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(54) **A FOLDING MOVABLE PANELS SYSTEM**

SYSTEM AUS FALTBAREN BEWEGLICHEN PLATTEN

SYSTÈME DE PANNEAUX MOBILES PLIABLES

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Description

[0001] The present invention relates to a folding movable panels system.

[0002] In the prior art, there are known solutions for movable panels systems that, according to requirements, make it possible to close off an environment, for example a veranda.

[0003] In particular, a movable panels system is configurable in a closing configuration, in which the panels are arranged longitudinally and separate the two adjacent environments, and a packaged configuration, in which the panels are rotated and mutually adjacent in such a way as to connect the two environments.

[0004] In the prior art, there are solutions for movable panels systems known as "folding door" or "bi-folding door" systems. Specifically, there are different types of movable panels systems, for example "bi-folding door with access door", "hybrid sliding and bi-folding" and "sliding center folding" systems.

[0005] In the known embodiments, the panels are typically made of glass and are large in size, allowing for natural lighting of an environment, even with panels in the closed position.

[0006] within the sector, movable panels systems are known wherein said panels are engaged to an upper guide which is in turn attached to a ceiling or a beam whereupon, therefore, the full force of the weight of the panels is entirely born. Examples of these known movable panels systems are disclosed in documents DE19854739C1 and US2007/272372A1.

[0007] The main problem with the known solutions is in relation to the dimensions of the panels which in the technical sector are required to be increasingly more significant.

[0008] Firstly, as the dimensions increase, the support and movement of the panels becomes a critical factor in the design and life of associated systems.

[0009] Secondly, in some cases or for some types of installations, for example for outdoor use, the characteristics of the building or the load-bearing structure do not permit the installation of known movable panels systems.

[0010] In addition, in some known solutions, the presence of panels of significant dimensions has been the cause of structural problems in relation to the upper beams whereupon they bear.

[0011] The object of the present invention is to present a movable panels system that meets the aforementioned needs and overcomes the aforementioned disadvantages.

[0012] This object is achieved by the movable panels system claimed in claim 1. The claims dependent on these request protection for further features and entail further technical benefits.

[0013] In addition, further features and advantages of the invention will become clear from the description provided below of the preferred embodiments thereof given as non-limiting examples in reference to the at-

tached figures, wherein:

- Figures 1, 1a and 1b show a perspective view of the movable panels system in accordance with the present invention, according to a preferred embodiment, respectively in the closing configuration, in an intermediate configuration and in a packaged configuration;
- Figure 2 depicts a perspective view of separate parts of the movable panels system in accordance with the present invention, according to a preferred embodiment;
- Figure 2a shows a lateral view of the movable panels systems in accordance with the present invention, according to a preferred embodiment;
- Figure 3 shows a cross-sectional view of the movable panels system of Figure 2a, along the section plane A-A, according to a preferred embodiment;
- Figures 3a and 3b show an enlarged detail of Figure 3, respectively within a region proximal to the upper guide and the lower guide;
- Figure 4 shows a cross-sectional view of the movable panels system of Figure 2a, along the sectional plane B-B, according to a preferred embodiment;
- Figures 4a and 4b show an enlarged detail of Figure 4, respectively within a region proximal to the upper guide and to the lower guide;
- Figures 5 and 5a show a load-bearing carriage group of the movable panels system according to the present invention, according to a preferred embodiment, respectively mounted and in separate parts;
- Figures 6 and 6a show a hinge device of the movable panels system according to the present invention, according to a preferred embodiment, respectively mounted and in separate parts;
- Figures 7 and 7a show a head bearing group of the movable panels system according to the present invention, according to a preferred embodiment, respectively mounted and in separate parts;
- Figures 8 and 8a show a head hinge device of the movable panels system according to the present invention, according to a preferred embodiment, respectively mounted and in separate.

[0014] With reference to the attached figures, the folding movable panels system is indicated in the entirety thereof with the number 1.

[0015] According to the present invention, the movable panels system 1 comprises a longitudinal axis X-X, for example parallel to a ground plane P, and a vertical axis V-V.

[0016] According to the present invention, the movable panels system 1 comprises a lower guide 2 resting on the ground plane P and a vertically spaced upper guide 3.

[0017] According to a preferred embodiment, the lower guide 2 and the upper guide 3 are implemented at least partially by means of extrusion, for example from metal.

[0018] According to the present invention, the lower

guide 2 comprises at least one rail 20 extending along the longitudinal axis X-X.

[0019] According to a preferred embodiment, the rail 20 has a T-shaped cross-section, comprising a protruding rail head 25.

[0020] According to a preferred embodiment, the lower guide 2 comprises at least one pair of rails 20 spaced apart transversely.

[0021] The lower guide 2 comprises two auxiliary partitions 27, spaced apart transversely, which extend along the longitudinal axis X-X and define an auxiliary housing 270, which is described in greater detail hereinafter.

[0022] The auxiliary partitions 27 have an inverted L-shaped cross-section.

[0023] According to a preferred embodiment, the auxiliary partitions 27 are transversely comprised between two rails 20 of the lower guide 2.

[0024] According to the present invention, the movable panels system 1 comprises a plurality of movable panels 4a, 4b of a planar shape, preferably made of glass, mutually hinged, and each comprising a lower edge 42a, 42b and an upper edge 43a, 43b.

[0025] According to a preferred embodiment, the movable panels system 1 comprises at least one connecting hinge device, preferably two vertically spaced connecting hinge devices. The connecting hinge device is engaged with each pair of adjacent panels, preferably with respective side edges of the two adjacent panels. The desired "book" or "bellows" effect of the movable sliding panels is obtained by means of the connection hinge device.

[0026] In particular, the movable panels system 1 comprises at least one sliding panel 4a movable along the longitudinal axis X-X.

[0027] Preferably, the sliding panel 4a engages in a sliding manner on a relevant rail 20.

[0028] According to a preferred embodiment, the movable panels system 1 comprises a plurality of sliding panels 4a mutually hinged and sliding on a relevant rail 20 along the longitudinal axis X-X.

[0029] According to the present invention, the movable panels system 1 comprises rotation and sliding means operatively connected to the sliding panel 4a, suitable for allowing the rotation and sliding of said sliding panel 4a.

[0030] The rotation and sliding means comprise a load-bearing carriage group 5 and a hinge device 6.

[0031] According to the present invention, the hinge device 6 is engaged to the upper edge 43a of the sliding panel 4a and is housed in a rotationally and freely sliding manner at least partially in the upper guide 3.

[0032] According to the present invention, the load-bearing carriage group 5 is engaged to the lower edge 42a and comprises a supporting body 50 and a plurality of wheels 53.

[0033] Preferably, each wheel 53 is engaged in a slidingly free manner to the at least one rail 20 and hinged in a rotationally free manner to the supporting body 50 in a wheel axis W-W substantially parallel to the ground plane

P, for example substantially horizontal.

[0034] That is, the supporting body 50 translates along the rail 20 by means of the wheels 53.

[0035] Preferably, the load-bearing carriage 5 comprises at least two wheels 53 positioned on opposite sides.

[0036] Preferably, the load-bearing carriage group 5 comprises at least two pairs of wheels 53, each pair being positioned on one side, wherein the wheels 53 of each pair are longitudinally aligned.

[0037] According to a preferred embodiment, the load-bearing carriage group 5 comprises at least one auxiliary wheel 54 hinged to the supporting body 50 in a substantially vertical auxiliary axis Q-Q. Preferably, the load-bearing carriage group 5 comprises at least two auxiliary wheels 54 positioned on opposite sides.

[0038] In particular, each auxiliary wheel 54 is engaged in a sliding manner to the auxiliary partitions 27 in the auxiliary housing 270 defined therebetween.

[0039] According to a preferred embodiment, the auxiliary wheel 54 engages the lower guide 2 in such a way as to prevent detachment in the vertical direction, i.e., to prevent lifting of the panels 4a, 4b.

[0040] According to the present invention, the load-bearing carriage group 5 further comprises a lower pin 51 extending along a substantially vertical first rotation axis R1-R1, engaged to the supporting body 50. In addition, the load-bearing carriage group 5 comprises a lower body 52 engaged to the sliding panel 4a and to the lower edge 42a, and engaged in a rotationally free manner to the supporting body 50 by means of the lower pin 51.

[0041] According to the present invention, the load-bearing carriage group 5 comprises a thrust bearing 55, suitable for receiving forces acting along the first rotation axis R1-R1, engaged to the lower pin 51 and engaged to the supporting body 50 or to the lower body 52, suitable for allowing the rotation of the lower body 52 in relation to the supporting body 50.

[0042] In other words, the load-bearing carriage group 5 supports the sliding panel 4a sliding along the longitudinal axis X-X in discharging the force of weight of said sliding panel 4a onto the rail 20. Specifically, the lower pin 51 receives the force of weight of the sliding panel 4a from the lower body 52 and applies it to the supporting body 50 by means of the thrust bearing 55. At the same time, the load-bearing carriage group 5 allows the rotation of the sliding panel 4a around the first rotation axis R1-R1, by means of coupling the lower pin 51 and the thrust bearing 55.

[0043] According to a preferred embodiment, the supporting body 50 comprises a housing 500, in which the thrust bearing 55 is housed, and the lower pin 51 comprises an engagement portion 511 engaged to the thrust bearing 55 within said housing 500. Preferably, the lower pin 51 comprises a rotation portion 512 integrally connected in rotation to the lower body 52.

[0044] That is, the lower pin 51, the lower body 52 and the sliding panel 4a are integrally connected in rotation.

[0045] According to a different embodiment, the thrust bearing 55 is housed integrally connected in the lower body 52, the rotation portion 512 is engaged in a rotationally free manner to the thrust bearing 55, and the engagement portion 511 is engaged to the supporting body 50. Thus, during the rotation of the sliding panel 4a, the lower pin 51 is in a fixed angular position.

[0046] According to a preferred embodiment, the upper guide 3 comprises a sliding seat 30, for example defined by a plurality of walls and partitions preferably obtained as one piece with the upper guide 3.

[0047] According to a preferred embodiment, the hinge device 6 comprises an upper body 62 integrally connected to the sliding panel 4a and to the upper edge 43a, and an upper pin 61 extending along the first rotation axis R1-R1, i.e. vertically aligned with the lower pin 51, integrally connected to the upper body 62.

[0048] The hinge device 6 further comprises an annular element 63 supported in a rotationally free manner by the upper pin 61 and engaged in a sliding manner to the upper guide 3 in the sliding seat 30.

[0049] Preferably, during the sliding of the sliding panel 4a, the annular member 63 rotates coaxially to the upper pin 61, sliding along the upper guide 43, thereby facilitating the movement thereof.

[0050] The type of folding movable panels system anticipates that the lower pin 51 and the upper pin 61 translate vertically aligned along the guides 2, 3, i.e. along the longitudinal axis X-X.

[0051] According to the invention, the plurality of panels comprises a head panel 4b, rotatable around a second rotation axis R2-R2 and fixed along the longitudinal axis X-X.

[0052] The movable panels system 1 comprises rotation means operatively connected to the head panel 4b, comprising a head hinge device 7 engaged at the upper edge 43b, suitable for allowing the rotation of the head panel 4b relative to the upper guide 3.

[0053] In addition, the rotating means comprise a head bearing group 8 engaged at the lower edge 42b, comprising a base body 80, engaged to the lower guide 2 in a fixed position along the longitudinal axis X-X, and a lower head pin 81 that extends along the second rotation axis R2-R2, engaged to the base body 80.

[0054] The head bearing group 8 also comprises a lower head body 82 engaged to the head panel 4b and to the lower edge 42b, and engaged in a rotationally free manner to the base body 80 by means of the lower head pin 81.

[0055] In addition, the head bearing group 8 comprises a head thrust bearing 85, engaged at the lower head pin 81 and engaged to the base body 80 or the lower head body 82, suitable for allowing the rotation of the lower head body 82.

[0056] In other words, the lower head pin 81 receives the force of weight of the head panel 4b and applies it to the base body 80 by means of the head thrust bearing 85. At the same time, the head bearing group 8 allows the

rotation of the sliding panel 4a around the first rotation axis R1-R1, by means of coupling the lower head pin 81 and the head thrust bearing 85.

[0057] According to a preferred embodiment, the base body 80 comprises a base housing 800 in which a head thrust bearing 85 is housed, and the lower head pin 81 comprises a lower portion 811 engaged in a rotationally free manner to the head thrust bearing 85 in said base housing 800, and an upper portion 812 integrally connected to the lower head body 82.

[0058] According to a different embodiment, the head thrust bearing 85 is housed integrally connected in the lower head body 82, the upper portion 512 is engaged in a rotationally free manner to the head thrust bearing 85, and the lower portion 811 is engaged to the base body 80. Thus, during the rotation of the head panel 4b, the lower head pin 81 is in a fixed angular position.

[0059] According to a preferred embodiment, the base body 80 comprises an upper base portion, wherefrom the lower head pin 84 protrudes, and a lower base portion 806, facing the lower guide 2.

[0060] Preferably, the base body 80 comprises an anti-lifting profile 808 housed in said lower base portion 806, having a complementary shape to the auxiliary housing 270, in which it is inserted.

[0061] According to a preferred embodiment, the base body 80 is at least partially insertable into the lower rail 2, by means of sliding the anti-lifting profile 808 into the auxiliary housing 270, along the longitudinal axis X-X.

[0062] According to a preferred embodiment, the anti-lifting profile 808 engages the lower guide 2 in such a way as to prevent detachment in the vertical direction, i.e., to prevent accidental lifting of the panels 4a, 4b.

[0063] According to a preferred embodiment, the base body 80 further comprises at least one backing profile 809 housed in the lower base portion 806, positioned vertically abutting against a relevant rail 20, preferably a head rail 25.

[0064] According to a preferred embodiment, wherein the head hinge device 7 comprises an anchoring body 70 engaged to the upper guide 3, in a fixed position along the longitudinal axis X-X, and an upper head pin 71 extending along the second rotation axis R2-R2, engaged to the anchoring body 70.

[0065] In addition, preferably the head hinge device 7 comprises an upper head body 72 integrally connected to the head panel 4b and to the upper edge 43b, and engaged in a rotationally free manner to the anchoring body 70 by means of the upper head pin 71.

[0066] Preferably, the upper head pin 71 and the lower head pin 84 are vertically aligned along the second rotation axis R2-R2, at a fixed position along the longitudinal axis X-X.

[0067] According to a preferred embodiment, the head hinge device 7 comprises an anti-lifting element 75 which is preferably annular in shape, for example, open circumferentially, coaxial to the upper head pin 71. Preferably, the anti-lifting element 75 is suitable for preventing the

lower head pin 81 from slipping off from the base housing 800, along the second rotation axis R2-R2.

[0068] In accordance with a preferred embodiment, said anti-lifting element 75 is vertically comprised between the anchoring body 70 and the upper head body 72, having a thickness such as to prevent the lower portion 811 of the lower head pin 81 from falling out.

[0069] According to a preferred embodiment, the hinge device 6 engaged to the sliding panel 4a also comprises an anti-lifting element, which is annular in shape, e.g. coaxial to the upper pin 61, between the annular element 63 and the upper body 62.

[0070] According to a preferred embodiment, the lower body 52, the upper body 62, the upper head body 72 and the lower head body 82 have substantially the same characteristics as those described above. Said components are substantially identical parts, except for the fact that they are used in different positions and for different purposes, for example operating on a movable panel and/or head panel.

[0071] According to a preferred embodiment, the movable panels system 1 comprises a box-like body 9 for at least one edge 42a, 42b of the at least one sliding panel 4a and/or for at least one edge 43a, 43b of the head panel 4b.

[0072] According to a preferred embodiment, said box-like body 9 is made at least partially by means of extrusion, for example from a material belonging to the family of metal materials.

[0073] According to a preferred embodiment, the movable panels system 1 comprises a box-like body 9 for each edge 42a, 42b, 43a, 43b of each panel 4a, 4b. Said box-like body 9 is integrally connected in translation and rotation to a relevant panel 4a, 4b.

[0074] According to a preferred embodiment, the lower body 52 is integrally connected to a box-like body 9.

[0075] According to a preferred embodiment, the upper body 62 is integrally connected at the box-like body 9.

[0076] According to a preferred embodiment, the upper head body 72 is integrally connected to a box-like body 9.

[0077] According to a preferred embodiment, the lower head body 82 is integrally connected to a box-like body 9.

[0078] According to a preferred embodiment, the movable panels system 1 comprises at least one flexible covering member 10, for example two flexible covering members 10, extending vertically from said box-like body 9.

[0079] Preferably, the flexible covering member 10 extends substantially along the entire longitudinal length of the box-like body 9.

[0080] In the closing configuration of the movable panels system 1, for example with the panels in the closed position and longitudinally aligned, the flexible covering member 10 extends at least partially overlapping a relevant rail 2, 3.

[0081] In addition, during the rotation of the panel 4a,

4b, the at least one flexible covering member 10 elastically deforms in contact with said guide 2, 3.

[0082] Preferably, the flexible covering member 10 at least partially covers the rotation and sliding means of the sliding panel 4a.

[0083] Preferably, the flexible covering member 10 at least partially covers the rotation means of the head panel 4b.

[0084] Innovatively, the folding movable panels system fully fulfills the intended object in overcoming the typical problems of the prior art.

[0085] Advantageously, the movable folding panels system does not structurally bear upon ceilings and/or beams and/or lintels. Advantageously, the force of weight of the panels is discharged onto the bottom rail, obviating the problem of installations involving ceilings and/or beams and/or lintels.

[0086] Advantageously, it is also possible to mount the movable panels system in outdoor installations that are typically lacking in structural load-bearing capacity.

[0087] Advantageously, the upper rail does not have a panel support function, i.e. it does not support any weight. Advantageously, the upper guide is structurally simple and inexpensive to implement.

[0088] Advantageously, it is possible to implement numerous panels of different sizes and lengths, depending upon the environment wherein they are installed.

[0089] Advantageously, the load generated by the panels homogeneously bears upon the ground plane and is stabilized during rotation.

[0090] Advantageously, the vertical alignment of the panels is ensured, especially during rotation.

[0091] Advantageously, the vertical load balancing is ensured. Advantageously, the auxiliary wheels prevent vertical misalignments and favor homogeneous sliding.

[0092] Advantageously, the movable panels systems has panels that are prevented from undesired lifting and detaching from the lower guide thereby reducing the risk of injury. Advantageously, the auxiliary wheels engage to the lower guide in an anti-lifting manner. Advantageously, the anti-lifting profile of the base body has an anti-lifting function.

[0093] Advantageously, the assembly of the movable panels system is simple, as it comprises a limited number of components.

[0094] Advantageously, the movable panels system has strong aesthetic qualities. Advantageously, in fact, the at least one flexible covering member covers a relevant guide, hiding from view the means of rotation and/or the means of rotation and sliding.

[0095] Advantageously, the problem of the accumulation of dirt and water within the guides is avoided, presenting a clean aesthetic and obviating the need for frequent maintenance and cleaning operations.

[0096] It is clear that a person skilled in the art may make changes to the invention described above in order to meet contingent needs, which changes all fall within the scope of protection as defined in the following claims.

Claims

1. A folding movable panels system (1) comprising:

- i) an upper guide (3) and a lower guide (2),
wherein the lower guide (2) rests on a ground
plane (P) and comprises at least one rail (20)
that extends along a longitudinal axis (X-X);
ii) a plurality of mutually hinged panels (4a, 4b)
comprising at least one sliding panel (4a), each
panel (4a, 4b) comprising an upper edge (43a,
43b) and a lower edge (42a, 42b);
iii) rotating and sliding means operatively con-
nected to each sliding panel (4a), comprising:

- a) a hinge device (6) engaged at the upper
edge (43a), housed in a rotationally and
freely sliding manner at least partially in
the upper guide (3);
b) a load-bearing carriage group (5) en-
gaged at the lower edge (42a), comprising:

- a supporting body (50);
- a plurality of wheels (53), each wheel
(53) engaged in a slidingly free manner
to the at least one rail (20) and rotation-
ally hinged to the supporting body (50)
in a wheel axis (W-W) substantially
parallel to the ground plane (P);
- a lower pin (51) that extends along a
substantially vertical first rotation axis
(R1-R1), engaged to the supporting
body (50);
- a lower body (52) engaged to the
sliding panel (4a) and engaged in a
rotationally free manner to the support-
ing body (50) by means of the lower pin
(51);
- a thrust bearing (55), engaged to the
lower pin (51) and engaged to the sup-
porting body (50) or the lower body
(52), suitable for allowing the rotation
of the lower body (52);

wherein the lower guide (2) comprises:

- a pair of auxiliary partitions (27) that extend
along the longitudinal axis (X-X);
- an auxiliary housing (270) comprised transver-
sely between the auxiliary partitions (27);
wherein the load-supporting carriage group (5)
comprises at least one auxiliary wheel (54) en-
gaged in a sliding manner to the auxiliary parti-
tions (27) in the auxiliary housing (270) and
hinged to the supporting body (50) in a vertical
auxiliary axis (Q-Q);
wherein the plurality of panels (4a, 4b) com-
prises a head panel (4b), wherein the movable

panel system (1) comprises rotational means
operatively connected to the head panel (4b)
comprising a head hinge device (7) engaged at
the upper edge (43b), suitable for allowing the
rotation of the head panel (4b) relative to the
upper guide (3);
wherein the movable panel system (1) is **char-
acterized in that** the rotational means further
comprises a head bearing group (8) engaged at
the lower edge (42b), comprising:

- a base body (80) engaged to the lower
guide (2) at a fixed position along the long-
itudinal axis (X-X);
- a lower head pin (81) that extends along a
substantially vertical second rotation axis
(R2-R2), engaged to the base body (80);
- a lower head body (82) engaged to the
head panel (4b) and engaged in a rotation-
ally free manner to the base body (80) by
means of the lower head pin (81);
- a head thrust bearing (85), engaged to the
lower head pin (81) and engaged to the
base body (80) or the lower head body
(82), suitable for allowing the rotation of
the lower head body (82).

2. Folding movable panels system (1) according to
claim 1, wherein the supporting body (50) comprises
a housing (500), in which the thrust bearing (55) and
a portion of the lower pin (51) engaged to the thrust
bearing (55) are housed.

3. Folding movable panels system (1) according to any
one of the preceding claims, wherein the upper guide
(3) comprises a sliding seat (30) wherein the hinge
device (6) comprises:

- an upper body (62) integrally connected to the
sliding panel (4a);
- an upper pin (61) that extends along the first
rotation axis (R1-R1), integrally connected to the
upper body (62);
- an annular element (63) supported in a rota-
tionally free manner by the upper pin (61) and
engaged in a sliding manner to the upper guide
(3) in the sliding seat (30).

4. Folding movable panels system (1) according to any
one of the preceding claims, wherein the base body
(80) comprises a base housing (800) in which a head
thrust bearing (85) and a portion of the lower head pin
(81) engaged to the head thrust bearing (85) are
housed.

5. Folding movable panels system (1) according to
claim 4, wherein the base body (80) comprises a
lower base portion (806) and an anti-lifting profile

(808) in said lower base portion (806), having complementary shape to the auxiliary housing (270), in which it is housed.

6. Folding movable panels system (1) according to claim 5, wherein the base body (80) comprises at least one backing profile (809) housed in the lower base portion (806) positioned vertically abutting against a respective rail (20). 5
7. Folding movable panels system (1) according to any one of the claims 4 to 6, wherein the head hinge device (7) comprises: 10
- an anchoring body (70) engaged to the upper guide (3) in a fixed position along the longitudinal axis (X-X); 15
 - an upper head pin (71) that extends along the second rotation axis (R2-R2), engaged to the anchoring body (70); 20
 - an upper head body (72), integrally connected to the head panel (4b) and engaged in a rotationally free manner to the anchoring body (70) by means of the upper head pin (71). 25
8. Folding movable panels system (1) according to claim 7, wherein the head hinge device (7) comprises an anti-lifting element (75) coaxial to the upper head pin (71), suitable for preventing the lower head pin (81) from slipping off from the base housing (800). 30
9. Folding movable panels system (1) according to any one of the claims 7 or 8, wherein the lower body (52), the upper body (62), the upper head body (72) and the lower head body (82) have substantially the same features being substantially identical. 35
10. Folding movable panels system (1) according to any one of the preceding claims, comprising: 40
- a box-like body (9), engaged to at least one edge (42a, 42b, 43a, 43b) of at least one panel (4a, 4b); 45
 - at least one, preferably two, flexible covering members (10) which extend vertically from said box-like body (9);
- wherein with panels (4a, 4b) longitudinally aligned, the at least one flexible covering member (10) extends at least partially overlapping a respective guide (2, 3), wherein, upon the rotation of the panel (4a, 4b), said at least one flexible covering member (10) elastically deforms in contact with said guide (2, 3). 50
11. Folding movable panels system (1) according to any 55

one of the preceding claims, comprising a plurality of sliding panels (4a) mutually hinged and sliding along the longitudinal axis (X-X).

Patentansprüche

1. System (1) aus faltbaren, beweglichen Platten, umfassend:
- i) eine obere Führung (3) und eine untere Führung (2), wobei die untere Führung (2) auf einer Grund- bzw. Bodenebene (P) ruht bzw. aufliegt und zumindest eine Schiene (20) umfasst, die sich entlang einer Längsachse (X-X) erstreckt;
 - ii) eine Mehrzahl von aneinander angelenkten Platten (4a, 4b), umfassend zumindest eine Gleitplatte (4a), wobei jede Platte (4a, 4b) eine obere Kante (43a, 43b) und eine untere Kante (42a, 42b) umfasst;
 - iii) Dreh- und Gleit- bzw. Schiebemittel, die operativ mit jeder Gleitplatte (4a) verbunden sind, umfassend:
 - a) eine Scharniervorrichtung (6), die an der oberen Kante (43a) in Eingriff ist, und zumindest teilweise in der oberen Führung (3) auf drehbare und frei gleitende Weise untergebracht ist;
 - b) eine lasttragende Wagen- bzw. Schlitten-Gruppe (5), die an der unteren Kante (42a) in Eingriff ist, umfassend:
 - einen Trägerkörper (50);
 - eine Mehrzahl von Rädern (53), wobei jedes Rad (53) auf frei gleitende Weise mit der zumindest einen Schiene (20) in Eingriff ist und drehbar an dem Trägerkörper (50) in einer Radachse (W-W) im Wesentlichen parallel zu der Bodenebene (P) angelenkt ist;
 - einen unteren Stift (51), der sich entlang einer im Wesentlichen vertikalen ersten Drehachse (R1-R1) erstreckt und mit dem Trägerkörper (50) in Eingriff ist;
 - einen unteren Körper (52), der mit der Gleitplatte (4a) in Eingriff ist und auf frei drehende bzw. drehfreie Weise mit dem Trägerkörper (50) mittels des unteren Stifts (51) in Eingriff ist;
 - ein Drucklager (55), das mit dem unteren Stift (51) in Eingriff ist und mit dem Trägerkörper (50) oder dem unteren Körper (52) in Eingriff ist, und geeignet ist, die Drehung des unteren Körpers (52) zu ermöglichen;

wobei die untere Führung (2) umfasst:

- ein Paar Hilfstrennungen (27), die sich entlang der Längsachse (X-X) erstrecken;
- ein Hilfsgehäuse (270), das quer zwischen den Hilfstrennungen (27) umfasst bzw. enthalten ist;

wobei die lasttragende Wagengruppe (5) zumindest ein Hilfsrad (54) umfasst, das auf gleitende Weise mit den Hilfstrennungen (27) in dem Hilfsgehäuse (270) in Eingriff ist und an dem Trägerkörper (50) in einer vertikalen Hilfsachse (Q-Q) angelenkt ist;

wobei die Mehrzahl von Platten (4a, 4b) eine Kopfplatte (4b) umfassen, wobei das bewegliche Plattensystem (1) Drehmittel umfasst, die operativ mit der Kopfplatte (4b) verbunden sind und die eine Kopfscharniervorrichtung (7) umfassen, an der oberen Kante (43b) in Eingriff ist, und die geeignet ist, die Drehung der Kopfplatte (4b) relativ zu der oberen Führung (3) zu ermöglichen; wobei das bewegliche Plattensystem (1) **dadurch gekennzeichnet ist, dass** die Drehmittel ferner eine Kopflagergruppe (8) umfassen, die an der unteren Kante (42b) in Eingriff ist, umfassend:

- einen Basiskörper (80), der mit der unteren Führung (2) an einer festen Position entlang der Längsachse (X-X) in Eingriff ist;
- einen unteren Kopfstift (81), der sich entlang einer im Wesentlichen vertikalen zweiten Drehachse (R2-R2) erstreckt, und mit dem Basiskörper (80) in Eingriff ist;
- einen unteren Kopfkörper (82), der mit der Kopfplatte (4b) in Eingriff ist und auf frei drehende bzw. drehfreie Weise mit dem Basiskörper (80) mittels des unteren Kopfstifts (81) in Eingriff ist;
- ein Kopfdrucklager (85), das mit dem unteren Kopfstift (81) in Eingriff ist und mit dem Basiskörper (80) oder dem unteren Kopfkörper (82) in Eingriff ist, und geeignet ist, die Drehung des unteren Kopfkörpers (82) zu ermöglichen.

2. System (1) aus faltbaren, beweglichen Platten nach Anspruch 1, wobei der Trägerkörper (50) ein Gehäuse (500) umfasst, in dem das Drucklager (55) und ein Abschnitt des unteren Stifts (51), der mit dem Drucklager (55) in Eingriff ist, untergebracht sind.

3. System (1) aus faltbaren, beweglichen Platten nach einem der vorhergehenden Ansprüche, wobei die obere Führung (3) einen Gleitsitz (30) umfasst, wobei die Scharniervorrichtung (6) umfasst:

- einen oberen Körper (62), der integral mit der Gleitplatte (4a) verbunden ist;
- einen oberen Stift (61), der sich entlang der ersten Drehachse (R1-R1) erstreckt, und integral mit dem oberen Körper (62) verbunden ist;
- ein ringförmiges Element (63), das auf frei drehende bzw. drehfreie Weise durch den oberen Stift (61) getragen ist und auf gleitende Weise mit der oberen Führung (3) in dem Gleitsitz (30) in Eingriff ist.

4. System (1) aus faltbaren, beweglichen Platten nach einem der vorhergehenden Ansprüche, wobei der Basiskörper (80) ein Basisgehäuse (800) umfasst, in dem ein Kopfdrucklager (85) und ein Abschnitt des unteren Kopfstifts (81), der mit dem Kopfdrucklager (85) in Eingriff ist, untergebracht sind.

5. System (1) aus faltbaren, beweglichen Platten nach Anspruch 4, wobei der Basiskörper (80) einen unteren Basisabschnitt (806) und ein Anti-Abheben-Profil bzw. Abhebeschutzprofil (808) in dem unteren Basisabschnitt (806) umfasst, der bzw. das eine Form komplementär zu dem Hilfsgehäuse (270) aufweist, in dem es untergebracht ist.

6. System (1) aus faltbaren, beweglichen Platten nach Anspruch 5, wobei der Basiskörper (80) zumindest ein in dem unteren Basisabschnitt (806) untergebrachtes Stützprofil (809) umfasst, das vertikal gegen eine jeweilige Schiene (20) anliegend positioniert ist.

7. System (1) aus faltbaren, beweglichen Platten nach einem der Ansprüche 4 bis 6, wobei die Kopfscharniervorrichtung (7) umfasst:

- einen Verankerungskörper (70), der mit der oberen Führung (3) in einer festen Position entlang der Längsachse (X-X) in Eingriff ist;
- einen oberen Kopfstift (71), der sich entlang der zweiten Drehachse (R2-R2) erstreckt, und mit dem Verankerungskörper (70) in Eingriff ist;
- einen oberen Kopfkörper (72), der integral mit der Kopfplatte (4b) verbunden ist und mit dem Verankerungskörper (70) mittels des oberen Kopfstifts (71) auf frei drehende bzw. drehfreie Weise in Eingriff ist.

8. System (1) aus faltbaren, beweglichen Platten nach Anspruch 7, wobei die Kopfscharniervorrichtung (7) ein Anti-Abheben-Element bzw. Abhebeschutzelement (75) koaxial zu dem oberen Kopfstift (71) umfasst, das geeignet ist, ein Abrutschen des unteren Kopfstifts (81) von dem Basisgehäuse (800) zu verhindern.

9. System (1) aus faltbaren, beweglichen Platten nach

einem der Ansprüche 7 oder 8, wobei der untere Körper (52), der obere Körper (62), der obere Kopfkörper (72) und der untere Kopfkörper (82) im Wesentlichen die gleichen Merkmale aufweisen, die im Wesentlichen identisch sind.

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10. System (1) aus faltbaren, beweglichen Platten nach einem der vorhergehenden Ansprüche, umfassend:

- einen kastenartigen Körper (9), der mit zumindest einer Kante (42a, 42b, 43a, 43b) zumindest einer Platte (4a, 4b) in Eingriff ist;

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- zumindest ein, vorzugsweise zwei, flexible Abdeckungsglieder (10), die sich vertikal von dem kastenartigen Körper (9) erstrecken;

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wobei bei längs ausgerichteten Platten (4a, 4b) sich das zumindest eine flexible Abdeckungsglied (10) zumindest teilweise eine jeweilige Führung (2, 3) überlappend erstreckt, wobei bei Drehung der Platte (4a, 4b) sich das zumindest eine flexible Abdeckungsglied (10) in Kontakt mit der Führung (2, 3) elastisch verformt.

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11. System (1) aus faltbaren, beweglichen Platten nach einem der vorhergehenden Ansprüche, umfassend eine Mehrzahl von Gleitplatten (4a), die aneinander angelenkt sind und entlang der Längsachse (X-X) gleiten.

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Revendications

1. Système de panneaux mobiles pliants (1) comprenant :

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i) un guide supérieur (3) et un guide inférieur (2), dans lequel le guide inférieur (2) repose sur un sol plane (P) et comprend au moins un rail (20) qui s'étend le long d'un axe longitudinal (X-X) ;

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ii) une pluralité de panneaux articulés mutuellement (4a, 4b) comprenant au moins un panneau coulissant (4a), chaque panneau (4a, 4b) comprenant un bord supérieur (43a, 43b) et un bord inférieur (42a, 42b) ;

45

iii) des moyens rotatifs et coulissants reliés fonctionnellement à chaque panneau coulissant (4a), comprenant :

a) un dispositif à charnière (6) engagé dans le bord supérieur (43a), logé de façon rotativement et librement coulissante au moins partiellement dans le guide supérieur (3) ;

50

b) un groupe de chariots porteurs (5) engagé au bord inférieur (42a), comprenant :

55

- un corps de support (50) ;
- une pluralité de roues (53), chaque

roue (53) engagée de façon librement coulissante dans ledit au moins un rail (20) et articulé en rotation sur le corps de support (50) dans un axe de roue (W-W) sensiblement parallèle au sol plane (P) ;

- une tige inférieure (51) qui s'étend le long d'un premier axe de rotation (R1-R1) sensiblement vertical, engagé dans le corps de support (50) ;

- un corps inférieur (52) engagé dans le panneau coulissant (4a) et engagé de façon libre en rotation dans le corps de support (50) moyennant la tige inférieure (51) ;

- un palier (55) engagé avec la tige inférieure (51) et engagé dans le corps de support (50) ou le corps inférieur (52), apte à permettre la rotation du corps inférieur (52) ;

dans lequel le guide inférieur (2) comprend :

- une paire de cloisons auxiliaires (27) qui s'étendent le long de l'axe longitudinal (X-X) ;

- un boîtier auxiliaire (270) compris transversalement entre les cloisons auxiliaires (27) ;

dans lequel le groupe de chariots porteurs (5) comprend au moins une roue auxiliaire (54) engagée de façon coulissante dans les cloisons auxiliaires (27) dans le logement auxiliaire (270) et articulée au corps de support (50) dans un axe auxiliaire vertical (Q-Q) ;

dans lequel la pluralité de panneaux (4a, 4b) comprend un panneau de tête (4b), dans lequel le système de panneaux mobiles (1) comprend des moyens de rotation reliés fonctionnellement au panneau de tête (4b) comprenant un dispositif à charnière de tête (7) engagé dans le bord supérieur (43b), apte à permettre la rotation du panneau de tête (4b) par rapport au guide supérieur (3) ;

dans lequel le système de panneaux mobiles (1) est **caractérisé en ce que** les moyens rotatifs comprennent en outre un groupe de paliers de tête (8) engagé au bord inférieur (42b), comprenant :

- un corps de base (80) engagé dans le guide inférieur (2) à une position fixe le long de l'axe longitudinal (X-X) ;

- une tige de tête inférieure (81) qui s'étend le long d'un deuxième axe de rotation sensiblement vertical (R2-R2), engagé dans le corps de base (80) ;

- un corps de tête inférieur (82) engagé dans le panneau de tête (4b) et engagé de façon libre en rotation dans le corps de base (80) moyennant la tige de tête inférieure (81) ;
 - un palier de roulement de tête (85), engagé avec la tige de tête inférieure (81) et engagée sur le corps de base (80) ou le corps de tête inférieur (82), apte à permettre la rotation du corps de tête inférieur (82).
2. Système de panneaux mobiles pliants (1) selon la revendication 1, dans lequel le corps de support (50) comprend un logement (500) dans lequel le palier de roulement (55) et une partie de la tige inférieure (51) engagée dans les paliers de roulement (55) sont logés.
3. Système de panneaux mobiles pliants (1) selon l'une des revendications précédentes, dans lequel le guide supérieur (3) comprend un siège coulissant (30), dans lequel le dispositif à charnière (6) comprend :
- un corps supérieur (62) entièrement attaché au panneau coulissant (4a) ;
 - une tige supérieure (61) qui s'étend le long le premier axe de rotation (R1-R1) entièrement attachée au corps supérieur (62) ;
 - un élément annulaire (63) supporté de façon libre en rotation par la tige supérieure (61) et engagé de façon coulissante au guide supérieur (3) dans le siège coulissant (30).
4. Système de panneaux mobiles pliants (1) selon l'une des revendications précédentes, dans lequel le corps de base (80) comprend un logement de base (800) dans lequel un palier de roulement de tête (85) et une partie de la tige de tête inférieure (81) engagée dans le palier de roulement de tête (85) sont logés.
5. Système de panneaux mobiles pliants (1) selon la revendication 4, dans lequel le corps de base (80) comprend une partie de base inférieure (806) et un profil anti-soulèvement (808) dans ladite partie de base inférieure (806), ayant une forme complémentaire au logement auxiliaire (270) dans lequel il est logé.
6. Système de panneaux mobiles pliants (1) selon la revendication 5, dans lequel le corps de base (80) comprend au moins un profil de support (809) logé dans la partie de base inférieure (806) positionné verticalement en butée contre un rail respectif (20).
7. Système de panneaux mobiles pliants (1) selon l'une des revendications 4 à 6, dans lequel le dispositif à charnière de tête (7) comprend :
- un corps d'ancrage (70) engagé dans le guide supérieur (3) dans une position fixe le long de l'axe longitudinal (X-X) ;
 - une tige de tête supérieure (71) qui s'étend le long du deuxième axe de rotation (R2-R2), engagé dans le corps d'ancrage (70) ;
 - un corps de tête supérieur (72), entièrement engagé dans le panneau de tête (4b) et engagé de façon libre en rotation sur le corps d'ancrage (70) moyennant la tige de tête supérieure (71).
8. Système de panneaux mobiles pliants (1) selon la revendication 7, dans lequel le dispositif à charnière de tête (7) comprend un élément anti-soulèvement (75) coaxial à la tige de tête supérieure (71), apte à empêcher la tige de tête inférieure (81) de glisser du logement de base (800).
9. Système de panneaux mobiles pliants (1) selon l'une des revendications 7 ou 8, dans lequel le corps inférieur (52), le corps supérieur (62), le corps de tête supérieur (72) et le corps de tête inférieur (82) ont sensiblement les mêmes caractéristiques, étant sensiblement identique.
10. Système de panneaux mobiles pliants (1) selon l'une des revendications précédentes, comprenant :
- un corps en forme de boîte (9), engagé dans au moins un bord (42a, 42b, 43a, 43b) d'au moins un panneau (4a, 4b) ;
 - au moins un, de préférence deux, éléments de recouvrement flexibles (10) qui s'étendent verticalement à partir dudit corps en forme de boîte (9) ; dans lequel, avec des panneaux (4a, 4b) alignés longitudinalement, ledit au moins un élément de recouvrement flexible (10) s'étend au moins partiellement en chevauchant un guide respectif (2, 3), dans lequel, par la rotation du panneau (4a, 4b), ledit au moins un élément de recouvrement flexible (10) se déforme élastiquement en contact avec ledit guide (2, 3).
11. Système de panneaux mobiles pliants (1) selon l'une des revendications précédentes, comprenant une pluralité de panneaux coulissants (4a) articulés mutuellement et coulissant le long de l'axe longitudinal (X-X).

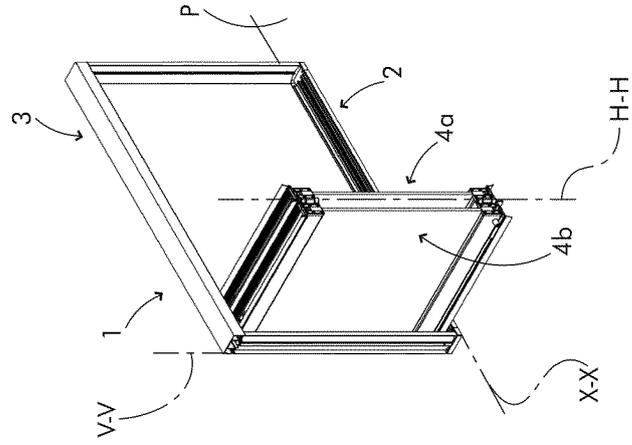


fig. 1b

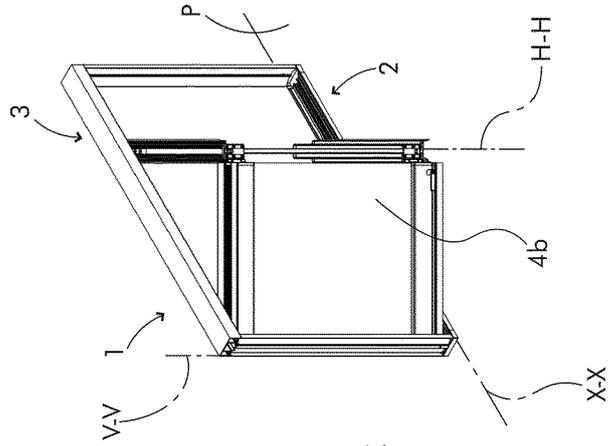


fig. 1a

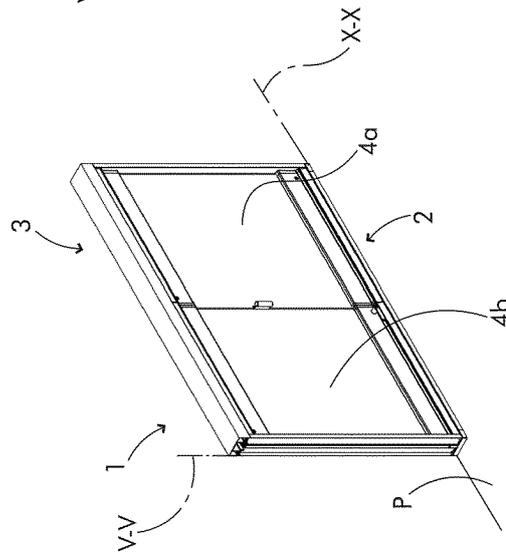


fig. 1

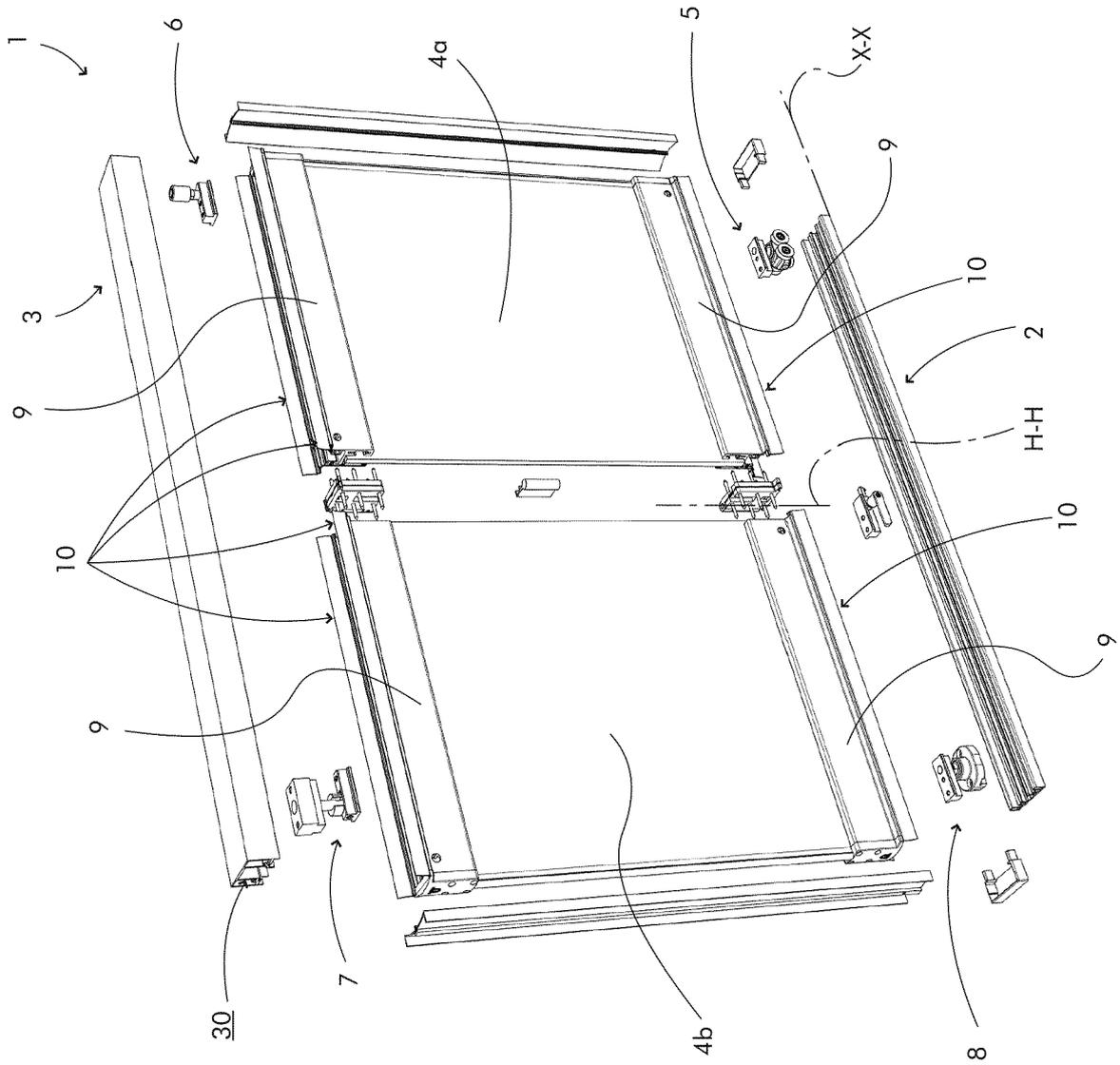
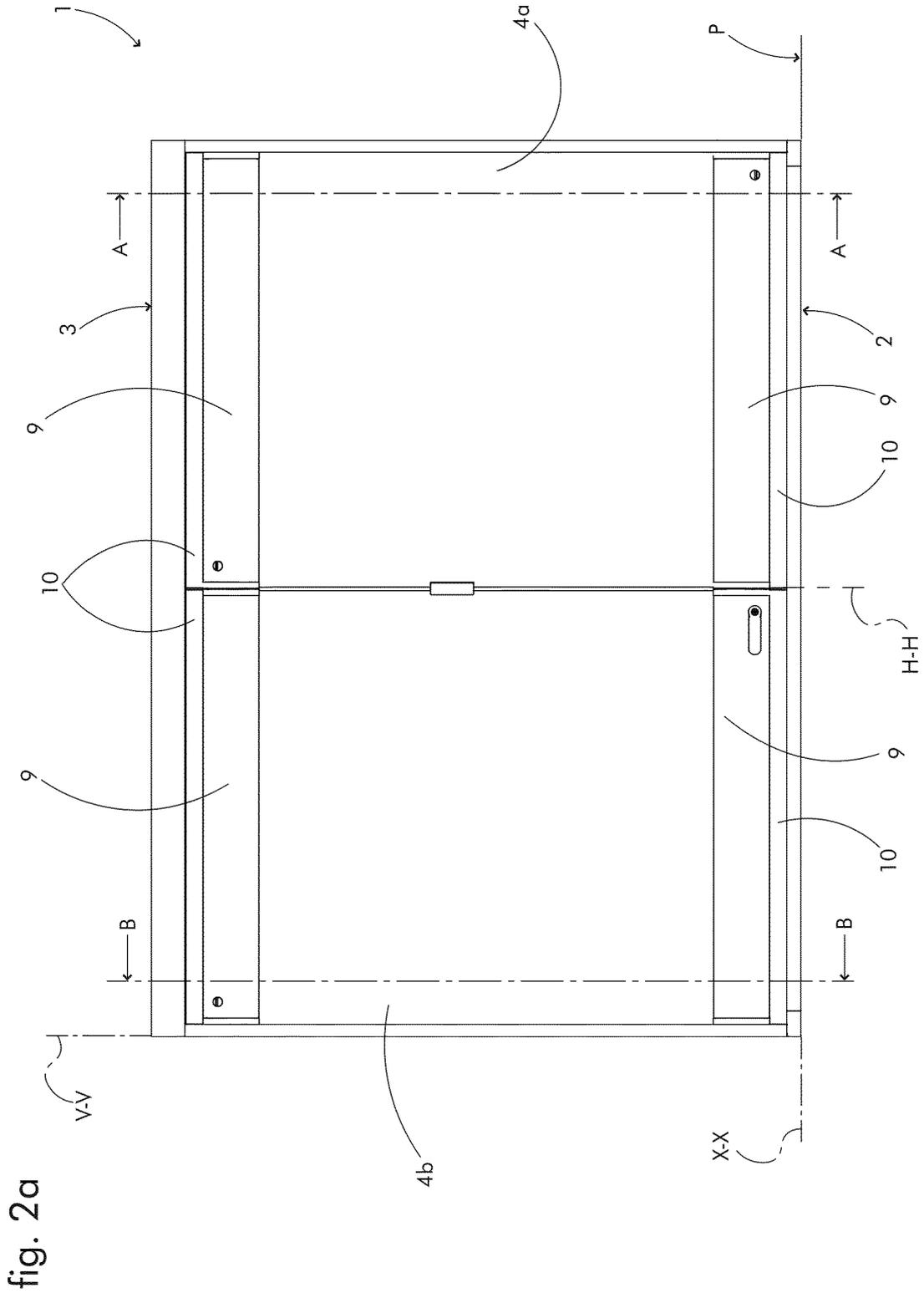


fig. 2



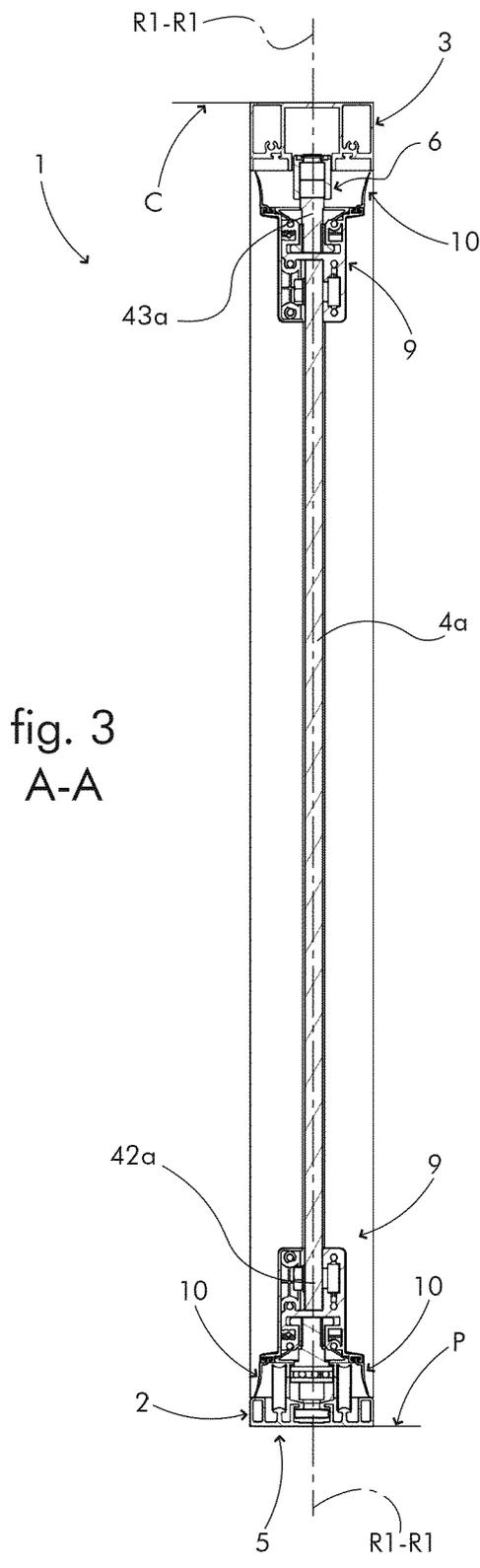


fig. 3
A-A

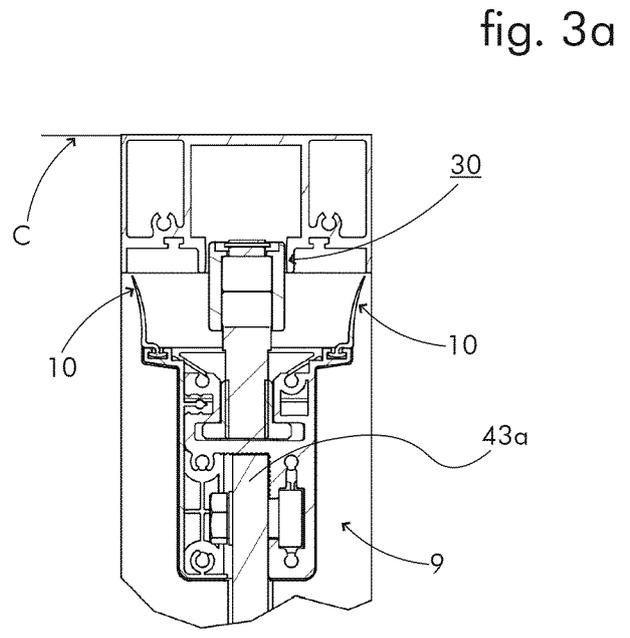


fig. 3a

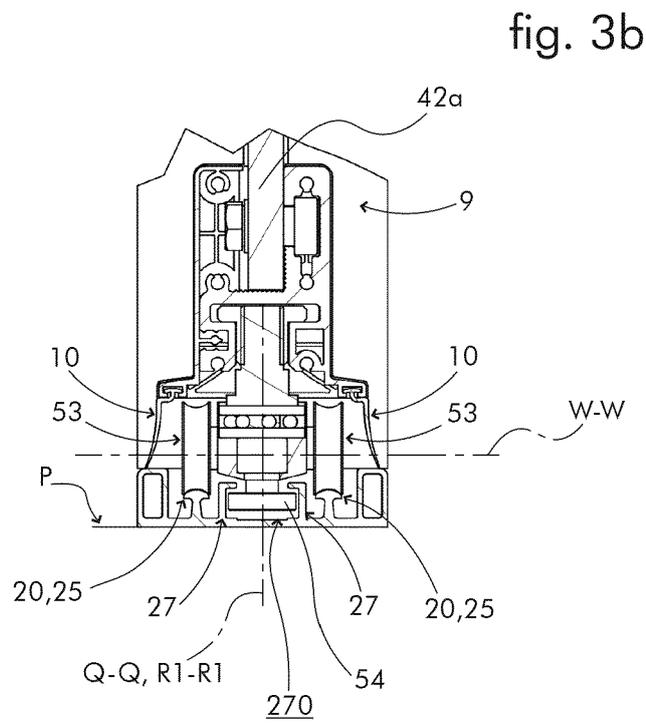


fig. 3b

fig. 4a

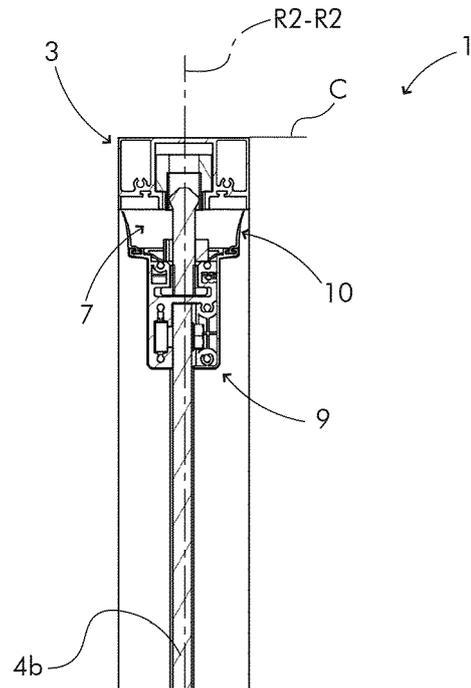
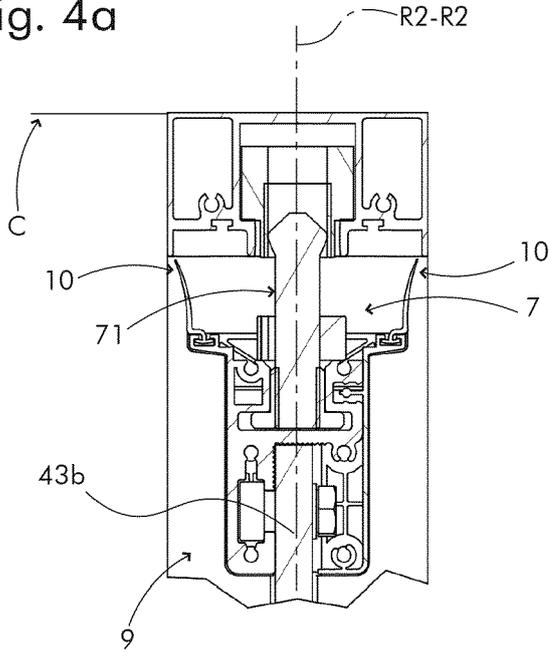


fig. 4
B-B

fig. 4b

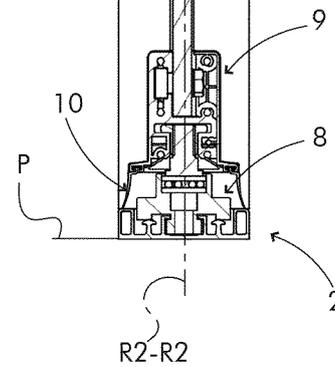
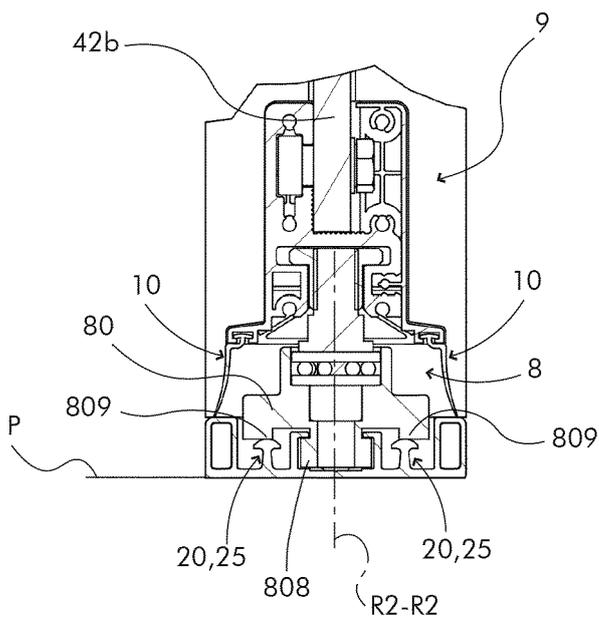


fig. 5

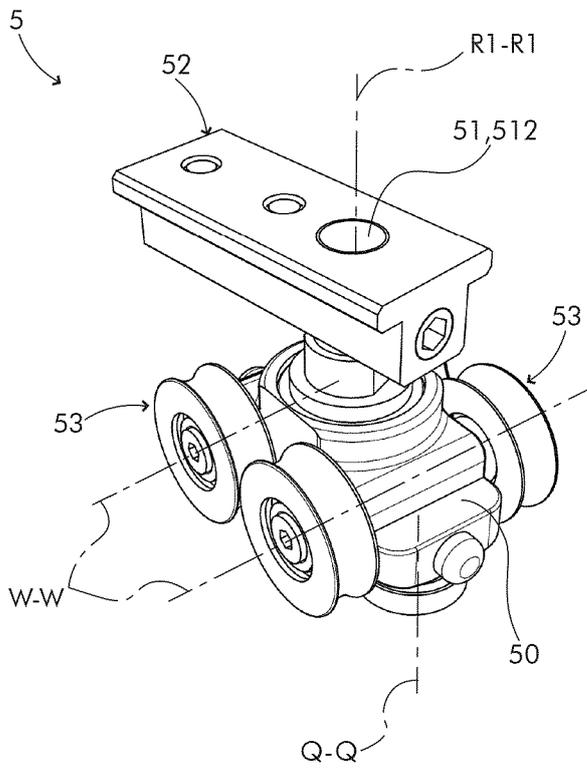


fig. 5a

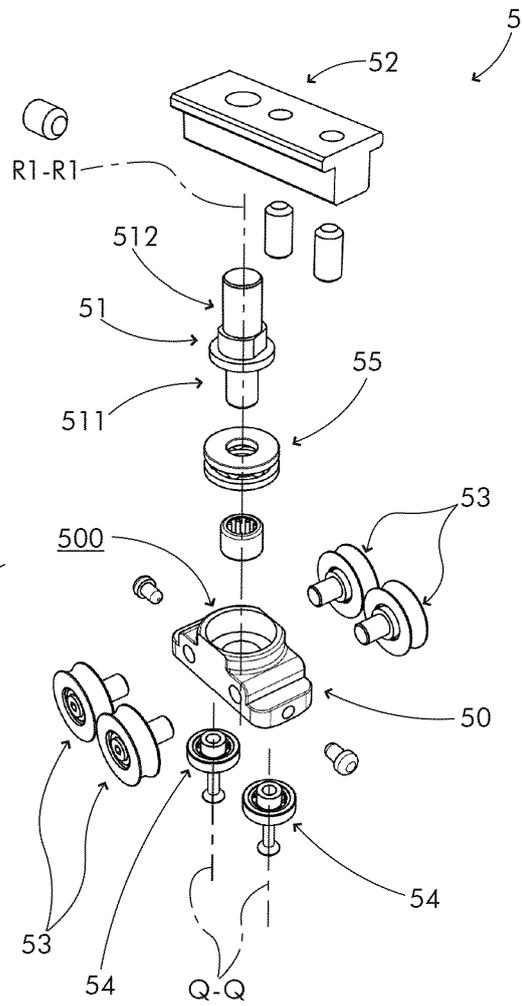


fig. 6

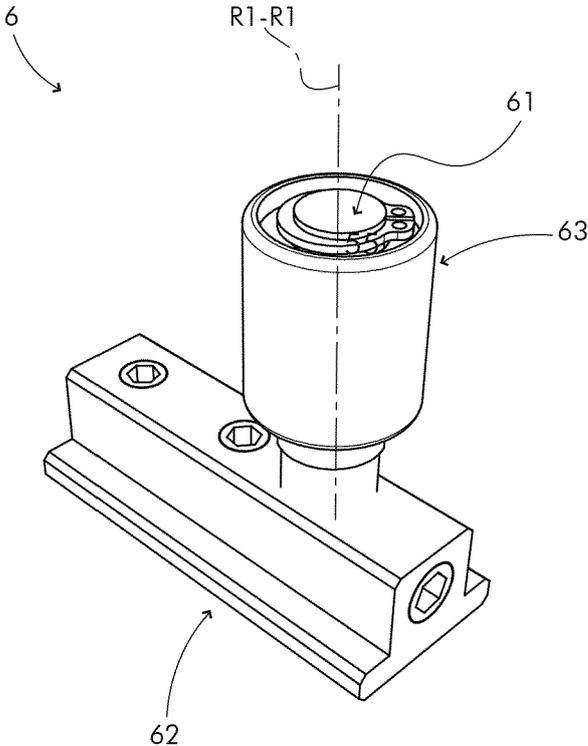


fig. 6a

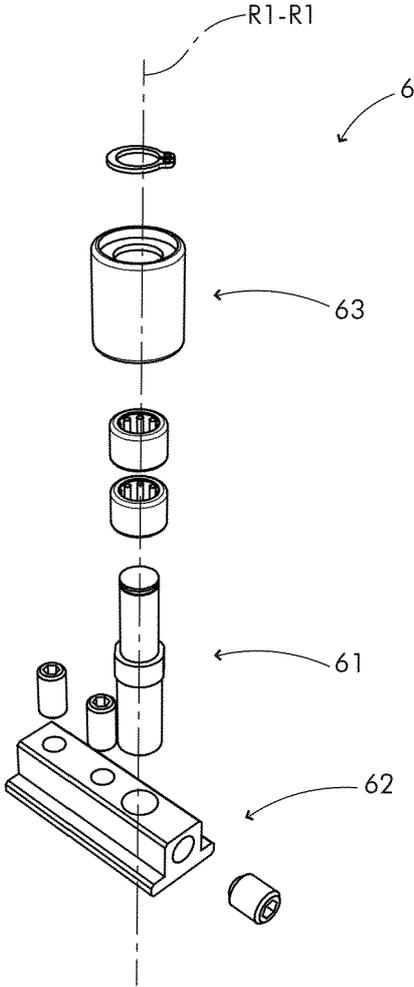


fig. 7

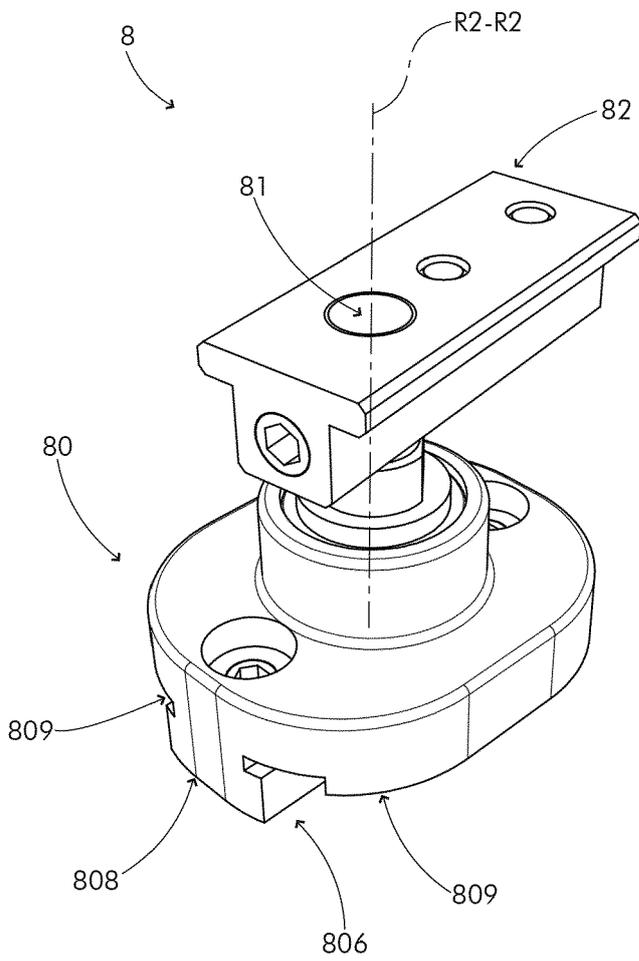


fig. 7a

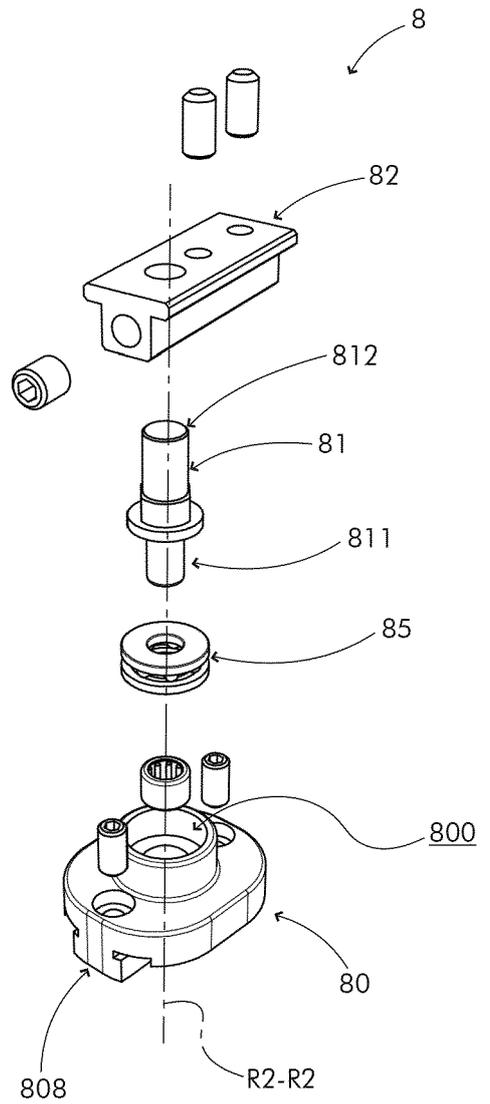


fig. 8

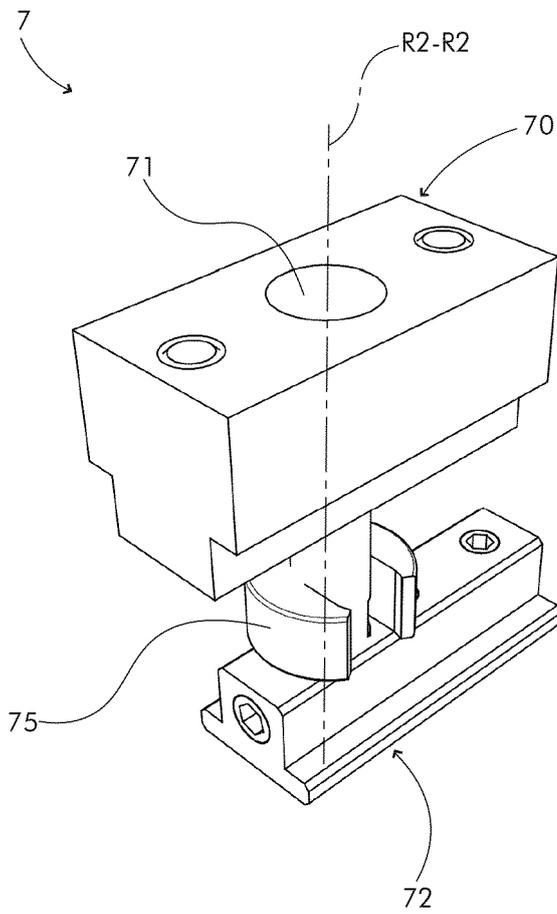
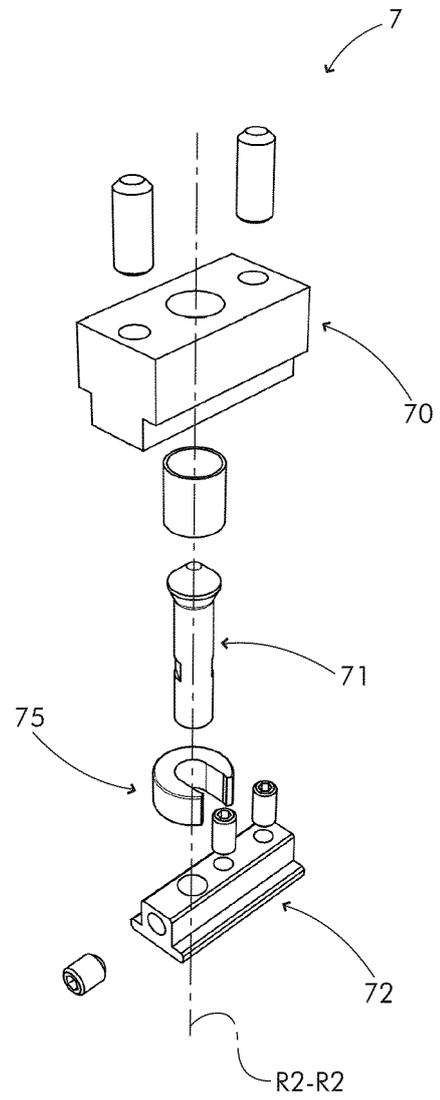


fig. 8a



REFERENCES CITED IN THE DESCRIPTION

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