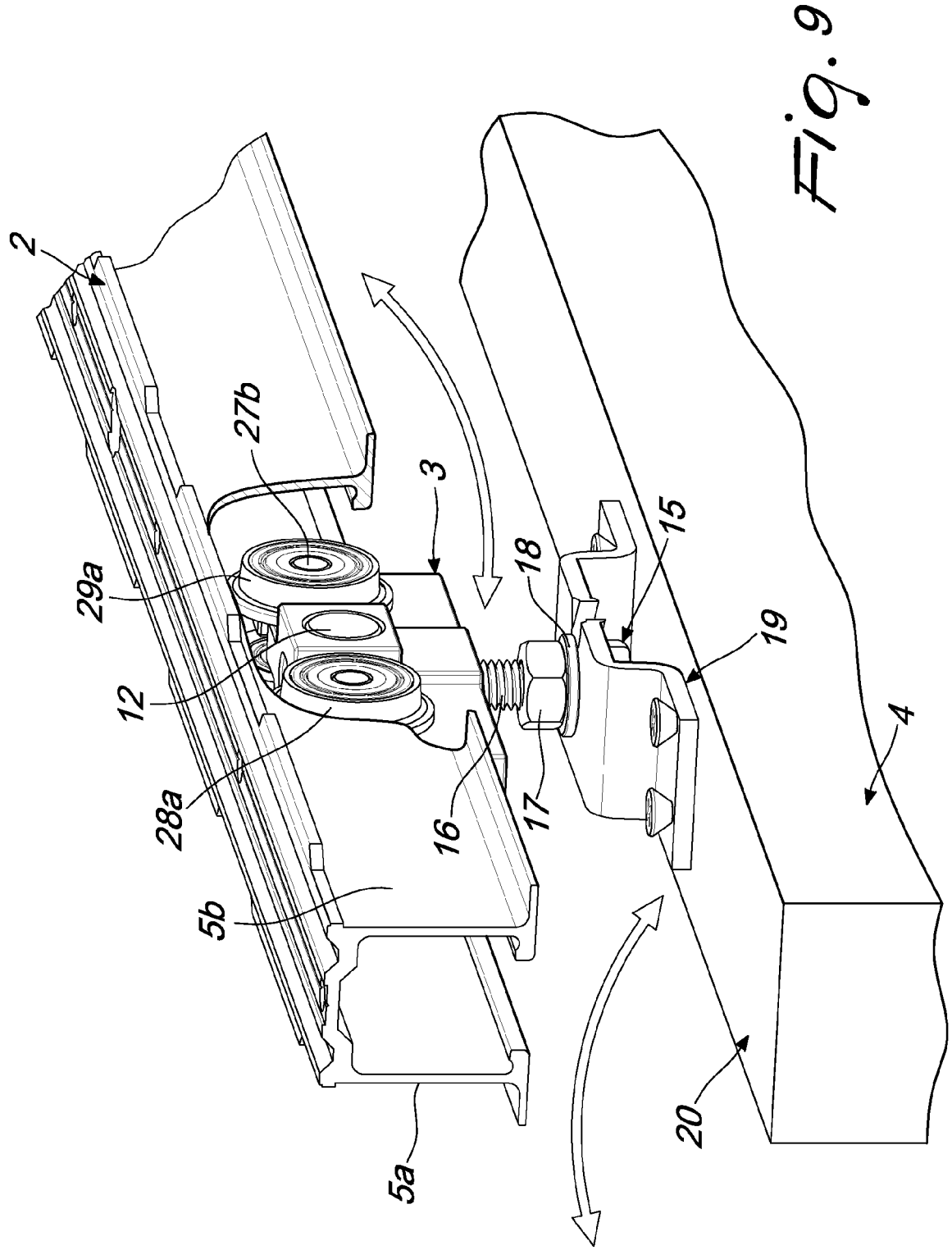
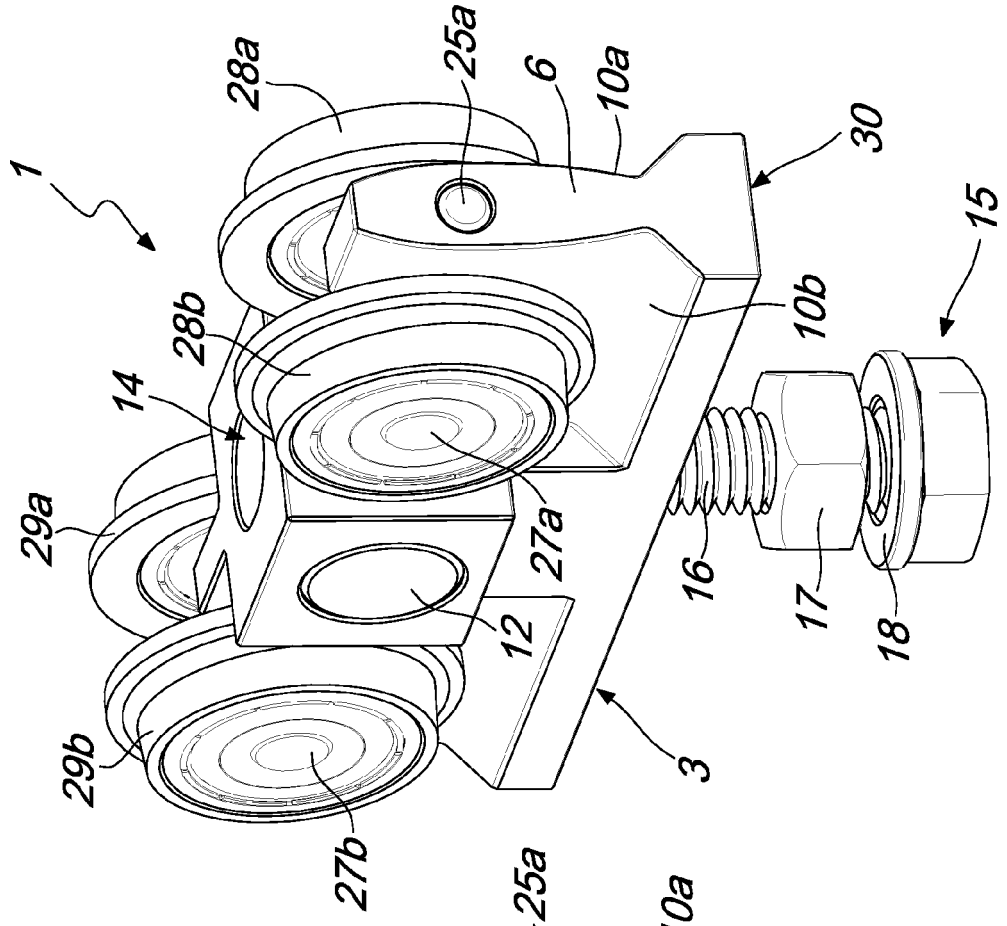


Fig. 9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12
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Fig. 11

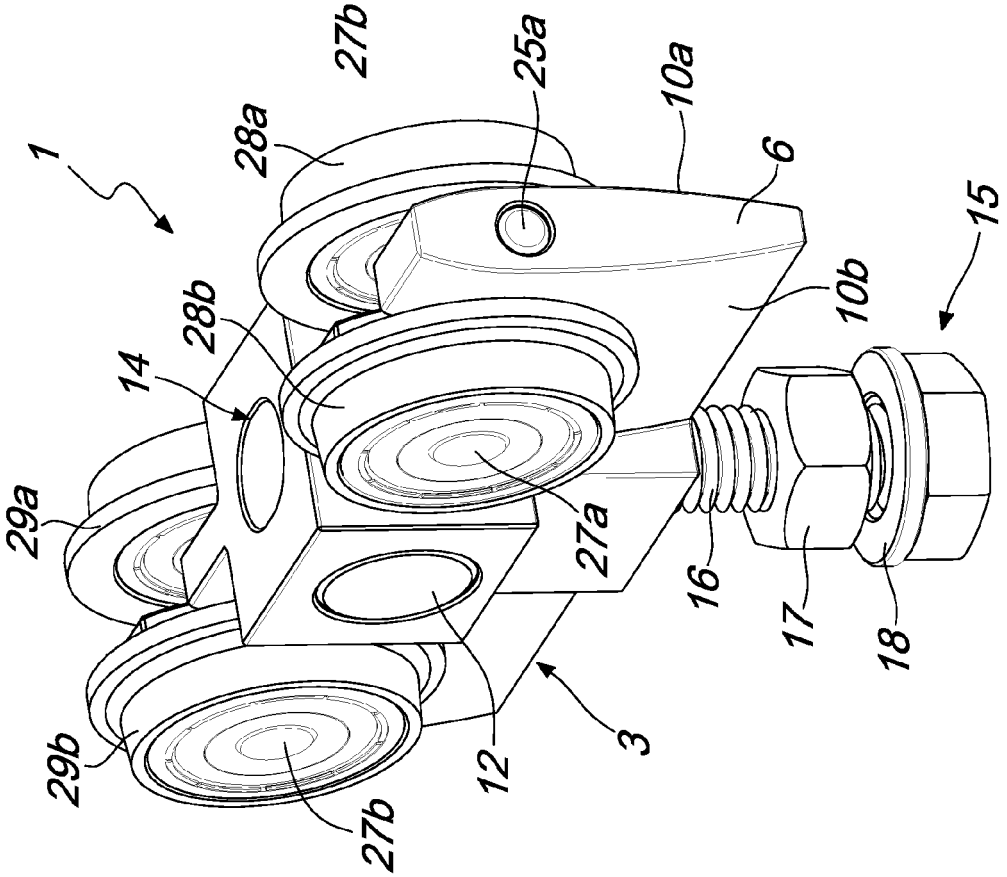
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Fig. 10

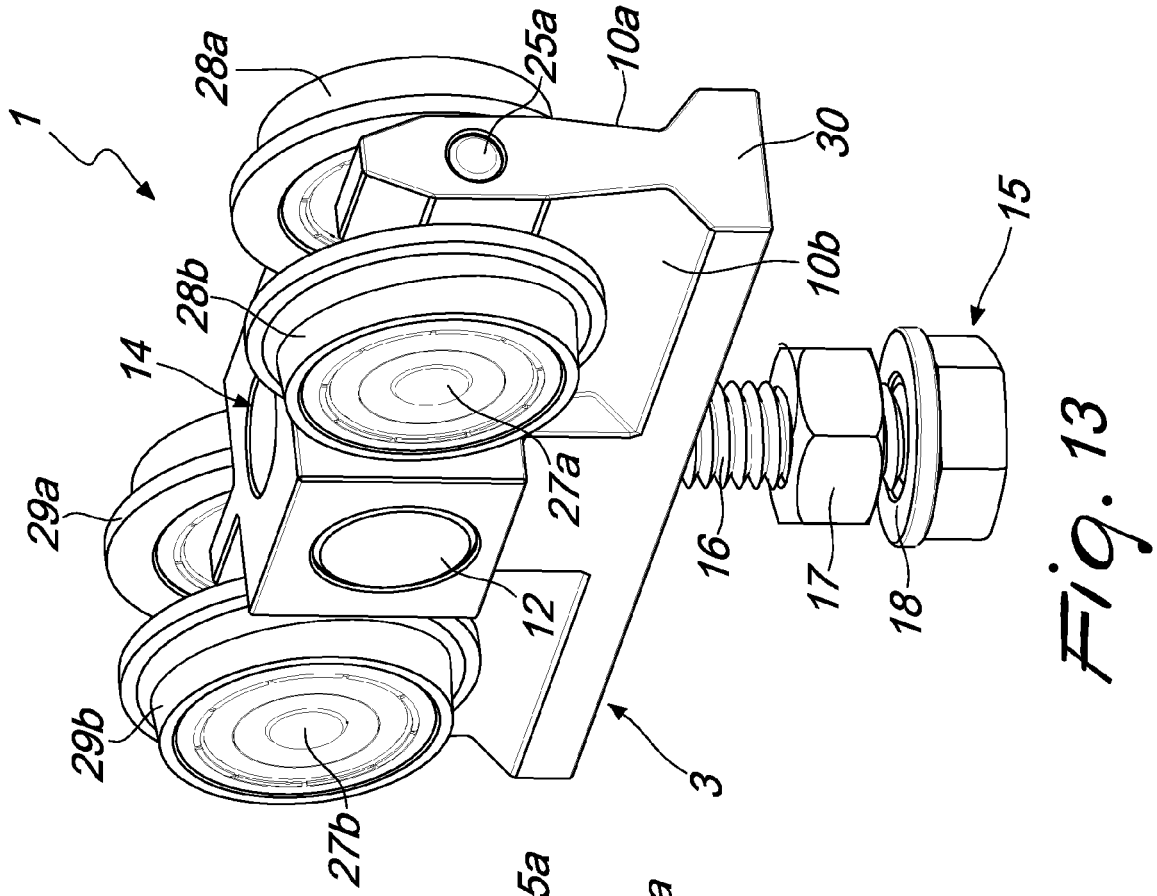
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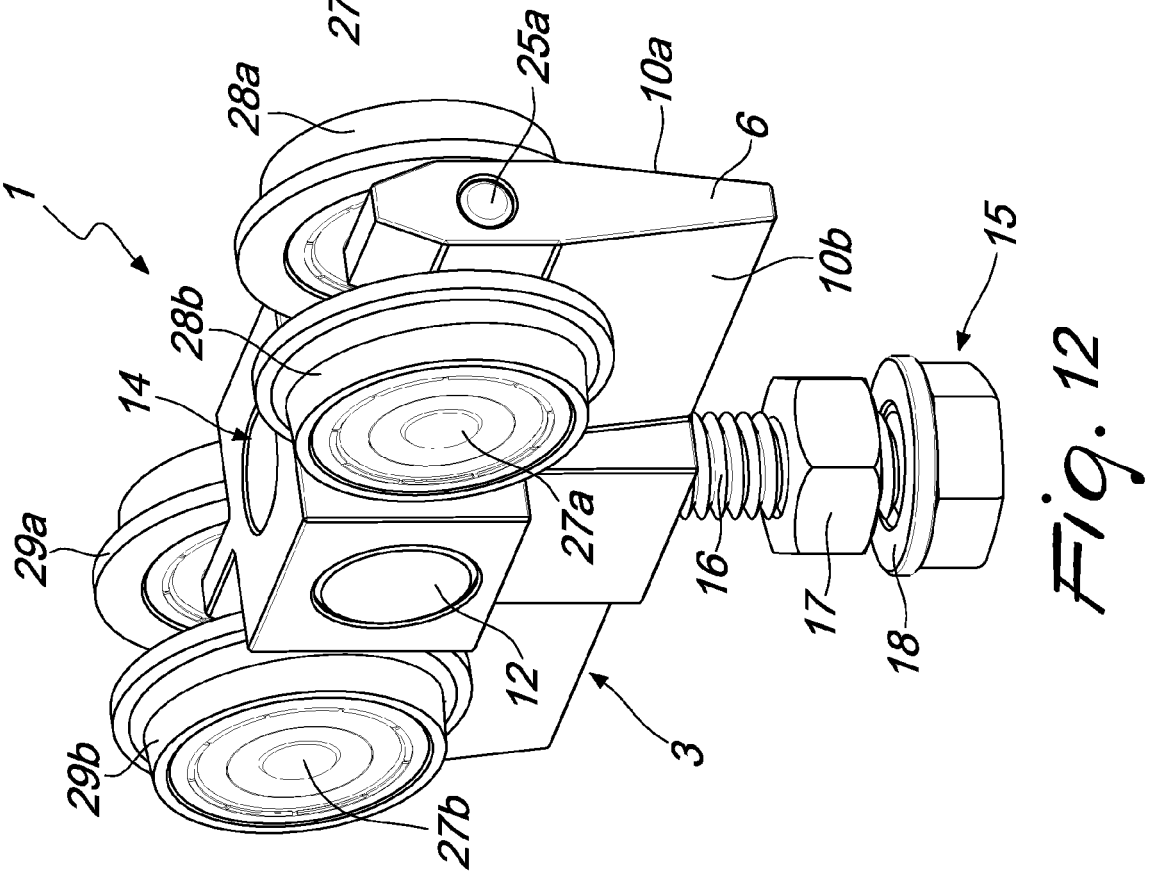
Fig. 13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27b

Fig. 12

Europäisches Patentamt
European Patent Office
Office européen des brevets

EUROPEAN SEARCH REPORT

Application Number
EP 12 16 5698

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X Y	GB 1 405 931 A (HENDERSON P C LTD) 10 September 1975 (1975-09-10) * page 1, line 61 - line 81; figures 1-3 *	1-5 9,10	INV. E05D15/06
X	US 2010/101150 A1 (HUANG SHIH-CHANG [TW]) 29 April 2010 (2010-04-29) * paragraph [0020] - paragraph [0026]; figures 3-8 *	1	
Y	CH 282 672 A (WARD ERIC [DE]) 15 May 1952 (1952-05-15) * page 1, line 30 - line 50; figures 1,2 *	9,10	
			TECHNICAL FIELDS SEARCHED (IPC)
			E05D

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	16 May 2012	Guillaume, Geert

CATEGORY OF CITED DOCUMENTS

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L : document cited for other reasons

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1

EPO FORM 1503 03.82 (P04C01)

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 12 16 5698

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
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16-05-2012

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
GB 1405931 A	10-09-1975	NONE	
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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

REFERENCES CITED IN THE DESCRIPTION

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- IT 1329977 **[0010]**
- IT TV20110149 A **[0045]**