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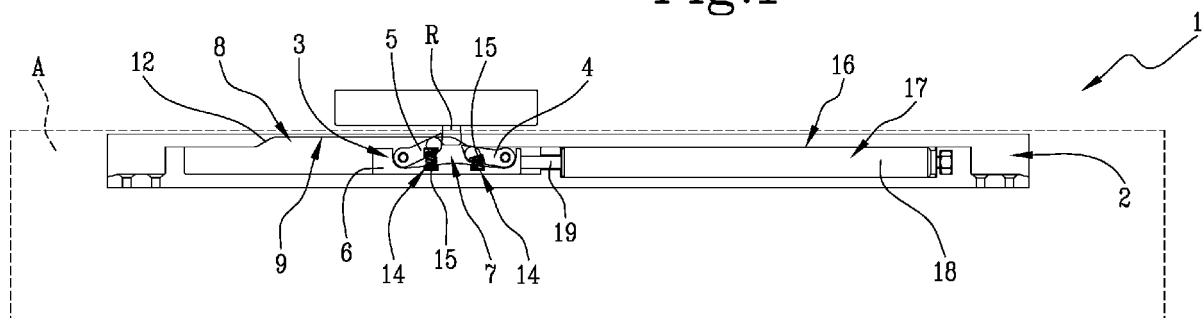
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(54) **DAMPING DEVICE FOR A LEAF OF A LIFT-AND-SLIDE WINDOW OR DOOR, DAMPING KIT FOR A LEAF OF A LIFT-AND-SLIDE WINDOW OR DOOR AND LIFT-AND-SLIDE WINDOW OR DOOR**

(57) Damping device (1) for a leaf (A) of a lift-and-slide window or door, configured to damp the opening and/or closing movement of the leaf (A) and comprising a containment body (2) that is solidly connectable to the leaf (A) and a cursor (3) reversibly slidable in the containment body (2) along a direction that is substantially parallel to a movement direction (X) of the leaf (A) between at least one first and a second position. In particular, the cursor (3) comprises a first abutting element (4) and a second abutting element (5) that are each adapted to engage a striker element (R) present on the fixed frame (T) and each is reversibly switchable between

a raised condition, in which it protrudes at least partially from the cursor (3) to abut on the striker element (R), and a lowered condition, in which it is at least partially housed inside said cursor (3) to permit a relative motion between the cursor (3) and the striker element (R). The damping device 1 further comprises a cam profile (9) operationally active on the abutting elements to activate switching thereof from the raised condition to the lowered condition and vice versa following movement of the cursor (3) between the first and the second position, and damping means (16) interposed between the containment body (2) and the cursor (3).

Fig.1



Description

TECHNICAL FIELD

[0001] The object of the present invention is a damping device for a leaf of a lift-and-slide window or door, a relative damping kit and a lift-and-slide window or door.

[0002] The present invention relates to the movement of a lift-and-slide window or door.

PRIOR ART

[0003] In this type of window or door, the leaf is movable between a lowered position, in which it rests on the lower base of the fitting (frame) in a stationary condition, and a raised position relative to the lower base of the fitting, in which the leaf can slide on the frame, typically from the closed position to the open position.

[0004] Sliding windows or doors are known in which the leaf is made by a glass panel inserted into a frame, generally made of wood, having both a structural and housing function for the devices and accessories that are necessary for sliding the leaf and locking the leaf in the closed position. Normally, such windows or doors have a rotatable handle for activating or locking the aforesaid devices for sliding and locking the leaf.

[0005] In particular, the sliding devices comprise carriages joined rigidly consecutively by a connecting device.

[0006] In greater detail, the carriages are inserted inside a seat made in the lower cross member of the frame of the leaf and are configured to switch between a sliding position and a stopped position so as to permit, respectively lifting or lowering of the leaf and thus opening and closure thereof.

[0007] Usually, the lift-and-slide windows or doors have a wing of considerable dimensions and weight and the inertia thereof can make movement operations between the different operating positions that it can adopt difficult and even dangerous.

[0008] In fact, owing to the weight and inertia of the leaf, collisions may occur between the leaf and the uprights of the frame during the opening or closing steps. These collisions, in addition to being particularly annoying because of the great noise caused, may contribute to rapid deterioration of the window and door.

[0009] Further, the difficulty of promptly braking the movement of the leaf occasionally causes episodes of crushing, for example of the hands of the users and/or of animals and/or people who may be in the trajectory of the leaf.

[0010] Prior art documents CN107435478 and WO 2021198185 refer respectively to an adjustable elastic damper and to an assistance device for closing and opening a lift-and-slide window or door.

OBJECTS OF THE INVENTION

[0011] In this context, the technical task of the present invention is to propose a damping device for a leaf of a lift-and-slide window or door, a damping kit for a leaf of a lift-and-slide window or door and a lift-and-slide window or door which are capable of overcoming the drawbacks arising from the prior art.

[0012] In particular, one object of the present invention is to devise a damping device for a leaf of a lift-and-slide window or door and a relative damping kit which permit secure and easy movement of particularly heavy leaves. Another object of the present invention is to propose a damping device, a damping kit and a lift-and-slide window or door that are reliable, tough and durable over time.

[0013] The specified technical task and the specified objects are substantially achieved by a damping device for a leaf of a lift-and-slide window or door, a relative damping kit and a lift-and-slide window or door comprising the technical features set out in one or more of the appended claims.

[0014] The dependent claims correspond to possible embodiments of the invention.

BRIEF DESCRIPTION OF THE DRAWINGS

[0015] Additional features and advantages of the present invention will become more apparent from the illustrative and thus non-limiting description of a preferred but not exclusive embodiment of a damping device for a leaf of a lift-and-slide window or door, as illustrated in the appended drawings, in which:

- figures 1-4 illustrate schematic views of a damping device according to respective operating configurations;
- figure 5 is a section view of a first constructional detail of the device shown in figures 1- 4;
- figure 6 is an enlarged view of a second constructional detail of the device shown in figures 1-4.

DETAILED DESCRIPTION

[0016] With reference to the accompanying figures, reference numeral "1" indicates as a whole a damping device for a leaf of a lift-and-slide window or door. The damping device 1 is configured to damp the movement of a leaf "A" in the opening and/or closing direction.

[0017] In other words, the damping device 1 enables the speed of the leaf "A" to be reduced during movement between an open position of the window or door, in which the leaf "A" is distal from an upright of the fixed frame "T" and opens a passage gap and a closed position, in which the leaf "A" is proximal to the upright of the frame and closes the passage gap.

[0018] The damping device 1 comprises a containment body 2 that is solidly connectable to the leaf "A". Further, a cursor 3 is slidably inserted into the containment body

2 and is reversibly movable between at least a first operating position (figure 1) and a second operating position (figure 2) along a direction substantially parallel to a movement direction "X" of the leaf "A". According to an aspect that will be described better below, the aforesaid first and second operating positions of the cursor 3 are preferably at opposite ends of a sliding channel 8 present on the containment body 2. Preferably, the containment body 2 is connectable to a top portion of the leaf "A".

[0019] The cursor 3 comprises a first abutting element 4 and a second abutting element 5, each of which is adapted to engage a striker element "R" present on the fixed frame "T".

[0020] Preferably, the striker element "R" is positioned on an upper crosspiece of the fixed frame "T".

[0021] According to one aspect of the invention, the abutting elements 4, 5 face one another, such that the first abutting element 4 engages the striker element "R" during a passage of the cursor 3 from the second operating position to the first operating position and, further, such that the second abutting element 5 engages the striker element "R" during a passage of the cursor 3 in the opposite direction, i.e. from the first position to the second position.

[0022] According to a further aspect of the invention, each of the abutting elements 4, 5 is reversibly switchable between a raised condition, in which the abutting element protrudes at least partially from the cursor 3 to abut on the striker element "R" (see abutting element 4 in figure 2 and abutting element 5 in figure 1), and a lowered condition, in which the abutting element is at least partially housed inside the cursor 3 to permit relative motion between the cursor 3 and the striker element "R" (see abutting the element 4 in figure 1 and the abutting element 5 in figure 2).

[0023] According to a possible embodiment of the present invention and as illustrated in the accompanying figures, the cursor 3 can comprise a support body 6 that has a seat 7 that is adapted to house, at least partially, the abutting elements 4, 5 when they are in a lowered condition.

[0024] In other words, the first abutting element 4 and the second abutting element 5 can be alternately retracted and extracted from the seat 7 of the support body 6. In greater detail, the abutting elements 4, 5 are extracted singly when they have to abut on the striker element "R", whereas they are retracted individually when the relative sliding between the cursor 3 and the striker element "R" has to be permitted.

[0025] Purely by way of non-limiting example, the abutting elements 4, 5 are pivoted on the support body 6 to be reversibly rotatable between the lowered condition and the raised condition.

[0026] With reference to figures 1 and 2, the containment body 2 comprises a sliding channel 8 parallel to the movement direction "X" of the leaf "A" and configured to house the cursor 3.

[0027] With reference to figures 1 and 2, the sliding

channel 8 has a cam profile 9 that activates switching of each abutting element 4, 5 from the raised condition to the lowered condition, and vice versa, following the movement of the cursor 3 between the first operating position and the second operating position along the containment body 2.

[0028] In more detail, the sliding channel 8 can be delimited transversely by a pair of shoulders. In this case, the shoulders further define the aforesaid cam profile 9.

[0029] Preferably, the cam profile 9 has a first switching portion 10 and a second switching portion 12 configured to act, respectively, on the first abutting element 4 and second abutting element 5 to promote switching thereof from the raised condition to the lowered condition and vice versa.

[0030] According to a further aspect, the damping device 1 can comprise elastic means 14 that is active on the first abutting element 4 and/or on the second abutting element 5 to ensure effective contact thereof against the cam profile 9. Advantageously, the presence of the elastic elements 14 promotes switching of the abutting elements 4, 5 from the lowered condition to the raised condition.

[0031] For example, the elastic means 14 can comprise one or more springs 15 each of which is operationally interposed between the support body 6 and a respective abutting element 4, 5.

[0032] According to the invention, the damping device 1 comprises damping means 16 interposed between the containment body 2 and the cursor 3. Advantageously, the damping means 16 acts between the containment body 2 and the cursor 3, at least when the latter moves from the second position to the first position.

[0033] In other words, the damping means 16 enables the speed of the leaf "A" to be reduced during movement thereof between an open position, in which the leaf "A" is distal relative to an upright of the fixed frame "T", and a closed position of the window or door, in which the leaf "A" is proximal to the upright of the fixed frame "T".

[0034] In greater detail, the damping means 16 can be so configured that the movement of the cursor 3 from the first to the second position results in the activation thereof and a movement of the cursor 3 in the opposite direction results in an at least partial resetting thereof.

[0035] In this manner, the damping means 16 confers great safety on the window or door by preventing the leaf "A", because of the inertia due to movement thereof, being able to damage or crush persons or objects arranged along the movement trajectory thereof.

[0036] Preferably, the damping means 16 is housed, at least partially, inside the containment body 2. Advantageously, this arrangement confers protection from possible blows and covering by dust, detritus and/or water splashes, for example rain, that could jam the operation of the damping means.

[0037] With reference to figures 1 and 2, the damping means can comprise a pneumatic damper 17. In particular, this damper comprises a cylinder 18 fixed to the

containment body 2 and a piston 19 fixed to the cursor 3. The piston 19 is slidably movable with reciprocating motion inside the cylindrical body 18 between a maximum insertion position, corresponding to the first position of the cursor 3 in the containment body, and a minimum insertion position, corresponding to the second position of the cursor 3 in the containment body 2.

[0038] In greater detail, the first abutting element 4 engages the striker element "R" during the passage of the cursor 3 from the second position to the first position, resulting in the movement of the piston 19 from the minimum insertion position to the maximum insertion position. The second abutting element 5 on the other hand engages the striker element "R" during the passage of the cursor 3 from the first position to the second position, resulting in a movement of the piston from the maximum insertion position to the minimum insertion position. In other terms, each movement of the cursor 3 from the first to the second position, and vice versa, determines a corresponding activation of the piston; this activation causes a slowing of the leaf, when the piston 19 moves in the direction of maximum insertion and is braked by the fluid present inside the cylinder 18. Vice versa, when the piston 19 moves in the direction of minimum insertion, the piston 19 is not braked by the fluid present inside the cylinder 18 and thus the movement of the piston serves to reset the damping means.

[0039] During a movement of the leaf "A" (figure 4) from the open position to the activation position, the first abutting element 4 is in the raised condition and engages the striker element "R", determining a passage of the cursor 3 from the second position (figure 2) to the first position (figure 1).

[0040] During the passage of the cursor 3 from the second position to the first position, the damping means acts between the containment body 2 and the cursor 3 to reduce the movement speed of the leaf "A".

[0041] When the first position (figure 1) of the cursor 3 is reached, the leaf "A" is arranged substantially in the activation position and the cam profile 9 activates switching of the first abutting element 4 from the raised condition to the lowered condition.

[0042] Subsequently, the leaf "A" can be further moved from the activation position to the closed position. During this movement, the first abutting element 4 is in lowered condition and is not active on the striker element "R" moving solidly with the containment body 2 and permitting relative sliding between the cursor 3 and the striker element "R".

[0043] Similarly, the leaf "A" can be moved (figure 3) from the closed position to the activation position.

[0044] During this movement, the second abutting element 5 is in raised condition and is active on the striker element "R" to promote a passage of the cursor 3 from the first position (figure 1) to the second position (figure 2).

[0045] In particular, during the passage of the cursor 3 from the first position to the second position, the con-

tainment body 2 and the cursor 3 act on the damping means to determine substantially reactivation thereof, for example by determining a passage of the piston 19 from the maximum insertion position to the minimum insertion position.

[0046] When the second position (figure 2) of the cursor 3 is reached, the cam profile 9 activates switching of the second abutting element 5 from the raised condition to the lowered condition.

[0047] Subsequently, the leaf "A" can be moved further to reach, if it has not already done so, the open position. During this possible movement, the second abutting element 5 is in the lowered condition and is not active on the striker element "R" moving solidly with the containment body 2 and permitting relative sliding between the cursor 3 and the striker element "R". According to a further possible embodiment that is not illustrated in the accompanying figures, the damping device 1 can comprise a further cursor 3 reversibly slidable in the containment body 2 along a direction that is substantially parallel to the movement direction "X" of the leaf "A" between a further first position and a further second position. In particular, the further cursor 3 can comprise a further first abutting element 4 and a further second abutting element 5 each adapted to engage a striker element, preferably distinguished from the aforesaid striker element "R", present on the fixed frame "T".

[0048] Advantageously, the damping device 1 can comprise further damping means 16 interposed between the containment body 2 and the further cursor 3 to limit the speed

of the leaf "A" at least partially.

[0049] For example, the further damping means 16 can be activatable between the containment body 2 and the further cursor 3 at least during one portion of the passage of the cursor 3 from the first position to the second position.

[0050] In other words, the damping means 16 enables the speed of the leaf "A" to be reduced at least partially at least during the movement of the leaf "A" from the closed position to the open position at least near a further activation position.

[0051] Advantageously, the damping device 1 can be retrofitted onto a leaf "A" that is already in use.

[0052] According to a further aspect, the present invention refers to a damping kit for a leaf "A" of a lift-and-slide window or door, comprising a damping device 1 according to what has been disclosed above and at least one striker element "R" that is connectable to the fixed frame "T" of the window or door and is engageable by the first abutting element 4 and/or by the second abutting element 5 to engage the cursor 3 on the fixed frame "T", in order to determine a relative motion between the containment body 2 and the cursor 3.

[0053] According to a further aspect, the present invention refers to a lift-and-slide window or door, comprising a leaf "A" and a fixed frame "T".

[0054] In particular, the leaf "A" moves relative to the

fixed frame "T" along a movement direction "X" between a plurality of operating positions comprised between a closed position of the door or window, in which the leaf "A" is proximal to an upright of the fixed frame "T", and an open position, in which the leaf "A" is distal from the upright of the fixed frame "T" and defines a passage gap.

[0055] The window or door further comprises a damping device according to what has been disclosed previously and at least one striker element "R" fixed to the fixed frame "T" and engageable by the first abutting element 4 and/or by the second abutting element 5 to engage the cursor 3 on the fixed frame "T", in order to determine a relative motion between the containment body 2 and the cursor 3.

Claims

1. A damping device (1) for a leaf (A) of a lift-and-slide window or door, said damping device (1) being configured to damp the movement of the leaf (A) in the opening and/or closing direction and comprising:

- a containment body (2) solidly connectable to the leaf (A);
- a cursor (3) slidably inserted into the containment body (2) and movable reversibly between at least a first and a second position along a direction substantially parallel to a movement direction (X) of the leaf (A);

wherein the cursor (3) comprises a first and a second abutting element (4, 5) adapted to engage with a striker element (R) present on the fixed frame (T), said abutting elements (4, 5) facing one another so that the first abutting element (4) engages the striker element (R) during a passage of the cursor (3) from the second position to the first position and the second abutting element (5) engages the striker element (R) during a passage of the cursor (3) from the first position to the second position; wherein each of said abutting element is further reversibly switchable between a raised condition, in which it protrudes at least partially from said cursor (3) to abut on the striker element (R), and a lowered condition, in which it is at least partially housed inside the cursor (3) to permit a relative motion between the cursor (3) and the striker element (R);

- a cam profile (9) arranged on the containment body (2) and operationally active on the abutting elements to activate switching thereof from the raised condition to the lowered condition and vice versa following movement of the cursor (3)

between the first and the second position along the containment body (2);

- damping means (16) interposed between the containment body (2) and the cursor (3).

2. The damping device according to claim 1, wherein said cursor (3) comprises elastic means (14) that is active on each abutting element (4, 5) to promote a movement thereof from said lowered condition to said raised condition.
3. The damping device according to one or more of the preceding claims, wherein said cam profile (9) has a first and a second switching portion (10, 12) configured to be activated respectively on said first abutting element (4) and on said second abutting element (5) to promote a switching thereof from the raised condition to the lowered condition and vice versa.
4. The damping device according to claim 3, wherein each switching portion (10, 12) has an extension that is transverse to the movement direction (X) of the leaf (A) and convergent towards a central portion of the cam profile (9).
5. The damping device according to one or more of the preceding claims, wherein said cursor (3) comprises a support body (6) defining a seat (7) to house, at least partially, the abutting elements (4, 5) when they are in a lowered condition.
6. The damping device according to claim 5, wherein at least one of said first and second abutting element (4, 5) is hinged on the support body (6) of the cursor (3) and is reversibly rotatable relative to said support body (6) between the lowered condition and the raised condition.
7. The damping device according to one or more of the preceding claims, wherein said damping means (16) is operationally active between the containment body (2) and the cursor (3) at least during the passage of said cursor (3) from the second to the first position.
8. The damping device according to one or more of the preceding claims, wherein said damping means (16) is housed at least partially inside the containment body (2).
9. The damping device according to one or more of the preceding claims, wherein said damping means (16) comprises at least one pneumatic damper (17).
10. The damping device according to one or more of the preceding claims, wherein said damping means (16) comprises:

- a cylindrical body (18) fixed or fixable to the containment body; (2);
- a piston (19) connected or connectable to the cursor (3),

wherein said piston (19) is reversibly slidable inside the cylindrical body (18) between a maximum insertion position, corresponding to said first position of the cursor (3) in the containment body (2), and a minimum insertion position, corresponding to said second position of said cursor (3) in the containment body (2).

11. The damping device according to claim 10, wherein said first abutting element (4) is activatable on said striker element (R) during a passage of the cursor (3) from the second position to the first position, so as to promote a movement of said piston (19) from the minimum insertion position to the maximum insertion position, wherein said second abutting element (5) is activatable on said striker element (R) during a passage of the cursor (3) from the first position to the second position, so as to promote movement of said piston (19) from the maximum insertion position to the minimum insertion position.
12. The damping device according to one or more of the preceding claims, wherein said abutting elements (4, 5) are spaced apart from one another to define, at least when they are in a raised condition thereof, a housing that is engageable by the striker element (R) to engage said damping device (1) with the fixed frame (T) or the door or window.
13. A damping kit for a leaf (A) of a lift-and-slide window or door, comprising:
 - a damping device (1) according to one or more of the preceding claims;
 - at least one striker element (R) connectable to a fixed frame (T) of the door or window and engageable by said first abutting element (4) and/or by said second abutting element (5) to engage said cursor (3) with the fixed frame (T) of the door or window, so as to permit relative movement between said containment body (2) and said cursor (3).
14. A lift-and-slide window or door, comprising:
 - a leaf (A) and a fixed frame (T), said leaf (A) being reversibly movable relative to the fixed frame (T) along a movement direction (X) between a plurality of operating positions comprised between a closed position of the door or window, in which the leaf (A) is proximate to an upright of the fixed frame (T), and an open position, in which the leaf (A) is distal from the up-

right of the fixed frame (T) and defines a passage gap;

- a damping device (1) according to one or more of claims 1-12;

- at least one striker element (R) connected or connectable to said fixed frame (T) and engageable by said first abutting element (4) and/or by said second abutting element (5) to engage said cursor (3) with the fixed frame (T) of the door or window, so as to permit movement between said containment body (2) and said cursor (3).

Fig.1

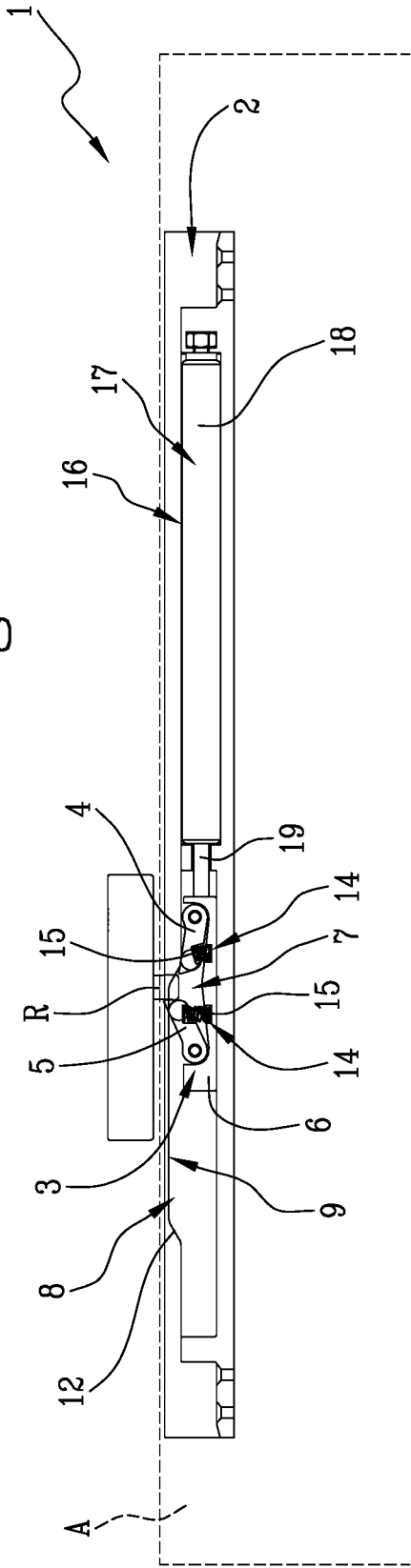


Fig.2

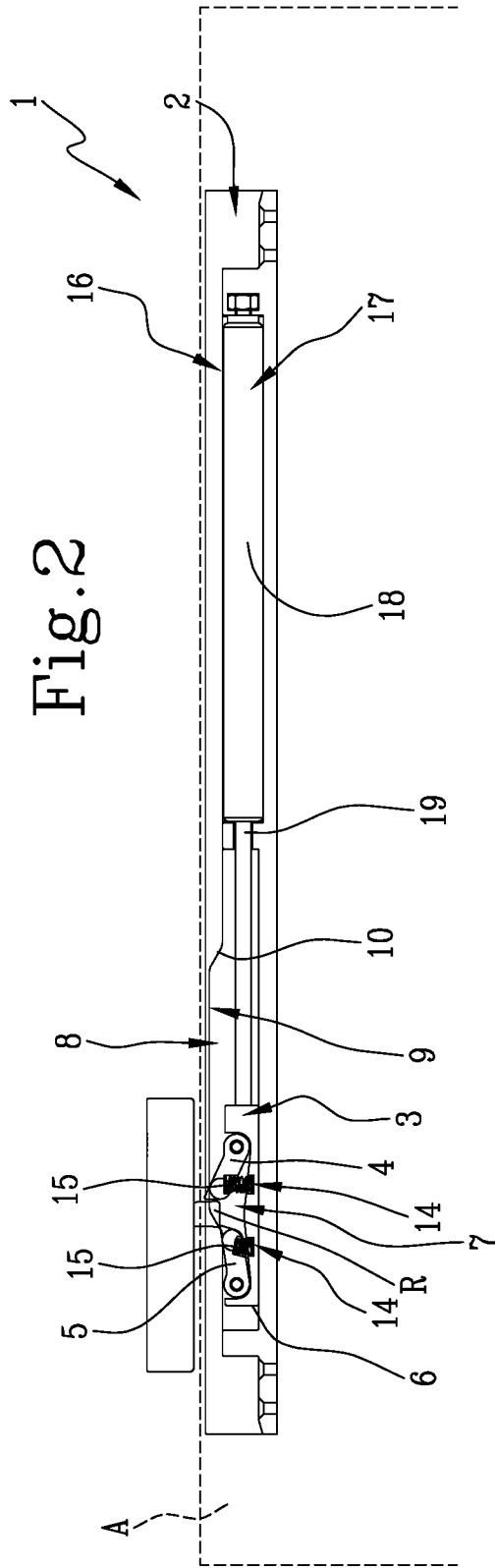


Fig.3

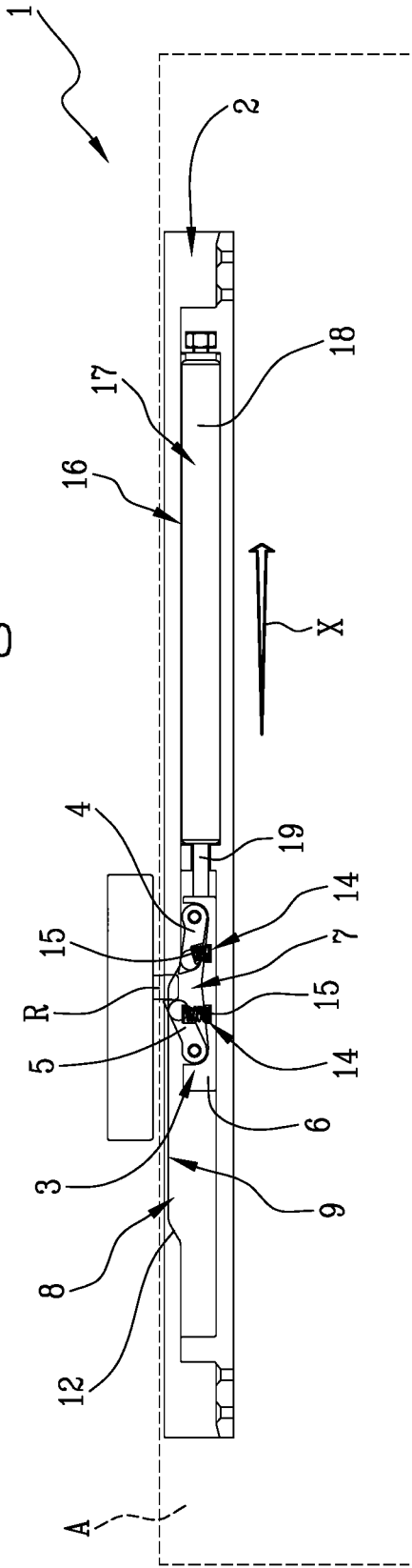


Fig.4

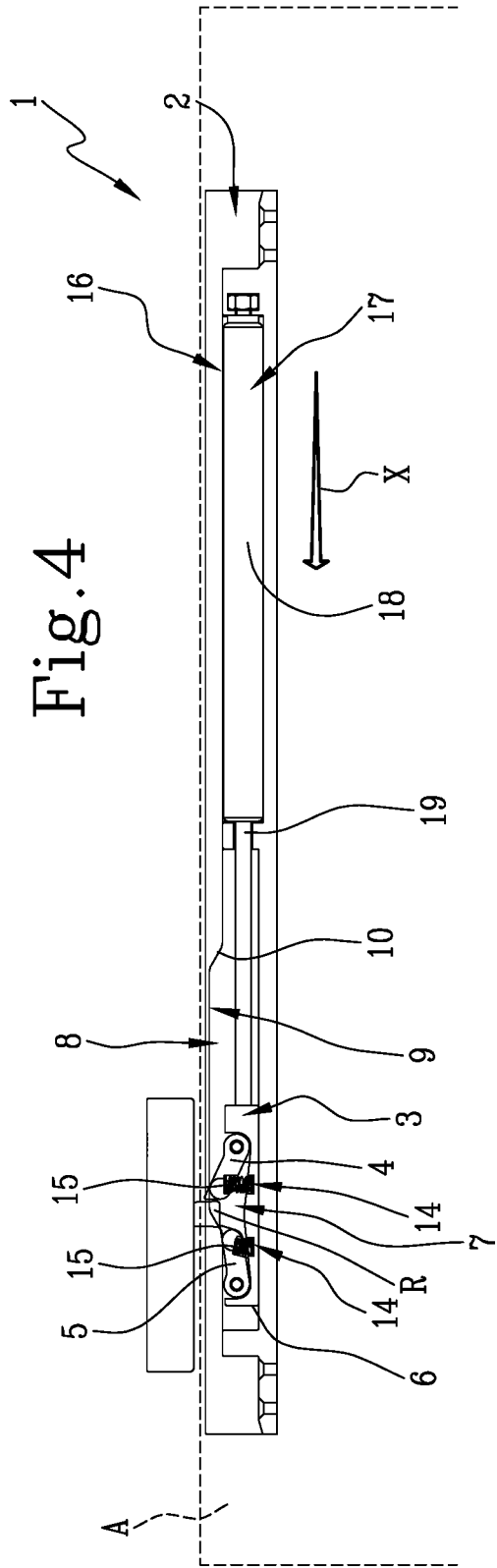


Fig.5

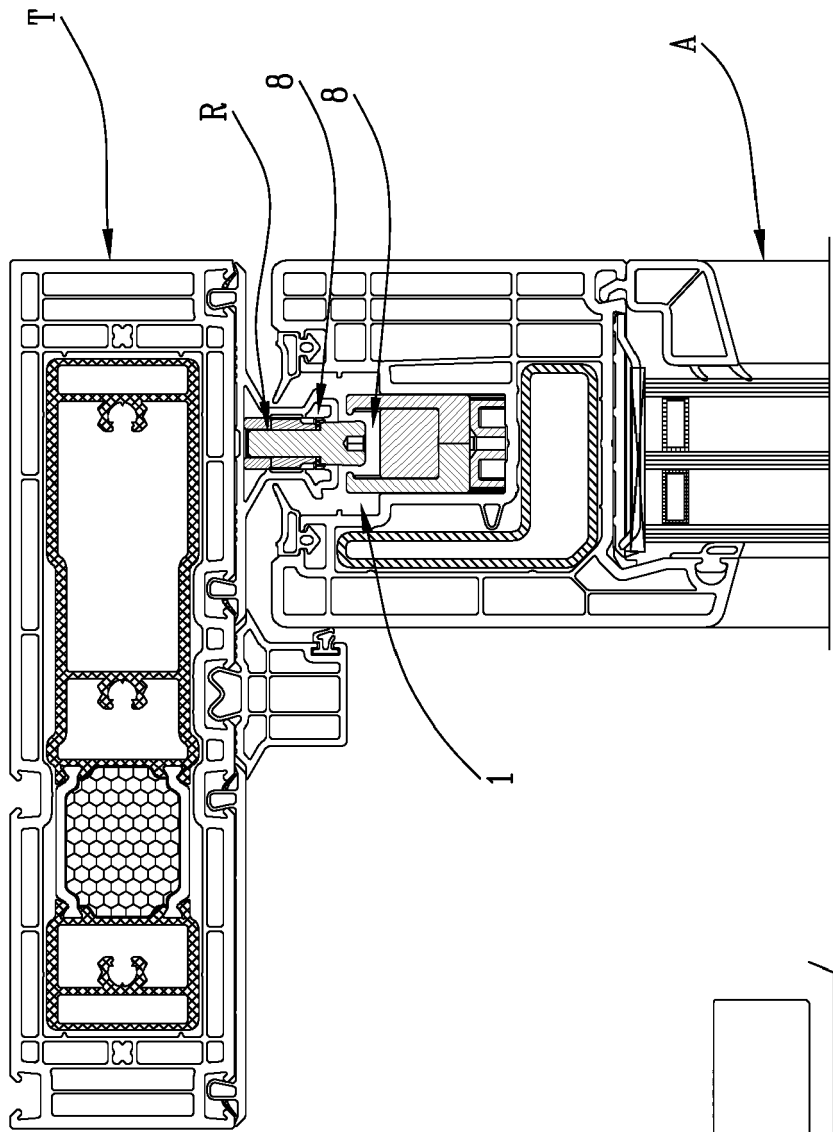
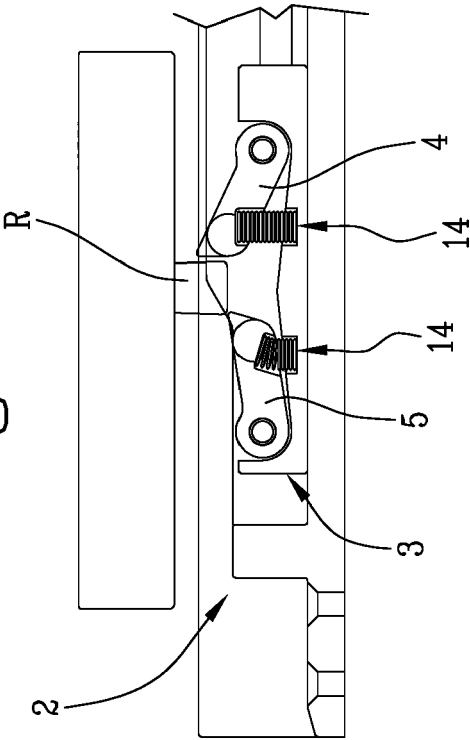


Fig.6





EUROPEAN SEARCH REPORT

Application Number

EP 23 16 3209

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A	CN 107 435 478 A (ZHONGSHAN OPIKE HARDWARE PRODUCTS CO LTD) 5 December 2017 (2017-12-05) * figures 1-3 * -----	1-14	INV. E05F5/00
A	WO 2021/198185 A1 (MACO TECHNOLOGIE GMBH [AT]) 7 October 2021 (2021-10-07) * page 10, line 23 - page 13, line 26 * * figures 1-6 * -----	1-14	
			TECHNICAL FIELDS SEARCHED (IPC)
			E05F
The present search report has been drawn up for all claims			
Place of search		Date of completion of the search	Examiner
The Hague		8 September 2023	Prieto, Daniel
CATEGORY OF CITED DOCUMENTS			
X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document			
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**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 23 16 3209

5 This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
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08-09-2023

10	Patent document cited in search report	Publication date	Patent family member(s)	Publication date
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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

REFERENCES CITED IN THE DESCRIPTION

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