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(54) **ANTIPANIC BREAK-OUT AND THERMAL BREAK SLIDING DOOR**

(57) The present invention relates to an antipanic break-out and thermal break sliding door comprising
- at least one wing (10) sliding and rotatable with respect to a frame (5) hanging from at least one carriage (24) by means of at least one joint (28) allowing the rotation of the wing with respect to the carriage;
characterised in that the wing (10) comprises a structure frame 12 subdivided into at least two parallel structure portions (12a, 12b), arranged to hold a panel (14) therebetween, and separated by a thermal break zone, wherein the two structure portions (12a, 12b) are rigidly joined to each other at least in the following manner:
- along the upper section of the wing (10) the joint (28) is above both structure portions (12a and 12b) and rigidly joins them together; the joint (28) rests on said structure portions (12a, 12b) with the interposition of at least one layer of thermally insulating material (62), which is crossed at one or more predetermined points by respective fastening elements (13).

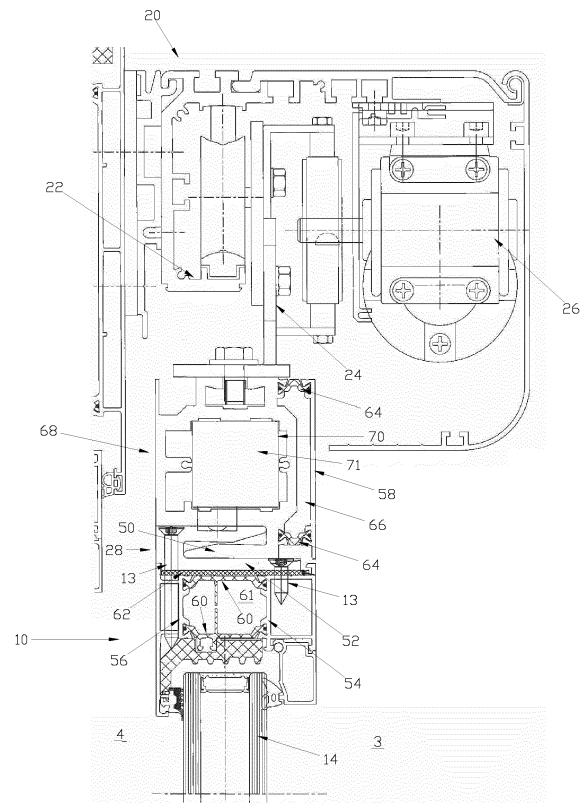


Fig. 4

Description

[0001] The present invention relates to an antipanic break-out and thermal break sliding door.

BACKGROUND ART

[0002] Antipanic break-out sliding doors are well-known in the field.

[0003] In order to obtain this feature, they possess two movements of the wings, a sliding one, usually automated, to be normally opened and closed, and a rotating one, to be extraordinarily opened by pushing in case of emergency.

[0004] However, they are not in general thermally efficient, i.e. they do not provide a high thermal insulation between the two rooms they separate. The reason is functional/structural, in fact it is very complex to combine insulation with the need for robustness required to withstand the weight of the sliding doors in both types of movement and their stresses, which could lead to serious deformations.

[0005] Thermal break frames are known in the field of hinge-opening doors and windows, however, they do not have the structural capacity required to withstand the antipanic breakout, as they simply couple two profiles, one intended to face the warm side of the frame and one the cold side, by the interposition of snap-fit thermal break elements. However, they are not made of metal, due to obvious conductivity reasons, but of polymeric material.

[0006] The general object of the present invention is to overcome all or some of the drawbacks of the prior art.

[0007] A preferred object of the present invention is to provide an antipanic break-out sliding door which also has high thermal insulation between the two rooms it separates.

[0008] A further preferred object is to provide an antipanic break-out and thermal break sliding door with enough structural strength as to maintain its functional integrity in the event of a breakout, as well as in the ordinary dynamic sliding use.

GENERAL INTRODUCTION

[0009] The present invention, according to a first general aspect thereof, relates to an antipanic break-out and thermal break sliding door comprising

- at least an outer frame (5);
- at least one carriage (24) sliding with respect to the outer frame (5);
- at least one wing (10) sliding and rotatable with respect to the outer frame (5) hanging from at least one carriage (24);
- the wing being hanging from at least one carriage (24) by means of at least one joint (28) which allows rotating the wing with respect to the carriage (thus achieving the antipanic break-out function);

characterized in that the wing (10) comprises a structure frame 12 subdivided into at least two parallel structure portions (12a, 12b), arranged to hold a panel (14) therebetween, preferably thermally insulating, such as a double glazing, a glass pane, an opaque panel or the like, where said structure portions (12a, 12b) face each other and are separated by a thermal break zone comprising at least one portion of thermally insulating material (60, 65), where the two structure portions (12a, 12b) are rigidly joined to each other at least in the following manner:

- along the upper section of the wing (10) the joint (28) is above both structure portions (12a and 12b) and rigidly joins them together; the joint (28) rests on said structure portions (12a, 12b) with the interposition of at least one layer of thermally insulating material (62), which is crossed at one or more predetermined points by respective fastening elements (13).

[0010] A thermal break and a high structural strength are thereby advantageously present at the same time.

[0011] According to some preferred embodiments increasing the above-mentioned advantage, the two structure portions (12a, 12b) are also rigidly joined to each other in the following manner:

- along a side section of the wing (10) at least one flange element (79) is present which supports the two structure portions (12a, 12b) with the interposition of at least one layer of thermally insulating material (80) and to which they are rigidly fastened at one or more predetermined points by respective fastening elements (13) (for example by means of screws; said flange being part of a rotation hinge (30a) of the wing (10) with respect to the carriage (24).

[0012] Preferably, the joint (28) comprises two complementary C-portions (50, 52) which can be engaged and disengaged by rotating the wing (10), where the lower C-portion (52) rigidly joins said structure portions (12a, 12b).

[0013] In such a case, preferably the upper C-portion (50) is rigidly fixed to the carriage and comprises a housing seat (68) of a part (71) of a rotation hinge (30a) of the wing with respect to the carriage (24).

[0014] Preferably said hinge part comprises a horizontal section (71) of an L-junction element (70), where the vertical section (72) of said element acts as a rotating pin or pin seat of the hinge (30a).

[0015] More preferably, the vertical section (72) and the flange (79) are both part of a same rotation hinge (30a) of the wing (10). The structure link is thereby particularly strong, allowing both the sliding and rotational movement of the wing, preserving it from deformation by breakout stresses and not interfering with the thermal

break between the structure portions of the frame.

[0016] For example, the vertical section (72) and the flange (79) comprise a pin and a respective seat thereof belonging to said rotation hinge (30a).

[0017] According to a variant provided, said hinge comprises two parts movable with respect to each other in a scissors-like manner, where one part is said part housed in the C-upper portion (50) and the other part is housed in the lower C-portion (52).

[0018] According to some preferred embodiments, the wing (10) comprises at least one shielding element (58) separating the joint (28) from one of the two rooms divided by the wing, where the shielding element (58) is spaced from the joint (28) by the interposition of at least a portion of thermally insulating material (64).

[0019] In such a case, preferably the joint (28) opens on one of its sides by rotation and said screening element (28) faces the opposite side.

[0020] Preferably, the shielding element (58) is also spaced from the joint (28) by the interposition of a thermally insulating chamber, such as an air chamber or containing a thermally insulating material, such as polyurethane foam.

[0021] According to some preferred embodiments, said thermal break zone also comprises a thermally insulating chamber, e.g. an air chamber or a chamber containing a thermally insulating material, e.g. polyurethane foam.

[0022] According to some preferred embodiments, at least one portion of thermally insulating material (60, 65) is engaged to the two structure portions (12a, 12b) to elastically join them to each other.

DETAILED DESCRIPTION

[0023] Further characteristics and advantages of the present invention will become clearer from the following detailed description of the preferred embodiments thereof, with reference to the appended drawings and provided by way of indicative and non-limiting example. In such drawings:

- the sequence of figures 1a to 1d shows an antipanic break-out sliding door according to the present invention in a closed configuration, in an open sliding configuration, in a broken configuration from a closed configuration and in a broken configuration from an open configuration respectively; the views are frontal;
- the sequence of figures 2a to 2d corresponds to the previous ones in an elevation view;
- figure 3 schematically shows an exploded view of a door according to the previous figures, where only one sliding wing is shown for ease of simplicity;
- figure 4 shows a section according to the vertical plane IV of the upper area of the door of the previous figures;
- figure 5 shows a section according to the horizontal

plane V of a side zone of the door of the previous figures;

- figure 6 shows a variant in which the rotation junction is scissors-like instead of L-shaped.

[0024] For the purposes of the present invention, a sliding door generally means a door comprising a user passageway and at least one wing sliding between a closed and an open configuration of the passageway to define a separation between two rooms 3 and 4. The two rooms communicate with each other through the passageway in the open configuration, and are separated in the closed configuration. The wing slides along a line separating the two rooms.

[0025] Generally, such door is an "antipanic break-out" door, as the at least one wing not only slides but is also able to be opened by being pushed towards at least one of the two rooms.

[0026] Still generally, such door is a "thermal break" door in that in the closed configuration it provides high thermal insulation between the two rooms, e.g. a predetermined minimum insulation.

[0027] With reference to figures 1 and 2, an antipanic break-out and thermal break sliding door according to the present invention is shown, indicated as a whole by reference number 1.

[0028] The door comprises an outer frame 5, intended to act as a frame for a room in a wall of a building, where wall is a general definition including for example outer or inner masonry walls, shop windows, facades. The door also includes one or more wings 10 sliding with respect thereto, in the illustrated example two of them are shown opening and closing as opposing to each other. In addition to the sliding wings 10, one or more wings 11 can be provided which do not slide in relation to the frame 5 and are therefore called infill wings.

[0029] The sequences in figures 1 and 2 basically show the movements of the wings in relation to the frame which allow to achieve the possible configurations. Said movements are, in particular, the sliding movements of the wings 10 indicated by the arrows S, and the rotation movements indicated by the arrows W, which are typical of both the sliding wings 10 and preferably also of the infill wings 11.

[0030] It must be cleared that the door according to the present invention comprises the breaking rotation W of at least the sliding wings 10, which may also be the only existing ones. If the infill wings 11 are present, they are called semi-fixed panels in case they also have a break-out rotation, otherwise, in case they do not even have such rotation and are therefore totally fixed, they are called fixed wings.

[0031] As will be better seen in the exploded view of figure 3, the movements of at least the sliding wings 10 are made possible respectively by a sliding system 20 arranged in the upper part of the door and by at least a plurality of antipanic rotation hinges 30a and 30b.

[0032] The sliding system 20 is generally arranged to

allow the sliding wing 10 to slide in a horizontal direction relative to the outer frame 5.

[0033] Each hinge 30a, 30b generally defines an axis of vertical rotation X of a respective sliding wing 10, whereby the axis is sliding integral with the wing with respect to the outer frame 5.

[0034] Each sliding wing 10 comprises a structure frame 12 and at least one thermally insulating panel 14, for example a double glazing or glass pane or the like, supported by the structure frame 12.

[0035] The structure frame 12 of the wing 10 is generally divided into two parallel structure portions 12a and 12b, facing one of the two rooms 3 and 4 respectively and separated from each other by a thermal break zone comprising at least a portion of thermally insulating material 60, 65, and preferably also a thermally insulating chamber 61, 69, for example an air chamber or containing a thermally insulating material, for example polyurethane foam. Preferably at least one of the portions of thermally insulating material 60, 65, preferably both are attached to the two structure portions 12a, 12b to join them together as well as insulate them. In case the chamber is present, the perimeter thereof is defined by said thermally insulating portions 60, 65 and said panel and said structure portions 12a, 12b.

[0036] The two structure portions 12a and 12b are arranged to hold a panel therebetween, preferably a double glazing 14, for example thermally insulating, a glass pane, an opaque panel, or the like.

[0037] With reference to figure 4, the sliding system 20 and the section of the upper part of the sliding wing 10 can be seen in detail.

[0038] The sliding system 20 comprises a linear guide 22 belonging to the outer frame 5, in relation to which a carriage 24 slides, preferably driven by a motor 26.

[0039] The carriage 24 supports the sliding wing 10 hanging below it by means of an antipanic break-out joint 28 that can be dismantled to allow break-out rotation about the axis X.

[0040] The joint comprises a first C-portion 50, known as "fixed", integral with the carriage 24 and a second C-portion 52, known as "mobile", complementary to the first one and integral with the wing. The two portions engage and disengage from each other by means of rotation W. Their orientation is such that when they are engaged, the portion 50 that is integral with the carriage holds against gravity the portion 52 that is integral with the wing, and thus supports the weight of the latter. It is possible to provide a device preventing accidental release 59 (figure 3), for example a pusher which provides a preload to be overcome for release, for example the pusher is integral with one of the two C-portions 50, 52 and is elastically pushed against the other.

[0041] The two C-portions preferably comprise two C-section profile elements, for example bars, parallel to each other and preferably extending substantially along the entire length of the upper section of the frame 12 of the wing 10.

[0042] The joint 28 should preferably be centred in relation to the centre of gravity of the wing 10.

[0043] The movable C-portion 52 is above both structure portions 12a and 12b of the frame 12 and rigidly joins them together. The movable C-portion 52 rests on the structure portions 12a and 12b by the interposition of at least one layer of thermally insulating material 62, preferably crossed at one or more predetermined points by fastening elements, for example screws 13.

[0044] In the example shown, the two structure portions 12a and 12b each comprise a structure profile element 54 and 56, for example a bar, extending substantially over the entire upper section of the wing 10.

[0045] In general, the two structure portions 12a and 12b are herein spaced by two portions of thermally insulating material 60, for example in the form of two profile elements, arranged to enclose an air chamber 61 between them and between the structure portions 12a and 12b. Said two thermally insulated portions are preferably engaged to respective seats of the structure portions 12a and 12b to join them together.

[0046] The C-portion 50 that is integral with the carriage is separated from one of the two rooms 3, 4 by at least one shielding element 58 from which it is spaced by the interposition of at least one portion of thermally insulating material 64. Preferably, an empty chamber 66 is preferably present between the shielding element 58 and the C-portion 50.

[0047] In general, it is preferable that the shielding element 58 extends vertically to shield from one of the two rooms 3 and 4 substantially all the joint 28, or a major part thereof, from which it is separated at least by means of the thermally insulating material 64. In such case, the screening element 58 is preferably placed on the side of the joint opposite the one containing the separation path of the two C-portions 50 and 52, so it does not hinder the rotation of the wing.

[0048] The upper part 68 of the C-shaped portion 50 connected to the carriage preferably comprises a hollow section wherein the horizontal section 71 of an L-shaped rotation joint 70, which also acts as a reinforcing element, is housed, the vertical section 72 of which serves as a pin for the rotation W of the wing 10.

[0049] As visible in figure 5, the pin 72 is rotatably coupled in a corresponding seat 74 integral with the wing. The hinge 30a comprises said pin 72 and said seat 74.

[0050] A side section of the wing frame comprises two parallel structure elements 77 and 78, for example two profile bars, arranged to hold the double-glazing 14 between them. They do not touch each other directly but are separated by at least a portion of thermally insulating material 75.

[0051] The two structure elements 77 and 78 are held in a mutual position with each other by at least one flange structure element 79, which supports them with the interposition of at least one layer of thermally insulating material 80 and to which they are joined, for example, by means of screws. Two elements 79 are shown in the

figure, but it is not excluded that it is a single piece extending along the whole side of the wing corresponding to the break-out hinges 30a, 30b.

[0052] In general, the two structure portions 12a and 12b are herein spaced by two portions of thermally insulating material 65, for example in the form of two profile elements, arranged to enclose an air chamber 69 between them and between the structure portions 12a and 12b.

[0053] Said two thermally insulating portions 65 are preferably engaged into respective seats of the structure portions 12a and 12b to join them together.

[0054] The flange structure element 79 preferably also houses the seat 74 of the pin 72, and still more preferably extends substantially over the entire height of one side of the wing 10 on which the hinges 30a and 30b are made.

[0055] The structure flange element 79, as visible in figure 5, can only be in contact with one of the two rooms 3 and 4, as it is shielded with respect to the other by a fixed wing 11 and by the respective gaskets between the fixed wing 11 and the sliding wing 10, and is therefore obviously thermally insulated.

[0056] Referring to Figure 3, the hinge 30b preferably comprises a pin 85 sliding by means of a sliding block 89 in a guide 88 of the outer frame 5 placed on the floor. For example, the pin 85 is housed in a seat 74b integral with the wing, obtained for example in a flange 79b or in the flange 79 itself if it is extended to the hinge 30b.

[0057] According to preferred examples, the two structure portions 12a and 12b of the wing frame 10, the C-portions 50 and 52, the shielding portion 58 and the flange 79, are made of metal material, for example aluminium alloy and/or steel, being for example made of profiled bars, while the thermally insulating material is in general a polymeric material, more insulating than metal, being for example polyamide.

[0058] In use, the two rooms 3 and 4 are thermally shielded from each other by the sliding wing 10 due to the thermal separation between the two structure elements 12a and 12b of the frame 12 and the separation between the C-joint 28 and its shielding element 58.

[0059] With reference to figure 6 a variant of a sliding door is shown where elements identical to the previous variant are referred to with the same reference numbers. The door of figure 6 differs from that of the preceding figures at least in that the junction element 70 instead of being L-shaped comprises two scissors-like articulated elements 71a 71b by means of the operative interposition of a pin 72 between them, and is indicated herein by number 70b. The articulated elements 71a and 71b are housed in respective housing seats 68a, 68b of the C-portions 50, 52.

GENERAL INTERPRETATION OF TERMS

[0060] In understanding the object of the present invention, the term "comprising" and its derivatives, as used herein, are intended as open-ended terms that

specify the presence of declared characteristics, elements, components, groups, integers and/or steps, but do not exclude the presence of other undeclared characteristics, elements, components, groups, integers and/or steps. The above also applies to words that have similar meanings such as the terms "comprised", "have" and their derivatives. Furthermore, the terms "part", "section", "portion", "member" or "element" when used in the singular can have the double meaning of a single part or a plurality of parts. As used herein to describe the above executive embodiment(s), the following directional terms "forward", "backward", "above", "under", "vertical", "horizontal", "below" and "transverse", as well as any other similar directional term, refers to the embodiment described in the operating position. Finally, terms of degree such as "substantially", "about" and "approximately" as used herein are intended as a reasonable amount of deviation of the modified term such that the final result is not significantly changed.

[0061] While only selected embodiments have been chosen to illustrate the present invention, it will be apparent from this description to those skilled in the art that various modifications and variations can be made without departing from the scope of the invention as defined in the appended claims. For example, the sizes, shape, position or orientation of the various components can be modified as needed and/or desired. The components shown which are directly connected or in contact with each other can have intermediate structures arranged between them. The functions of one element can be performed by two and vice versa. The structures and functions of one embodiment can be adopted in another embodiment. All the advantages of a particular embodiment do not necessarily have to be present at the same time. Any characteristic that is original compared to the prior art, alone or in combination with other characteristics, should also be considered a separate description of further inventions by the applicant, including the structural and/or functional concepts embodied by such characteristics. Therefore, the foregoing descriptions of the embodiments according to the present invention are provided for illustrative purposes only and not for the purpose of limiting the invention as defined by the appended claims and their equivalents.

Claims

1. Antipanic break-out and thermal break sliding door comprising
 - at least an outer frame (5);
 - at least one carriage (24) sliding with respect to the outer frame (5);
 - at least one wing (10) sliding and rotatable with respect to the outer frame (5) hanging from at least one carriage (24);
 - the wing being hanging from the at least one

- carriage (24) by means of at least one joint (28) that allows the rotation of the wing with respect to the carriage;
characterised in that the wing (10) comprises a structure frame 12 subdivided into at least two parallel structure portions (12a, 12b) arranged to hold a panel (14) therebetween, where said structure portions (12a, 12b) are facing each other and are separated by a thermal break zone comprising at least one portion of thermally insulating material (60, 65), where the two structure portions (12a, 12b) are rigidly joined to each other at least in the following manner:
 - along the upper section of the wing (10) the joint (28) is above both structure portions (12a and 12b) and rigidly joins them together; the joint (28) rests on said structure portions (12a, 12b) with the interposition of at least one layer of thermally insulating material (62), which is crossed at one or more predetermined points by respective fastening elements (13).
2. Door according to claim 1, **characterised in that** the two structure portions (12a, 12b) are rigidly joined to each other also in the following manner:
 - along a side section of the wing (10) at least one flange element (79) is present which supports the two structure portions (12a, 12b) with the interposition of at least one layer of thermally insulating material (80) and to which they are rigidly fastened at one or more predetermined points by respective fastening elements (13); said flange being part of a rotation hinge (30a) of the wing (10) with respect to the carriage (24).
3. Door according to any one of the preceding claims, **characterised in that** the joint (28) comprises two complementary C-portions (50, 52) which are engageable and disengageable by rotating the door (10), where the lower C-portion (52) rigidly joins said structure portions (12a, 12b).
4. Door according to claim 3, **characterised in that** the upper C-portion (50) is rigidly fixed to the carriage and comprises a housing seat (68, 68a) of a part (71, 71a) of a rotation hinge (30a) of the wing with respect to the carriage (24).
5. Door according to claim 4, **characterised in that** said hinge part comprises a horizontal section (71) of an L-junction element (70), where the vertical section (72) of said element acts as a rotating pin or pin seat of the hinge (30a).
6. Door according to claim 5 when dependent on claim 2 **characterised in that** the vertical section (72) and the flange (79) comprise a pin and a respective seat thereof belonging to said rotation hinge (30a).
7. Door according to claim 4, **characterized in that** said hinge comprises two parts (71a, 71b) movable with respect to each other to form a scissors-like junction (70b), where one part is housed in the upper C-portion (50) and the other part is housed in the lower C-portion (52).
8. Door according to any one of the preceding claims, **characterized in that** it comprises at least one shielding element (58) separating the joint (28) from one of the two rooms divided by the wing, where the shielding element (58) is spaced from the joint (28) by the interposition of at least one portion of thermally insulating material (64).
9. Door according to claim 8, **characterised in that** the joint (28) opens on one side thereof by rotation and said shielding element (28) is facing the opposite side.
10. Door according to claim 8 or 9, **characterised in that** the shielding element (58) is spaced from the joint (28) also by the interposition of a thermally insulating chamber.
11. Door according to any one of the preceding claims, **characterised in that** said thermal break zone also comprises a thermally insulating chamber (66, 69).
12. Door according to any one of the preceding claims, **characterised in that** the at least one portion of thermally insulating material (60, 65) is engaged to the two structure portions (12a, 12b) to elastically join them to each other.

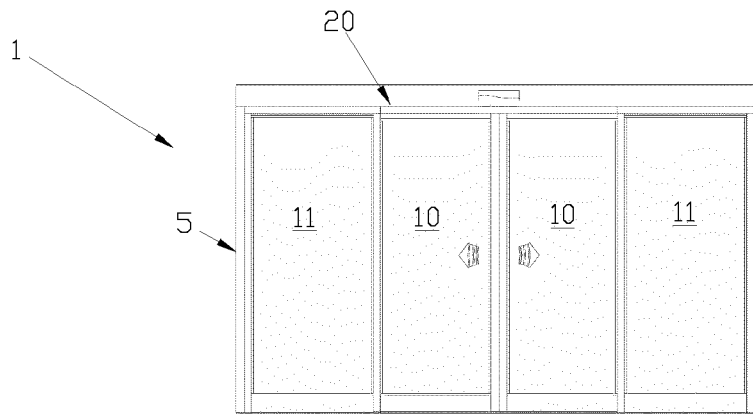


Fig. 1a

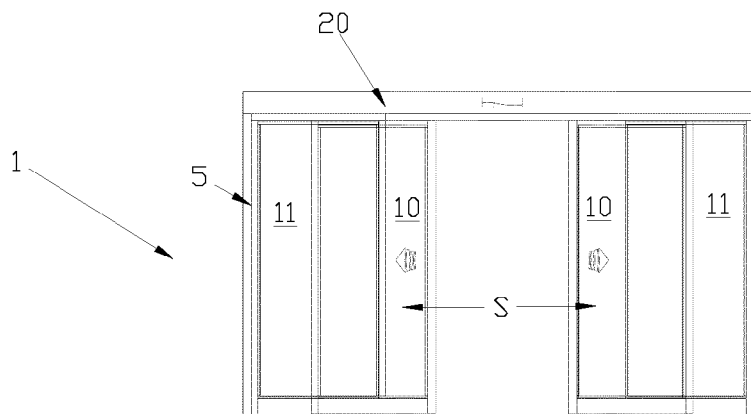


Fig. 1b

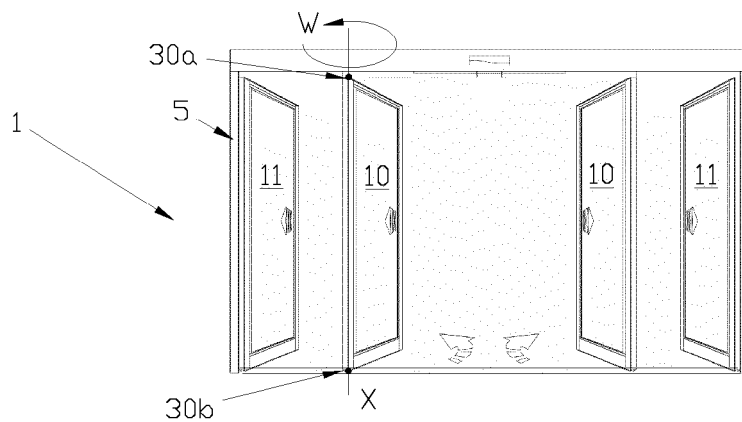


Fig. 1c

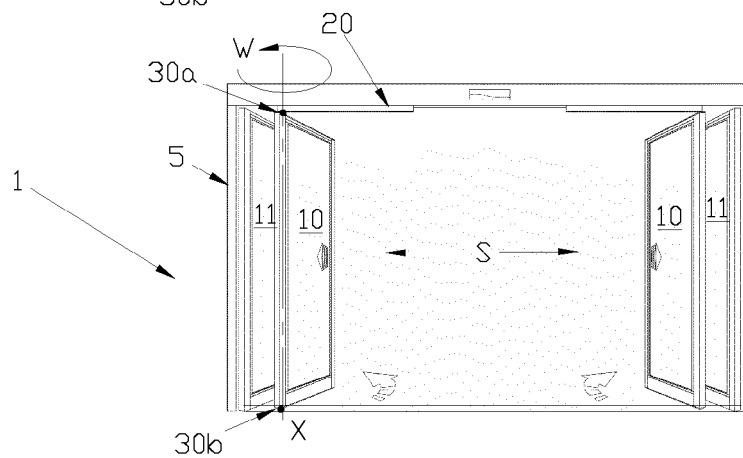


Fig. 1d

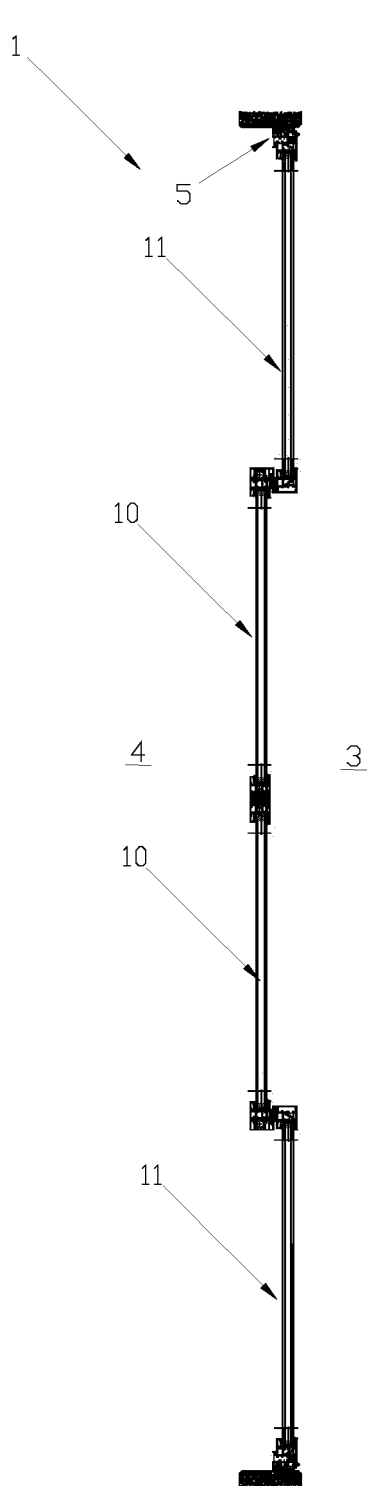


Fig. 2a

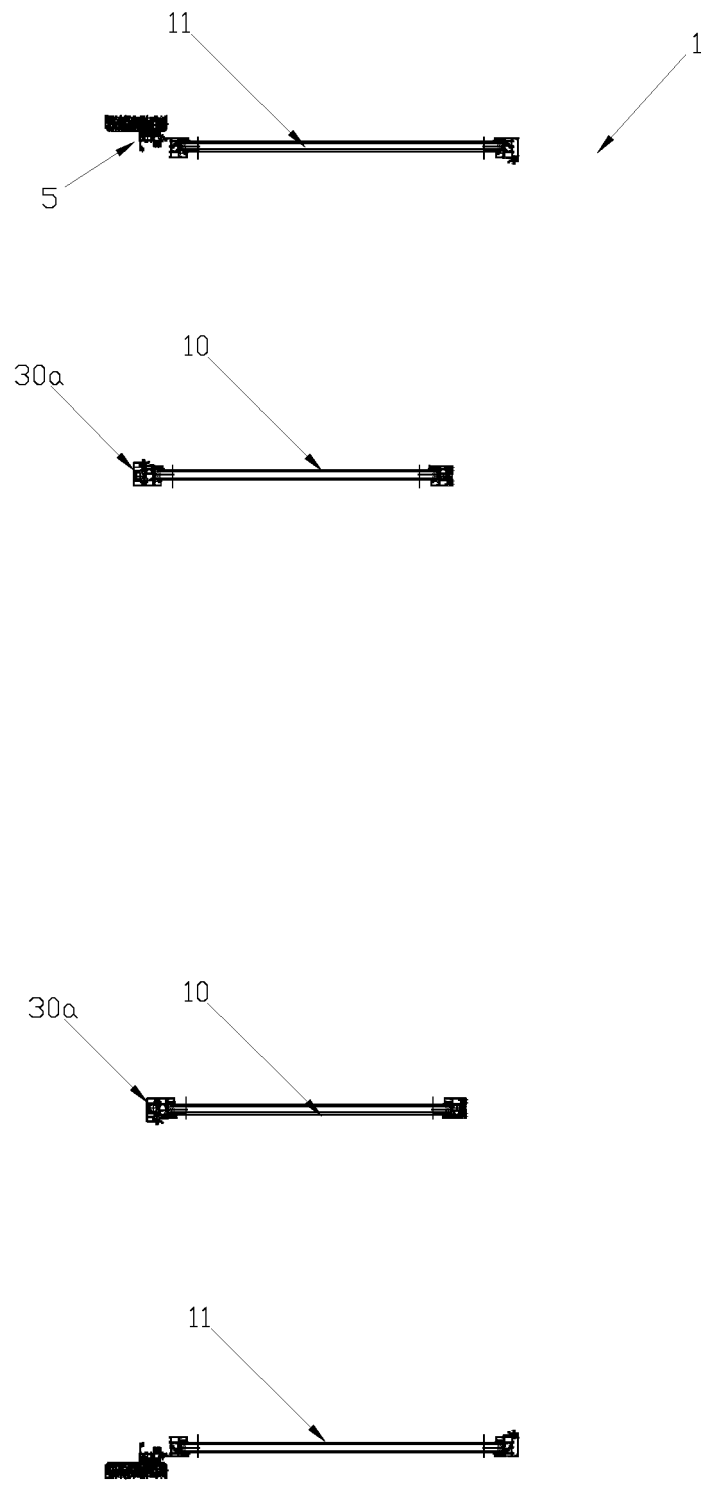
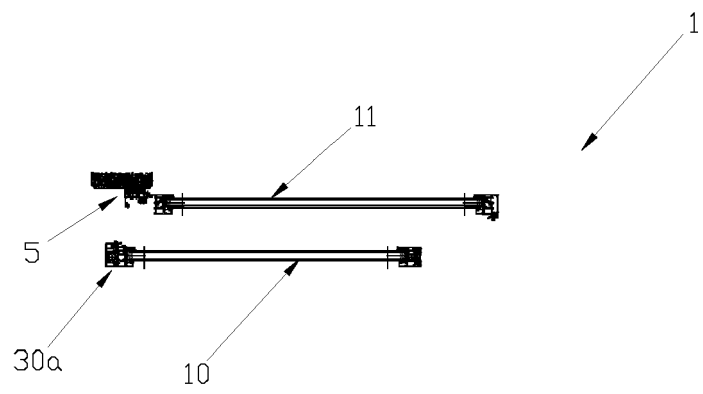
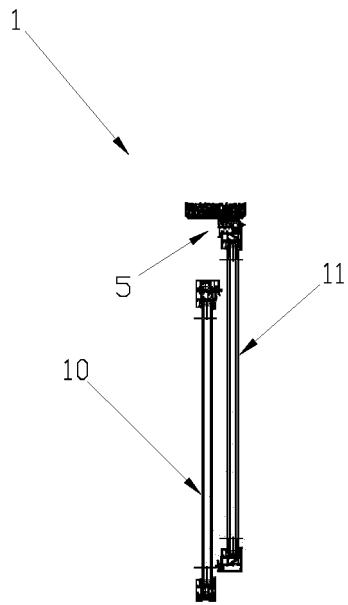


Fig. 2b



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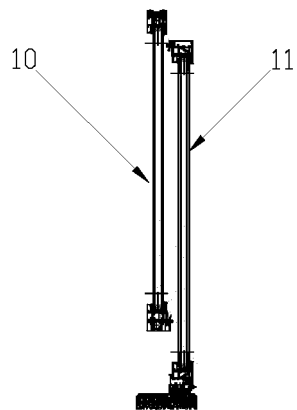


Fig. 2c

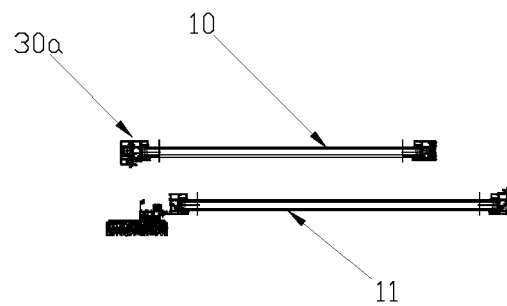


Fig. 2d

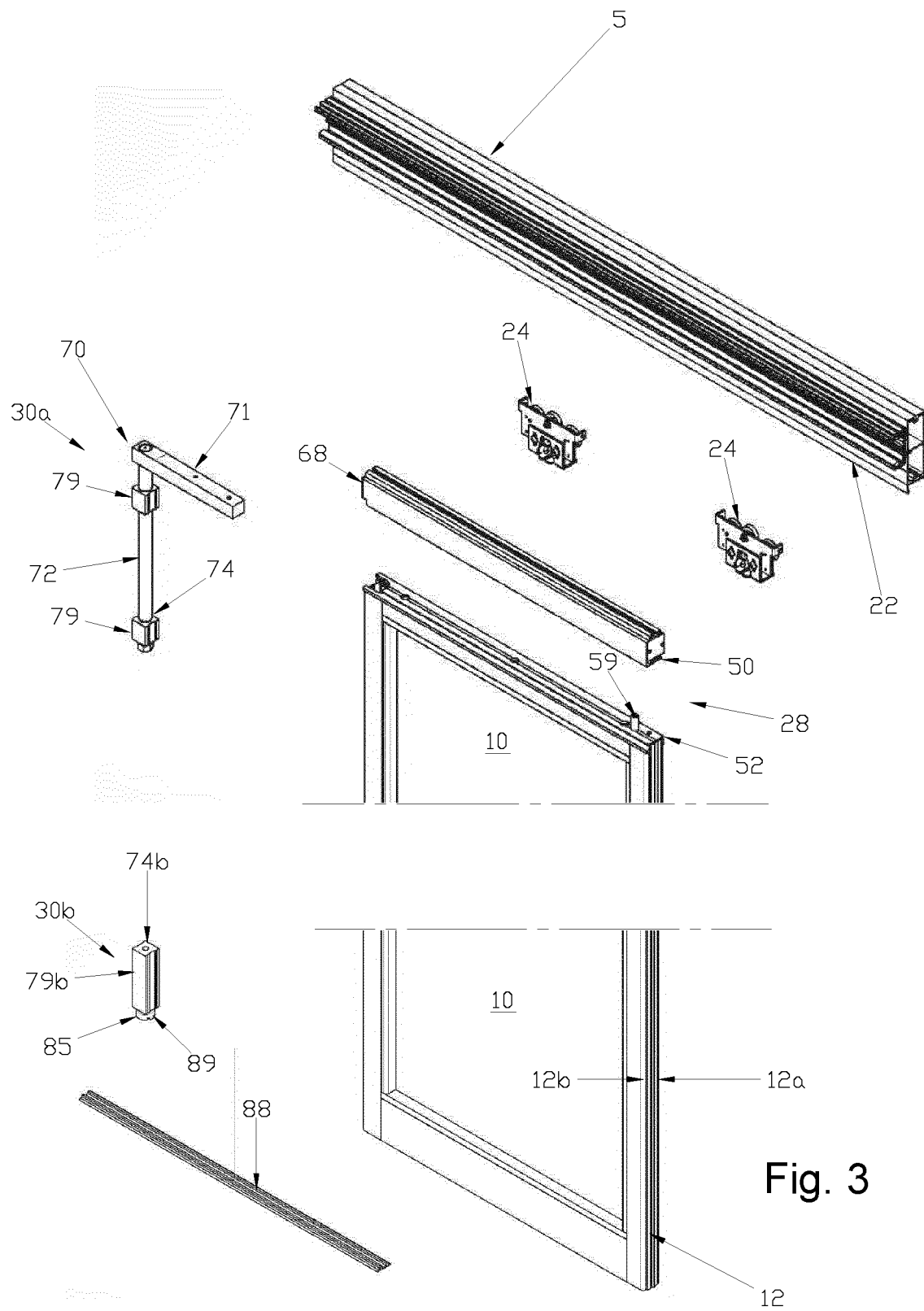


Fig. 3

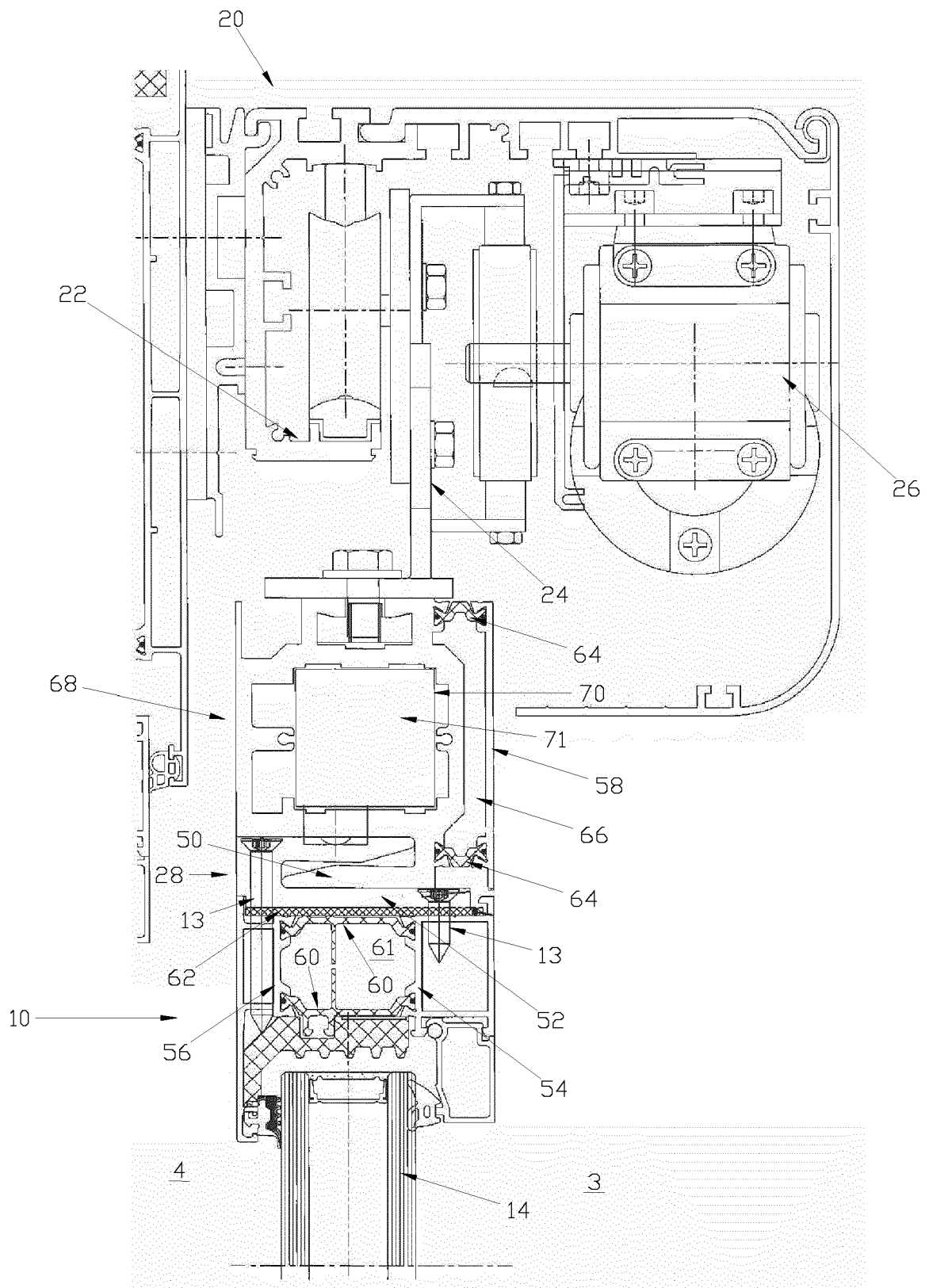


Fig. 4

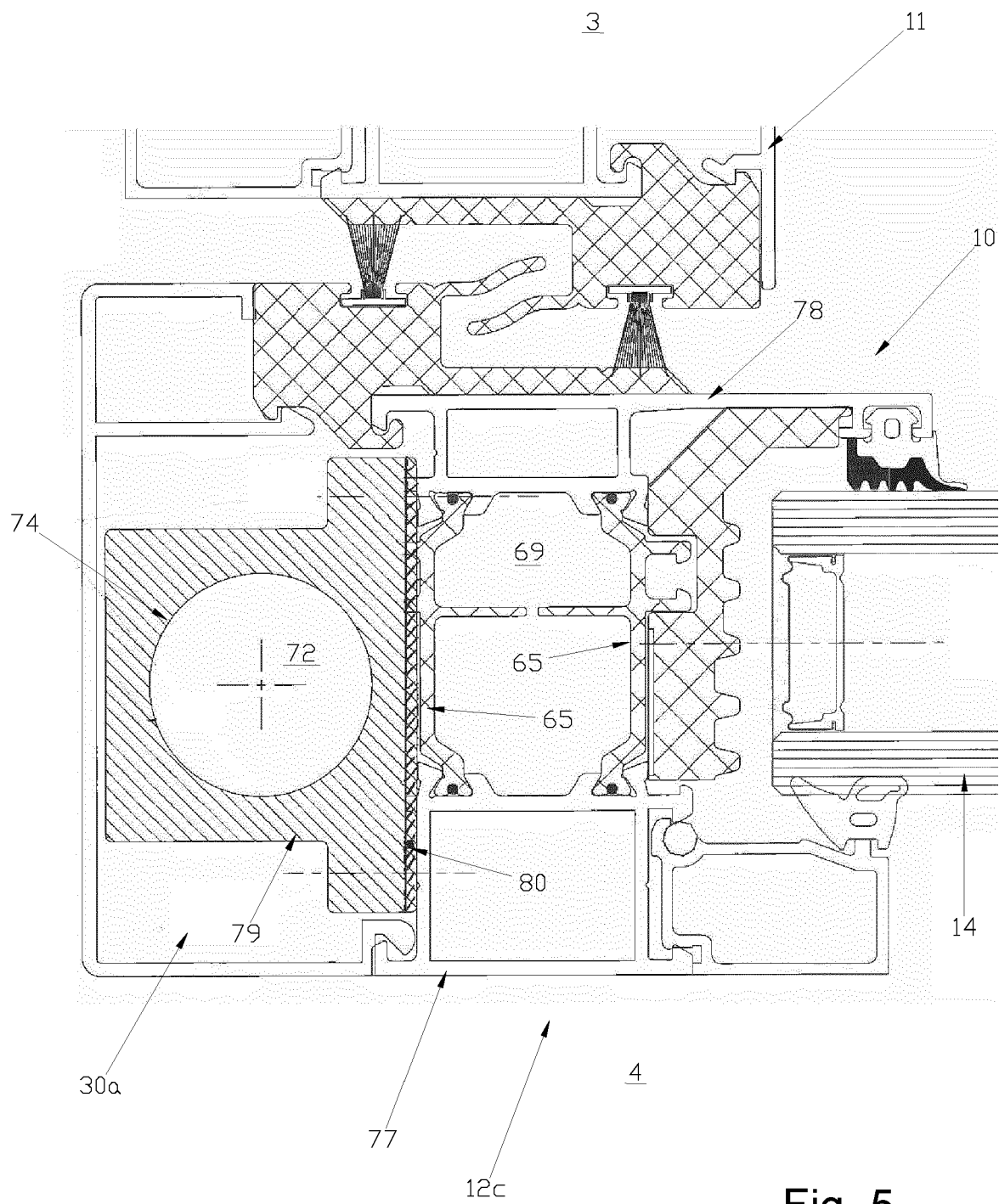


Fig. 5

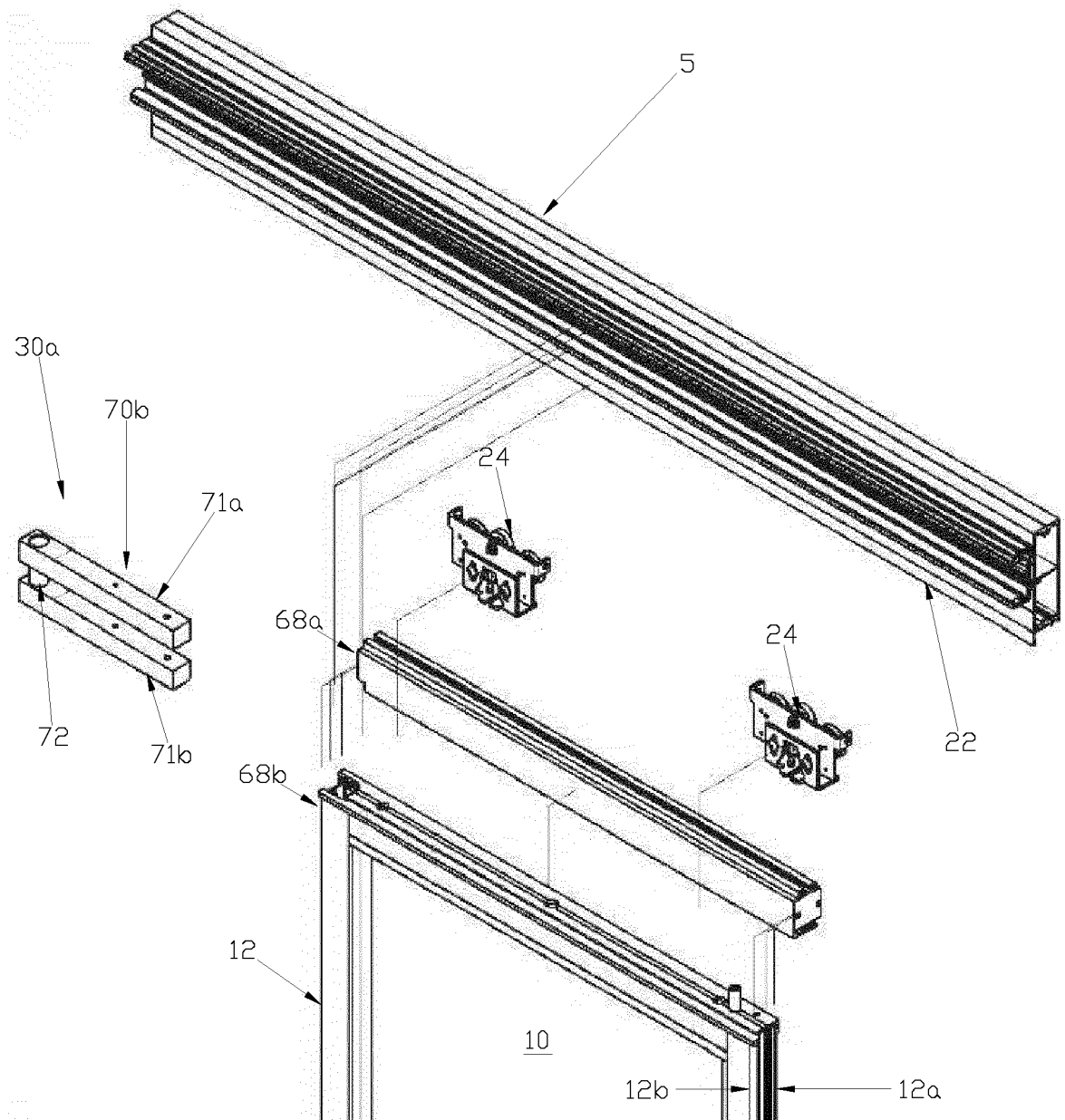


Fig. 6



EUROPEAN SEARCH REPORT

Application Number

EP 22 15 0336

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EPO FORM 1503 03:82 (P04C01)

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
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