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(54) Folding closure device

(57) A folding closure device is fit to be associated to the edges of an opening or passage and comprises at least a plurality of elongated elements (2).

Each elongated element (2) has at least a longitudinal side (5, 7) rotatingly connected by hinge means (3, 4) to a longitudinal side (5, 7) of an adjacent elongated element (2).

Said elongated elements (2) are movable between an opening condition of the passage, in which said elements (2) are, or are almost, mutual faced and a closing condition of said passage in which the elements (2) are coplanar or almost coplanar.

A longitudinal sliding side (5) of each elongated element (2) is associated in sliding manner to at least a guiding means (6).

The rotation axes of the hinge means (3) of the longitudinal sliding sides (5) of the elongated elements (2) define a respective fixed geometric plane and the rotation axes of the hinge means (4) of opposite longitudinal sides (7) of said elements (2) define a movable geometric plane more distanced from the at least a guiding means (6) in respect to the fixed geometric plane in any condition, also in closing condition, of the device (1).

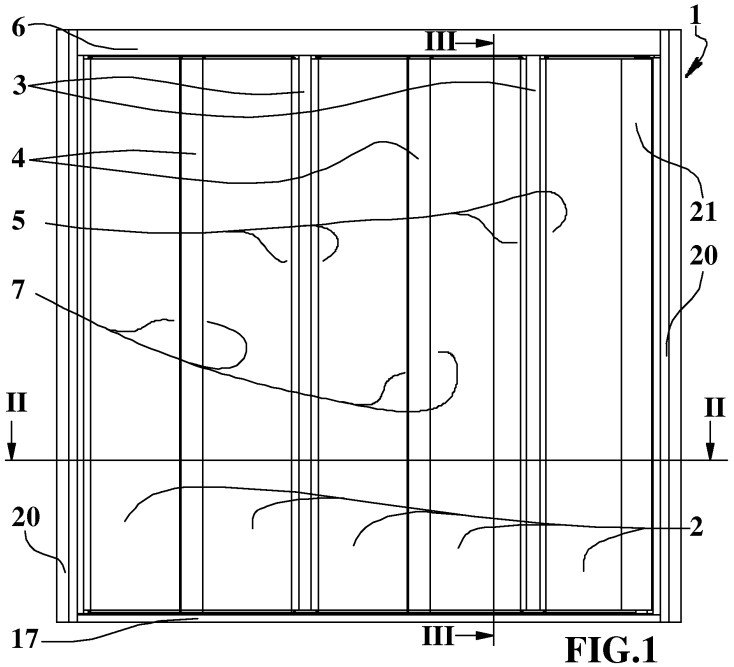

FIG.1

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Description

[0001] The present invention relates to the fastening and furniture field and refers to a folding closure device, particularly suitable to carry out shutters for doors, windows or similar and to carry to panels, rolling shutters and similar for constructions and furniture or pieces of furniture.

[0002] These are known as folding locks of spaces or furniture rooms between closing and opening conditions, equipped with elements which are elongated perpendicular to the motion direction and whose longitudinal sides are mutually pivoted.

[0003] A drawback of said known devices consists in that when they are in the closing condition of a space or room, it becomes difficult to open the devices and often it needs to use two hands or it needs to apply manually a rotation torque of the first element which renders their opening difficult and disadvantageous.

[0004] Other drawbacks of the known folding devices consist in that they let the air and light pass through, that, generally, they are not sufficiently robust and safe.

[0005] An object of the present invention is to propose a folding closure which can be opened in an easy manner without excessive efforts and that it is simple and reliable.

[0006] Other object is to propose a device that, in the closing condition, it blocks light and dust.

[0007] Further object is to propose a safe and robust device which is suitable to carry out either lockings or elements for furniture.

[0008] The characteristics of the invention are evident in the following with detailed reference to the attached drawings, in which:

- figure 1 shows a frontal view of the folding closure device, object of the present invention, in a closing condition;
- figure 2 shows a sectioned view at the plane II - II of figure 1;
- figure 2b shows a partial and enlarged view of figure 2;
- figure 3 shows a partial and sectioned view at the plane III - III of figure 1;
- figure 4 shows a top view of the device of figure 1;
- figure 5 shows a front view of the device of figure 1, in an opening condition;
- figure 6 shows a sectioned view at the plane IV - IV of figure 5;
- figure 7 from shows a top view of the device of figure 5;
- figure 8 shows an axonometric view of the device of figure 1, in an opening condition;
- figure 8b shows an enlarged view of a detail of figure 8 in which some parts have been removed away to make the others more evident.

[0009] With reference to the figures 1 - 8b, numeral 1 indicates the folding closure device, object of the present invention.

[0010] The folding closure device can be carried out as a rolling shutter for doors or windows, in a closing element for furnishings and furniture or it can be used anywhere as long as it is necessary to close an opening or passage.

[0011] Mentioned folding closure 1 is provided with an upper guiding means 6, a lower rail means 17 and two side uprights 20, whose ends are connected to form a square or a rectangular frame fit to be fixed to the edges of an opening or passage, for example to an opening of a furniture to a window and in general wherever it is necessary to open and to close a space or a room.

[0012] The device 1 comprises of a plurality of elongated elements 2, of slab shape with rectangular plant, carried out by section bars made of metallic, wooden or synthetic material, preferably made of aluminium. Each elongated element 2 comprises at least a longitudinal side 5, 7 connected in rotating manner by means of hinge means 3, 4, to a longitudinal side 5, 7 of an adjacent elongated element 2 forming an articulated folding wall.

[0013] Mentioned elongated elements are movable between an extreme opening condition of the passage, in which said elements 2 are, or are almost, mutually faced and an extreme closing condition of said passage in which the elements 2 are coplanar or almost coplanar.

[0014] A sliding longitudinal side 5 of each elongated element 2 is associated in sliding manner with at least a guiding means 6 and it is therefore bound to translate perpendicularly to itself on a fixed sliding plane.

[0015] In the closing condition the hinge means 3 of the sliding longitudinal sides 5 are staggered in respect with the hinge means 4 of the opposite longitudinal sides 7 of said elements 2.

[0016] More precise, the rotation axis of the hinge means 3 of the sliding longitudinal sides 5 of the elongated elements 2 define a respective fixed geometric plane one and the rotation axis of the hinge means 4 of the opposite longitudinal sides 7 of said elements 2 define a movable geometric plane more far away from the guiding means 6, in other words, from the plane defined by the frame, in respect to the fixed geometric plane. In the embodiment of the figures, the movable plane in the closing condition, is about 3 mm more distant from the plane of the frame than the distance between the fixed plane and the plane of the frame. Even more, the invention provides that the distance D between the fixed plane defined by the rotation axis of the hinge means 3 of the sliding longitudinal sides 5 of the elongated elements 2 and the movable plane defined by the rotation axes of the hinge means 4 of the opposite longitudinal sides 7 of said elements 2 is ranging between the double and one sixth of the thickness of the elongated elements 2.

[0017] Each hinge means 3 for connecting the sliding longitudinal sides 5 of two adjacent elongated elements 2 has at least one respective connecting body 8, such as an aluminium section bar, connected to said sliding longitudinal sides 5 by means of respective rotation piv-

ots 9 defining the corresponding rotation axes.

[0018] Likewise, each hinge means 4, for connecting the longitudinal sides 7 of two elongated elements 2 which are adjacent and opposite sliding longitudinal sides 5, has at least one respective connecting body 10 connected to said opposite longitudinal sides 7 by means of respective rotation pivots 11 defining the corresponding rotation axes.

[0019] The rotation pivots 9, 11 are fixed to the longitudinal sides 5, 7 of the elongated elements 2 or, preferably they are carried out in integral aluminium with said elements 2, and they are housed in rotating manner in rotation seats 12, 13 preferably obtained in the connecting bodies 8, 10 or vice versa.

[0020] An upper end of each hinge means 3 of the sliding longitudinal sides 5 of the elongated elements 2 has a sliding means 14 along the guiding means 6.

[0021] Each sliding means 14 comprises a set of small wheels or bushings 15 rotating freely around a horizontal and perpendicular axis to the guiding means 6, engaged in rolling manner the longitudinal seats 16 of the same guiding means 6.

[0022] The rail means 17, which is parallel in respect to the guiding means 6, is equipped with a channel 18 slidingly engaged by skid means 19 fixed to the lower ends, namely the ends opposite to the guiding means 6, of the hinge means 3 of the longitudinal sliding sides 5 of the elongated elements 2.

[0023] The upright 20 having the function of door leaf for the elongated element 2 extreme movable, has a respective compensation profile 21.

[0024] An end elongated element 2 is fixed by means of a fixed hinge means in respect the upright 20 and another end movable elongated element 2 matches, in the closing condition, with the another upright 20 or with the compensation profile 21 of this latter.

[0025] The end movable elongated element 2 has a respective compensation profile 23.

[0026] The guiding means 6 and track means 17 have respective matching brush means 22 of the elongated elements 2.

[0027] The operation of the device provides an opening force placed on the plane defined by the elongated elements in the closing condition, by virtue of the stagger corresponding to the distance D of the rotation axes generate torques for mutually inclining the elongated elements so facilitating the movement and the opening.

[0028] An advantage of the present invention is to provide a folding closure which can be opened in easy manner without excessive efforts and that it is simple and reliable.

[0029] Other advantage is to provide a device that, in the closing condition, it blocks light and powder.

[0030] Further advantage is to provide a robust and safe device and that it is suitable to carry out not only locks but also elements for furniture and piece of furniture.

Claims

1. Folding closure device fit to be associated to the edges of an opening or passage and comprising at least a plurality of elongated elements (2), each having at least a longitudinal side (5, 7) connected in rotating manner, by means of hinge means (3, 4), to a longitudinal side (5, 7) of an elongated element (2) adjacent and movable between an opening condition of the passage, where said elements (2) are, or are almost, mutually faced and a closing condition of said passage in which the elements (2) are coplanar or almost coplanar; a longitudinal sliding side (5) of each elongated element (2) is associated in sliding manner to at least a guiding means (6); said device (1) being **characterized in that** the rotation axes of the hinge means (3) of the longitudinal sliding sides (5) of the elongated elements (2) define a respective fixed geometric plane and the rotation axes of the hinge means (4) of the opposite longitudinal sides (7) of said elements (2) define a movable geometric plane more spaced from the at least a guiding means (6) in respect to the fixed geometric plane in any condition, also in closing condition, of the device (1).

2. Device according to claim 1 **characterized in that** each connecting hinge means (3) of the longitudinal sliding sides (5) of two adjacent elongated elements (2) has at least a respective connecting body (8) connected to said longitudinal sliding sides (5) by means of respective rotation pivots (9) defining the corresponding rotation axes.

3. Device according to claim 1 **characterized in that** each connecting hinge means (4) of the longitudinal sides (7) of two elongated elements (2) adjacent and opposite to said longitudinal sliding sides (5) has at least a respective connecting body (10) connected to said opposite longitudinal sides (7) by means of respective rotation pivots (11) defining the corresponding rotation axes.

4. Device according to claims 2 and 3 **characterized in that** the rotation pivots (9, 11) are fixed to the longitudinal sides (5, 7) of the elongated elements (2) and they are rotatingly housed in rotation seats (12, 13) of the connecting bodies (8, 10) or vice versa.

5. Device according to claim 1 **characterized in that** the distance (D) between the fixed plane defined by the rotation axes of the hinge means (3) of the longitudinal sliding sides (5) of the elongated elements (2) and the movable plane defined by the rotation axes of the hinge means (4) of the opposite longitudinal sides (7) of said elements (2) is ranging between double and one sixth of the thickness of the elongated elements (2).

6. Device according to claim 1 **characterized in that** one end of each hinge means (3) of the longitudinal sliding sides (5) of the elongated elements (2) has a sliding means (14) along the guiding means (6).

7. Device according to claim 6 **characterized in that** each sliding means (14) comprises a set of small wheels or bushings (15) engaged in rolling manner to the longitudinal seats (16) of the guiding means (6).

8. Device according to claim 1 **characterized in that** it comprises a rail means (17) parallel with respect to the guiding means (6) and equipped with a channel (18) slidingly engaged by skid means (19) fixed to the ends of the hinge means (3) of the longitudinal sliding sides (5) of the elongated elements (2) opposite to the guiding means (6).

9. Device according to claim 8 **characterized in that** the ends of guiding means (6) and rail means (17) are connected by side uprights (20).

10. Device according to claim 9 **characterized in that** at least one upright (20) has a respective compensation profile (21).

11. Device according to claim 10 **characterized in that** between the guiding means (6) and the rail means (17), at least one of them has matching brush means (22) of the elongated elements (2).

12. Device according to claim 10 **characterized in that** one end elongated element (2) is fixed to the respective upright (20) and another movable end elongated element (2) matches, in the closing condition, with the other upright (20) or with the compensation profile (21) of this latter.

13. Device according to claim 12 **characterized in that** the movable end elongated element (2) has a respective compensation profile (23).

14. Device according to claim 1 **characterized in that** each elongated element (2) is slab shaped having rectangular plant.

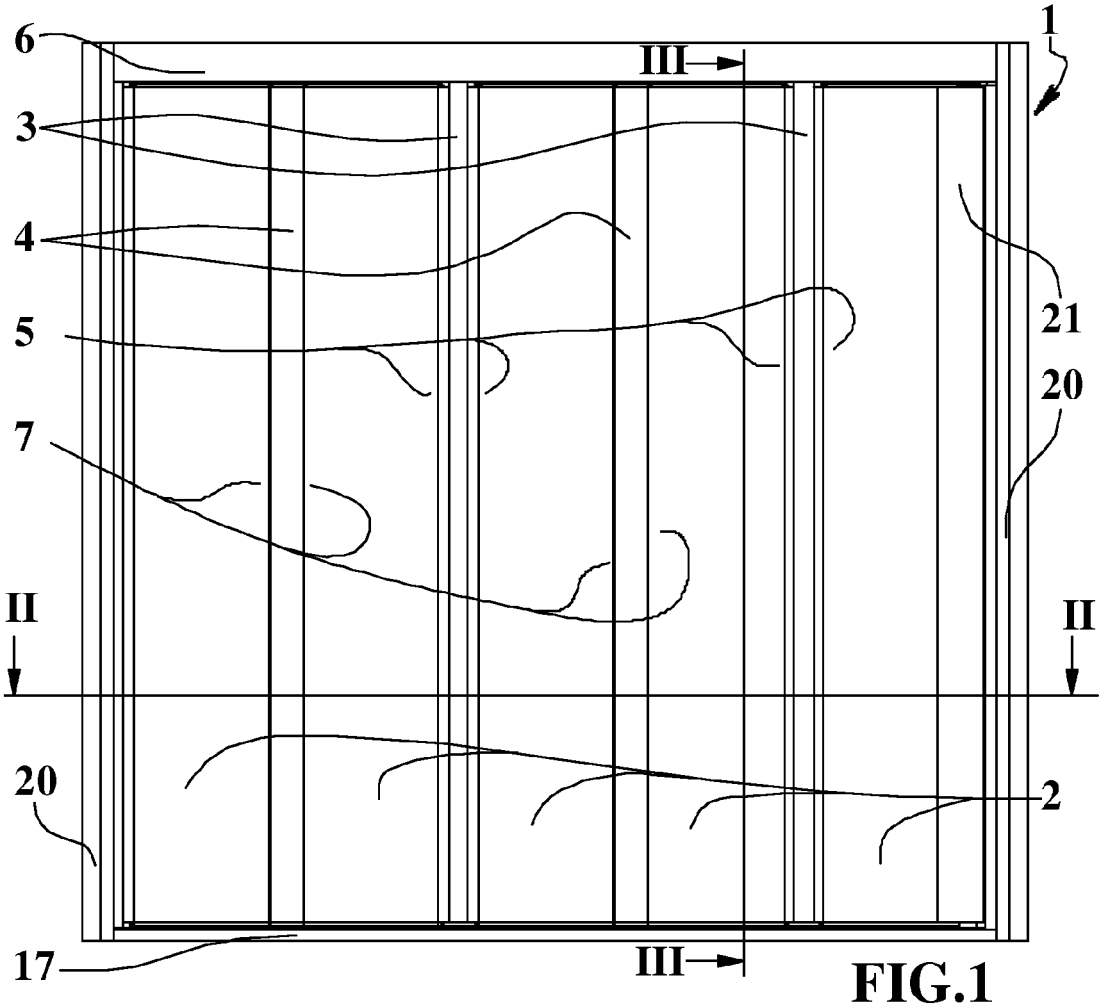

FIG.1

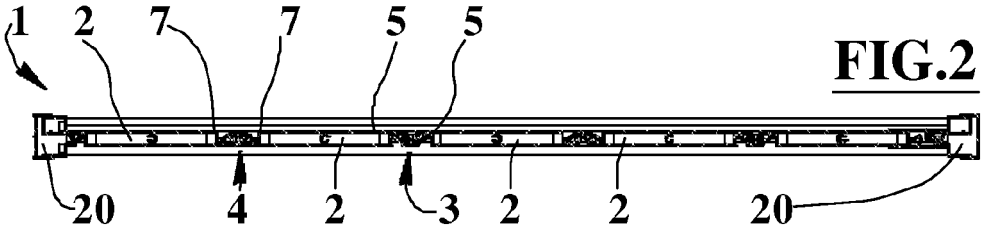

FIG.2

FIG.4

FIG.2b

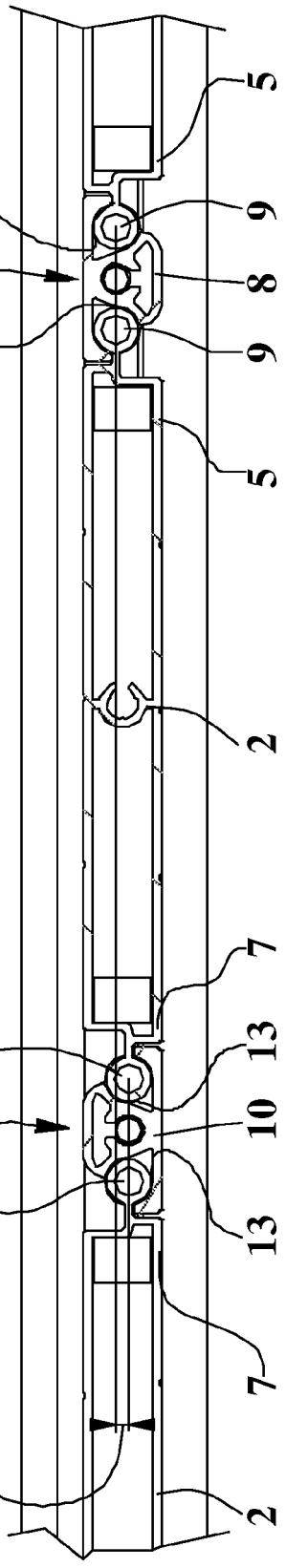
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FIG.3

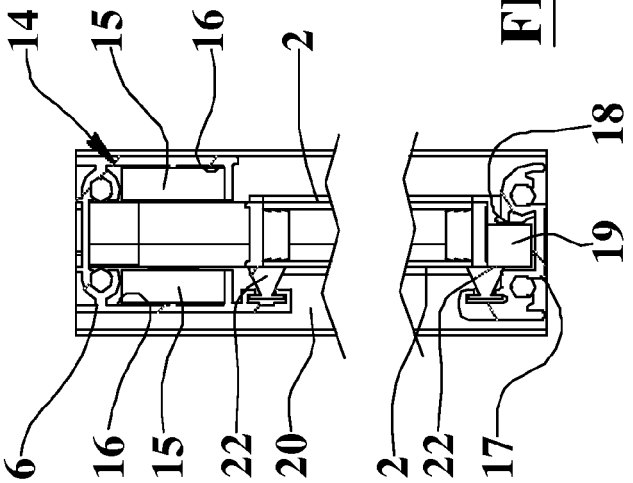
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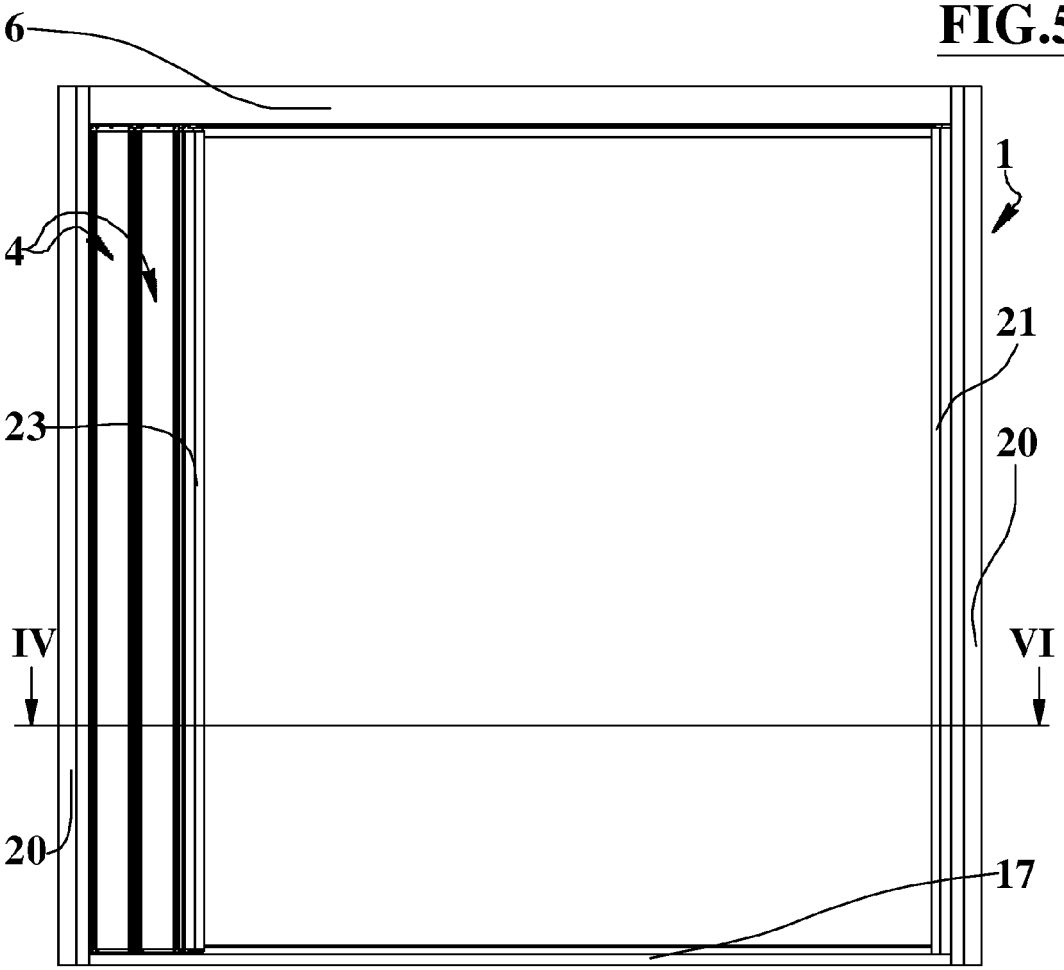
FIG.5



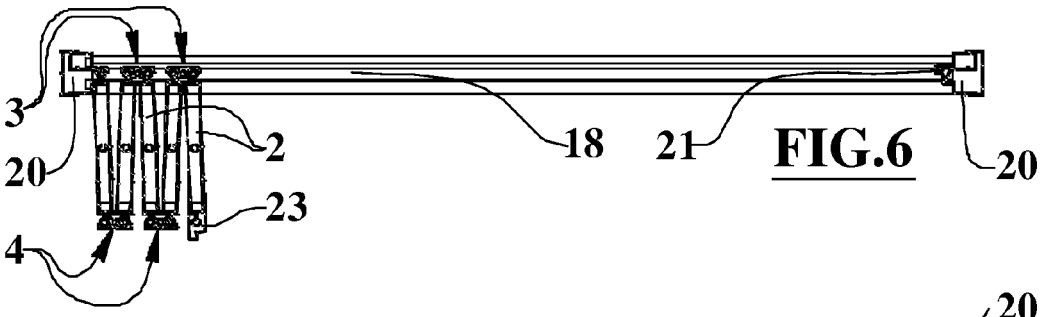


FIG.6

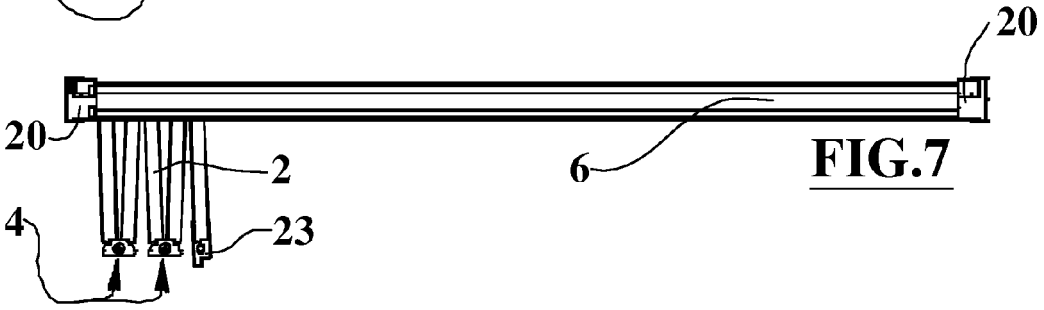


FIG.7

FIG.8b

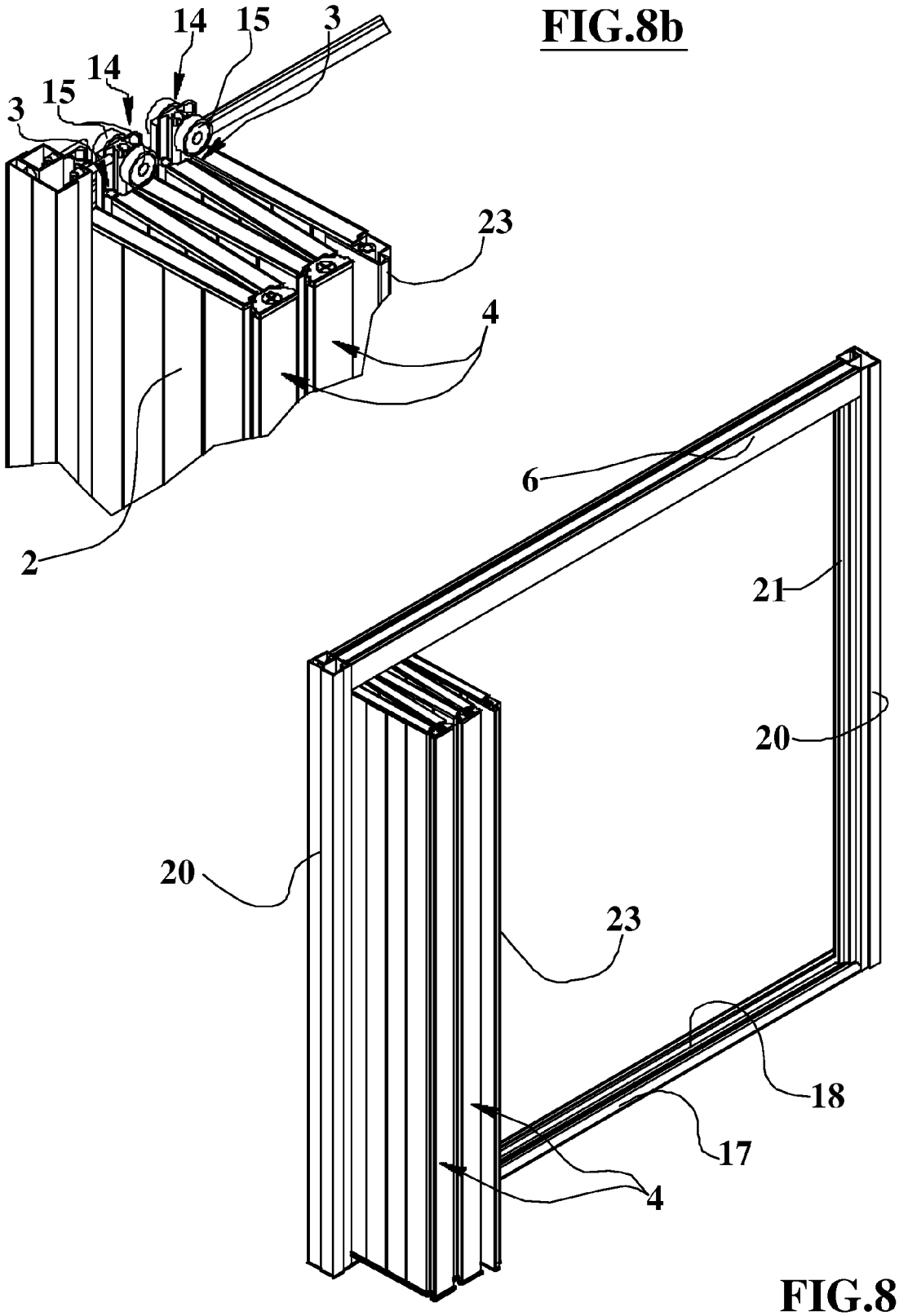


FIG.8