(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) **EP 2 960 411 B1**

(12) **EUROPEAN PATENT SPECIFICATION**

(45) Date of publication and mention of the grant of the patent:
21.08.2019 Bulletin 2019/34

(51) Int Cl.:
E05D 7/084 *(2006.01)* ***E05F 1/10*** *(2006.01)*
E04D 13/035 *(2006.01)*

(21) Application number: **14174242.9**

(22) Date of filing: **26.06.2014**

(54) **Smoke ventilating roof window arrangement**

Dachfenster zur Rauchentlüftung

Lucarne de ventilation de fumée

(84) Designated Contracting States:
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR

(43) Date of publication of application:
30.12.2015 Bulletin 2015/53

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Printed by Jouve, 75001 PARIS (FR)

Description

[0001] The present invention relates to a roof window having a frame and a sash, each having a top member, a bottom member and two side members, the sash being pivotally connected to the frame so that a pivotal opening movement of the sash in relation to the frame moves the window between a closed position and a fully opened position, wherein the window comprises a pressure spring, the pressure spring over at least a part of the opening movement pushing the sash against the fully opened position of the window, the pressure spring at a first position being rotatably attached to a first of the side sash members.

[0002] Roof windows of this kind are often used for providing ventilation of air, heat or smoke, so that a free airflow may be obtained in a building where a ventilation mechanism is necessary. There is often a need for providing especially smoke ventilation, where the window should be arranged such as to automatically open during for example a fire. In assisting this opening it is generally known to provide the windows with an auxiliary opening device.

[0003] A typical auxiliary opening device takes the form of a pressure spring, such as for example a gas spring, provided on either one or both sides of the window structure and connecting a side frame member with a side sash member. The pressure spring provides a spring force pushing the frame and sash members away from each other, thus forcing the window towards an open position. In order to close the window it is necessary to manually or automatically, for example by means of a chain operator, pull the window sash towards the window frame, where in a closed position, the pressure spring lies substantially parallel to the window frame.

[0004] A window of this kind is described in Applicant's European Patent No. EP 1 508 663, which discloses a pivotal roof window having an auxiliary opening device, such as a pressure spring, which in one end is connected to the sash of the window and in the other is connected to the frame. The auxiliary opening device has the function to provide a supplementary torque that helps to rotate the sash with respect to the frame during the opening movement.

[0005] This prior art construction of a pressure spring causes the side frame and side sash members to which the pressure spring is attached to be subjected to large forces. The pressure spring in both the open and closed position of the window therefore exerts large constant forces on the side sash and side frame members, which are thus subjected to stress loads that cause the window frame and sash members to be off-set in relation to each other, which has several drawbacks, including deterioration of the window's insulation properties. The forces exerted from the pressure spring may damage and/or deform the window over time, which may entail that the window can no longer be opened, causing a need for repair or replacement.

[0006] Furthermore the pressure springs are often arranged so that the forces exerted during the opening movement, in the beginning thereof, work against the opening movement of the window thus creating a stronger force to overcome during opening of the window.

[0007] Additionally the pressure springs of such installations are often connected to one or both of the side frame or sash members in a way so that the pivotal movement of the window during the opening movement causes the pressure spring to turn in a manner so as to extend on the interior side of the frame which may create an undesirable aesthetic appearance of the window in the building in which the window is installed.

[0008] In the light of the above it is the object of the present invention to provide a window of the type mentioned in the introduction, which has a more pleasing appearance and does not apply unnecessary damage to the window structure over time.

[0009] To meet this object the window according to the present invention is characterized in that the pressure spring at a second position is rotatably attached to an arm, and the arm at a third position is rotatably attached to the first of the side sash members and at a fourth position is rotatably attached to a foot, the foot being connected to a first of the side frame members, which is associated with the first side sash member, such as to be able to move in a longitudinal direction of the first side frame member during said opening movement, said longitudinal direction extending from the bottom frame member towards the top frame member.

[0010] Thus, the inventor has realized that in the above described prior art roof window forces exerted by the pressure spring on the sash and frame may be alleviated by in practice making the point of attachment between the pressure spring and the frame movable or slidable in the longitudinal direction. Hereby the pressure spring is arranged in the window so as to lessen or substantially neutralize any component of force not working to push the sash towards the fully opened position during the opening movement. This is achieved by the free movement of the foot, which is indirectly connected with the pressure spring via the arm. The free movement of the foot in the longitudinal direction has the effect of substantially neutralizing any component of force exerted by the pressure spring in the longitudinal direction. This ensures that any components of force in the longitudinal direction are neutralized as soon as the foot moves or slides a distance in the longitudinal direction. Hereby, the frame and sash will less likely be off-set in relation to each other and/or deformed over time.

[0011] According to one embodiment of the invention the second position is located between and at a distance from each of the third and fourth positions, so that the pressure spring in this way at the second position is rotatably attached to the arm at a position thereof, and that the pressure spring moves approximately in the same direction as the arm during parts of the opening movement. This has the result that the forces exerted on the

frame and sash side members by the pressure spring will be neutralized, due to the combined free movement of the pressure spring and the arm caused by the foot. The second position is preferably positioned with equal distance to the third and fourth positions, but could also be closer to one of the third or fourth positions. Preferably, the second position is not positioned closer to any one of the third and fourth positions than one third of the distance between the third and fourth positions.

[0012] According to another embodiment of the invention the first to fourth positions are each configured as rotary joints, each with a rotation axis extending substantially perpendicularly to said longitudinal direction, thus providing an axis of rotation corresponding to the direction of opening of the sash during the opening movement.

[0013] In a further embodiment of the invention the first and second positions in said closed position are located so that said pressure spring is arranged to extend in said longitudinal direction and in parallel with said arm. Furthermore, in a development of this embodiment said positions seen from the bottom frame member towards the top frame member are arranged in the order first, fourth, second and third. With this location of the positions, the arm and the pressure spring are arranged so that a length direction of the pressure spring is arranged to be parallel with the arm, thus providing an optimal configuration where the foot is able to absorb the forces exerted on the sash and frame members when the window is in the closed position. Furthermore this arrangement has the effect that it is possible to close the window entirely. During the opening movement of the window the location of the second and fourth positions may be so that the second position during a first part of the opening movement moves in said longitudinal direction along the side frame member towards the bottom frame member and in a second, subsequent part of the opening movement also moves in a direction away from the side frame member towards the side sash member, and the fourth position during the entire said opening movement moves in said longitudinal direction along the side frame member towards the bottom frame member, the arm in said fully opened position extending at an angle to the longitudinal direction of the side frame member. Through this movement pattern of the second and fourth positions it is assured that approximately all components of force exerted by the pressure spring in the longitudinal direction of the sash during the entire opening movement are substantially neutralized, this due to the longitudinal movement of the foot connected to both the arm and the pressure spring and thereby taking up all the forces during the entire opening movement. Furthermore the movement of the second position towards the sash during the opening movement has the effect of providing automatic opening of the sash due to the force of the pressure spring pushing the sash towards the open position while at the same time neutralizing the components of force exerted on the frame and sash members by the pressure spring in the longitudinal direction.

[0014] In one embodiment the foot is configured to move freely along said longitudinal direction during the entire opening movement, thus neutralizing the forces exerted by the pressure spring in all positions of the window.

[0015] In another embodiment the foot is configured to slide in the longitudinal direction with a foot slide surface sliding on a frame slide surface of the first side frame member during the opening movement, thus creating a minimum need of materials to arrange the foot in a slidable manner at the side frame member.

[0016] In a further embodiment of the invention, the first side frame member comprises a rail extending in said longitudinal direction, the rail being configured to guide the foot in said longitudinal direction during said opening movement, thus providing the foot with a guiding element, so that the direction of movement does not diverge from the longitudinal direction of movement.

[0017] The rail may in a further development of this embodiment comprise the foot slide surface and an abutment surface supporting the foot in a direction perpendicular to the longitudinal direction of said frame member. In another development of this embodiment the rail is provided as an integral U-shaped groove in the first frame member, the groove comprising a foot slide surface and an opposing abutment surface, said foot slide surface and said abutment surface connected by a connection portion guiding said foot to move in said longitudinal direction. The rail provided as a single abutment surface or as an integral groove of the side frame member, provides a guide for the foot, the abutment surface simply keeping the foot in place on the side frame member by a force exerted on the foot transverse to the longitudinal direction. The integral groove in a further development provides extra holding means for the foot, so that it will not risk being displaced during the opening movement.

[0018] In another embodiment the roof window may be symmetrical so that a second of the side frame members and a second of the side sash members opposing said first side frame and side sash members of said window are connected by a corresponding mirrored pressure spring arrangement with an arm and a foot. In this way the opening of the window may be assisted by two identical or similar, opposed pressure spring arrangements, both arranged on the window according to the present invention, so that no forces are exerted on any of the frame and sash members. Thus over time damage or deformation of the window structure is prevented.

[0019] The arm may in any embodiment be a substantially straight rod, and the pressure spring could for example be a hydraulic spring and/or a gas spring.

[0020] In the following the invention will be described in further detail by means of examples of embodiments, with reference to the schematic drawings in which

Fig. 1 shows a perspective view of a prior art roof window,

Fig. 2 is a diagrammatic side view of an embodiment

of a roof window according to the invention, where the window is in a closed position,

Fig. 3 is a view corresponding to that of Fig. 2, where the window is in a partly opened position,

Fig. 4 is a view corresponding to that of Fig. 2, where the window is in a fully opened position,

Fig. 5 is a detail of a first embodiment of a part of the roof window of Fig. 2 seen from the top bottom of the window,

Fig. 6 is a detail corresponding to Fig. 5 of a second embodiment,

Fig. 7 is a detail corresponding to Fig. 5 of a third embodiment.

[0021] Fig. 1 illustrates a prior art roof window comprising a frame 1 with a first and a second pair of mutually opposite frame members. The first pair consists of a top member 3 and a bottom member 4. The second pair consists of side members 5 and 6, each extending between the top and bottom members 3 and 4 to form a substantially rectangular frame 1 intended to be build-in into e. g. an inclined roof (not shown). The inclination may be defined by the roof pitch, which for example could be in the range 15-55° with respect to a horizontal plane. A sash generally designated 2 is constructed in a similar manner with a top member 7, a bottom member 8 and side members 9, 10 forming a rectangular sash 2. In the sash 2 a rectangular window pane 11 of any type, e.g. an insulating unit, is encased.

[0022] The sash 2 is connected with the frame 1 by means of a hinge device, which comprises a set of hinges, of which one hinge 12 is shown in Fig. 1, at corresponding side members 5 and 9, and 6 and 10, respectively, of the frame 1 and sash 2. The set of hinges may be designed in any suitable manner. Generally the use of a pivot hinge connecting the frame and sash members makes it possible to establish an overlap between the sash and the frame in the closed position of the window as well as creating the possibility of pivoting the roof window almost 180 degrees for example for cleaning purposes.

[0023] Fig. 2 shows a side view of an embodiment of the window according to the invention having a frame 101 and a sash 102 arranged in a not shown inclined roof similar to the prior art window of Fig. 1. The frame 101 and the sash 102 each have a respective top member 103, 107, a bottom member 104, 108 and two side members 105, 109 (only one side member shown in Figs 2 to 4). In the roof window of Fig. 2 the frame 101 and the sash 102 are arranged so that the sash 102 is pivotally connected to the frame 101, so that a pivotal opening movement of the sash 102 in relation to the frame 101 moves the window between a closed position and a fully opened position. The fully opened position is a position where the sash 102 is pivoted relative to the frame 101, and the pressure spring 106 is extended, for example the sash may be pivoted substantially perpendicular to the frame. In the example shown in Fig. 2 the window is centre hanged i.e. the axis of the pivot hinges 112 lies substantially halfway on the sash 102. The pivotal connection is known in the art to be provided for example by use of a set of two pivot hinges 112 providing a combined hinge axis as described in the above. Furthermore by this arrangement the point of rotation of the sash is displaced in relation to a plane defined by the sash, in the present case to the right in Fig. 3.

[0024] The window shown in Fig. 2 further comprises a pressure spring arrangement with a pressure spring 106 arranged in connection with the side sash and frame members 105, 109, the pressure spring 106 over at least a part of the opening movement pushing the sash 102 against the fully opened position of the window in a manner to be described in more detail in the following.

[0025] As is best illustrated in Figs 2 to 4, the pressure spring 106 is at a first position A rotatably attached to a first of the side sash members 109 and at a second position B rotatably attached to an arm 111; the arm 111 at a third position C is rotatably attached to the side sash member 109 and at a fourth position D rotatably attached to a foot 110. The arm 111 takes the form of a straight rod. The foot 110 is connected to a first of the side frame members 105, which is associated with the first side sash member 109, so as to be able to move in a longitudinal direction L illustrated by the dotted line in Fig. 2 and extending from the bottom frame member 104 towards the top frame member 103.

[0026] The second position B is located between and at a distance from each of the third C and fourth positions D so that the pressure spring 106 is connected to both the first side sash member 109 and the arm 111, where the connection to the arm 111 for example could be approximately at the middle thereof. However, the position B can be located at any other position along the arm 111, but should at least be arranged between the first and third positions. One end of the pressure spring 106 is connected to the lower part of the sash 102 below the hinge 112 while the second end of the pressure spring 106 is connected to the second position B of the arm 111.

[0027] In order for the pressure spring 106 to be able to push open the sash, during the opening movement each of the first to fourth positions A, B, C, D are configured as rotary joints, each with a rotation axis extending substantially parallel with the top members 103, 107 and bottom members 104, 108.

[0028] Referring to Fig. 2, the first A and second B positions are in said closed position located so that said pressure spring 106 is arranged to extend substantially in said longitudinal direction L and substantially in parallel with said arm 111, and said positions seen from the bottom frame member 104 towards the top frame member 103 in the closed position of the window are arranged in the order first A, fourth D, second B and third C.

[0029] With this arrangement the pressure spring 106 is configured to push open the sash 102 during the opening movement so that an automatic opening of the window is achieved. The opening of the window is carried

out in a substantially continuous two-part movement, where the first part of the movement is illustrated through the movement of the window sash 2 from the position of Fig. 2 to the position of Fig. 3, and the second part of the movement is illustrated through the movement of the window sash 2 from the position of Fig. 3 to the position of Fig. 4. The second position B during the first part of the opening movement, illustrated by the movement from Figs 2 to 3, moves in said longitudinal direction L along the side frame member 105 towards the bottom frame member 104. In the second, subsequent part of the opening movement, illustrated by the movement from Figs 3 to 4 the second position B also moves in a direction away from the side frame member 105 towards the side sash member 109. The fourth position D moves during the entire said opening movement, illustrated by Figs 2 to 4 in said longitudinal direction L along the side frame member 105 towards the bottom frame member 104, the arm 111 in said fully opened position extending at an angle α to the longitudinal direction L of the side frame member 105.

[0030] During the entire opening movement described above the foot 110 moves together with the position D freely along said longitudinal direction L. By "freely" should be understood that the movement of the foot 110 is not limited along the length of the side frame member 105. By allowing the foot 110 to move freely in the longitudinal direction L on the side frame member 105, the foot 110 may move in any distance along the longitudinal direction L of the side frame member 105 necessary for providing the effect of neutralizing the forces applied by the pressure spring in any position of the opening movement.

[0031] The foot 100 can be provided in many possible ways including for example the embodiments shown in Figs 5 to 7. The foot can be made of any suitable material, including among others plastic and metal. The shape of the foot could be any thinkable geometrical shape that would fit into the side frame member in which the foot is to be moved in the longitudinal direction; examples of shapes could be rectangular, oval, elliptic or triangular without being limited to any of these shapes.

[0032] Referring to Figs 2 to 4 it is shown how the foot in principle is configured to slide in said longitudinal direction L with a foot slide surface 113 sliding on a frame slide surface 114 of said first side frame member 105 during said opening movement. The foot slide surface 113 and/or the frame slide surface 114 could be made from any suitable material creating the necessary friction to provide a sliding mechanism between the two surfaces. Oil or other means for lowering the friction between the surfaces 113 and 114 may be provided.

[0033] In the embodiments shown in the drawings, the pressure spring is a hydraulic spring or a gas spring, but it could take the form of any suitable spring providing a force to push the sash against the open position during the opening movement.

[0034] The first side frame member 105 comprises a rail 115 extending in the longitudinal direction L, the rail 115 being configured to guide the foot 110 in the longitudinal direction L during the opening movement. In this way the foot slide surface 114 is arranged to slide on the frame slide surface 114 of the side frame member 105. The rail 115 may be provided by a linear guide, and the foot 110 by a slide or bush. The rail 115 and the arm 111 may substantially correspond to each other in length. In one example the rail 115 and/or arm 111 may be 1/3 of the window length or less. In one example the rail 115 extends from about the centre of the frame 101 to about halfway on the lower half of the frame 101.

[0035] Figs 5 to 6 show possible embodiments of the foot and rail. In the embodiment of Fig. 5 the rail 215 comprises the foot slide surface 213 and an abutment surface 216 supporting the foot 210 in a direction perpendicular to the longitudinal direction of frame member 105. The abutment surface 216 and the foot slide surface 213 of the rail 215 provide an L-shape of the frame side member 105 when seen in the longitudinal direction L.

[0036] Fig. 6 shows another embodiment of the foot and rail in which the rail 315 is provided as an integral U-shaped groove in the first frame member 105, the groove comprising a foot slide surface 313 and an opposing abutment surface 316, said foot slide surface 313 and said abutment surface 316 being connected by a connection portion 317 guiding the foot 310's movement in the longitudinal direction L.

[0037] In the embodiment shown in Fig. 7, the foot is embodied as a wheel or roller 410 provided in a rail 415, where the rail 415 comprises two opposing surfaces constituted by the abutment surface 416 and the opposite slide surface 413, where a connection portion 417 connects the two opposing surfaces. The abutment surface 416 and the slide surface 413 are provided with a protrusion 418 so that a track 419, 420 is formed on each side of the protrusions 418. The wheel 410 is in this way provided in the rail 415 so that it may be moved and/or rotated in the longitudinal direction of the frame side member 105 along the two tracks 419, 420 provided in the rail 415 so as to achieve the effects of the invention.

[0038] A second of the side frame members and a second of the side sash members opposing said first side frame and side sash members of said window may be connected by a second, corresponding and mirrored pressure spring arrangement with an arm and a foot to enhance the effects achieved by the first pressure spring arrangement.

[0039] Furthermore the roof window may comprise a chain actuator configured at least for performing the closure of the window. The window being configured with a chain actuator has the effect of providing closing assisting means, such that the window for example could be self closing and locking.

[0040] The invention should not be regarded as being limited to the embodiments described in the above, but various modifications and combinations may be carried out within the scope of the appended claims. For example

this disclosure may be employed in roof windows which are centre hanged, top hanged, bottom hanged, semi-top hanged or roof windows with multiple wings.

Claims

1. A roof window having a frame (101) and a sash (102), each having a top member (103, 107), a bottom member (104, 108) and two side members (105, 109),
the sash (102) being pivotally connected to the frame (101) so that a pivotal opening movement of the sash (102) in relation to the frame (101) moves the window between a closed position and a fully opened position, wherein the window comprises a pressure spring (106),
the pressure spring (106) over at least a part of the opening movement pushing the sash (102) against the fully opened position of the window,
the pressure spring (106) at a first position (A) being rotatably attached to a first of the side sash members (109),
characterized in that
the pressure spring (106) at a second position (B) is rotatably attached to an arm (111), and
the arm (111) at a third position (C) is rotatably attached to the first of the side sash members (109) and at a fourth position (D) is rotatably attached to a foot (113),
the foot (113) being connected to a first of the side frame members (105), which is associated with the first side sash member (109), such as to be able to move in a longitudinal direction of the first side frame member (105) during said opening movement, said longitudinal direction extending from the bottom frame member towards the top frame member.

2. A roof window according to claim 1, wherein the second position (B) is located between and at a distance from each of the third (C) and fourth (D) positions.

3. A roof window according to claim 1 or 2, wherein each of the first to fourth (A, B, C, D) positions are configured as rotary joints, each with a rotation axis extending substantially parallel with the top member (103, 107) or bottom member (104, 108).

4. A roof window according to any one of the previous claims, wherein said first (A) and second (B) positions in said closed position are located so that said pressure spring (106) is arranged to extend substantially in said longitudinal direction and substantially in parallel with said arm (111).

5. A roof window according to any one of the previous claims, wherein said positions (A, B, C, D) seen from the bottom frame member (104) towards the top frame member (103) in the closed window position are arranged in the order first (A), fourth (D), second (B) and third (C).

6. A roof window according to any one of the previous claims, wherein the second position (B) during a first part of the opening movement moves in said longitudinal direction along the side frame member (105) towards the bottom frame member (104) and in a second, subsequent part of the opening movement also moves in a direction away from the side frame member (105) towards the side sash member (109), and the fourth position (D) during the entire said opening movement moves in said longitudinal direction along the side frame member (105) towards the bottom frame member (104), the arm (111) in said fully opened position extending at an angle (α) to the longitudinal direction of the side frame member (105).

7. A roof window according to any one of the previous claims, wherein the foot (110) during the entire opening movement is configured to move freely along said longitudinal direction.

8. A roof window according to any one of the previous claims, wherein the foot (110) is configured to slide in said longitudinal direction with a foot slide surface (113) sliding on a frame slide surface (114) of said first side frame member (105) during the opening movement.

9. A roof window according to any one of the previous claims, wherein the first side frame member (105) comprises a rail (115) extending in said longitudinal direction, the rail (115) being configured to guide the foot (110) in said longitudinal direction during the opening movement.

10. A roof window according to claim 9, wherein the rail (115; 215) comprises the foot slide surface (113; 213) and an abutment surface (216) supporting the foot (110; 210) in a direction perpendicular to the longitudinal direction of said frame member.

11. A roof window according claim 9 or 10, wherein the rail (115; 215; 315) is provided as an integral U-shaped groove in the first side frame member (105), the groove comprising a foot slide surface (113; 213; 313) and an opposing abutment surface (216; 316), said foot slide surface (113; 213; 313) and said abutment surface (216; 316) connected by a connection portion (317) guiding said foot to move in said longitudinal direction.

12. A roof window according to any one of the previous claims, wherein a second of the side frame members and a second of the side sash members opposing

said first side frame (105) and side sash members (109) of said window are connected by a corresponding mirrored pressure spring arrangement with an arm and a foot.

13. A roof window according to any one of the previous claims, wherein said arm (111) is a substantially straight rod.

14. A roof window according to any one of the previous claims comprising a chain actuator configured at least for performing the closure of the window.

Patentansprüche

1. Dachfenster, das einen Rahmen (101) und einen Flügel (102) aufweist, die jeweils ein oberes Glied (103, 107), ein unteres Glied (104, 108) und zwei Seitenglieder (105, 109) aufweisen,
wobei der Flügel (102) schwenkbar mit dem Rahmen (101) verbunden ist, so dass eine Schwenköffnungsbewegung des Flügels (102) bezüglich des Rahmens (101) das Fenster zwischen einer geschlossenen Position und einer vollständig geöffneten Position bewegt,
wobei das Fenster eine Druckfeder (106) umfasst,
wobei die Druckfeder (106) den Flügel (102) zumindest über einen Teil der Öffnungsbewegung gegen die vollständig geöffnete Position des Fensters drückt, wobei die Druckfeder (106) in einer ersten Position (A) drehbar an einem ersten der Seitenflügelglieder (109) befestigt ist,
dadurch gekennzeichnet, dass
die Druckfeder (106) in einer zweiten Position (B) drehbar an einem Arm (111) befestigt ist, und
der Arm (111) in einer dritten Position (C) drehbar an dem ersten der Seitenflügelglieder (109) befestigt ist und in einer vierten Position (D) drehbar an einem Fuß (113) befestigt ist,
wobei der Fuß (113) mit einem ersten der Seitenrahmenglieder (105), der dem ersten Seitenflügelglied (109) zugeordnet ist, verbunden ist, um während der Öffnungsbewegung in einer Längsrichtung des ersten Seitenrahmenglieds (105) beweglich zu sein, wobei die Längsrichtung von dem unteren Rahmenglied zu dem oberen Rahmenglied verläuft.

2. Dachfenster nach Anspruch 1, wobei sich die zweite Position (B) zwischen und in einem Abstand von jeder der dritten (C) und der vierten (D) Position befindet.

3. Dachfenster nach Anspruch 1 oder 2, wobei jede der ersten bis vierten (A, B, C, D) Position als Drehgelenk ausgebildet ist, jeweils mit einer im Wesentlichen parallel zu dem oberen Glied (103, 107) oder unteren Glied (104, 108) verlaufenden Drehachse.

4. Dachfenster nach einem der vorhergehenden Ansprüche, wobei die erste (A) und zweite (B) Position in der geschlossenen Position so positioniert sind, dass die Druckfeder (106) dahingehend angeordnet ist, sich im Wesentlichen in der Längsrichtung und im Wesentlichen parallel zu dem Arm (111) zu erstrecken.

5. Dachfenster nach einem der vorhergehenden Ansprüche, wobei die Positionen (A, B, C, D), vom unteren Rahmenglied (104) zu dem oberen Rahmenglied (103) gesehen, in der geschlossenen Fensterposition in der Reihenfolge erste (A), vierte (D), zweite (B) und dritte (C) angeordnet sind.

6. Dachfenster nach einem der vorhergehenden Ansprüche, wobei sich die zweite Position (B) während eines ersten Teils der Öffnungsbewegung entlang dem Seitenrahmenglied (105) in der Längsrichtung zu dem unteren Rahmenglied (104) und in einem zweiten, anschließenden Teil der Öffnungsbewegung auch in einer von dem Seitenrahmenglied (105) weg zu dem Seitenflügelglied (109) verlaufenden Richtung bewegt, und sich die vierte Position (D) während der gesamten Öffnungsbewegung in der Längsrichtung entlang dem Seitenrahmenglied (105) zu dem unteren Rahmenglied (104) bewegt, wobei sich der Arm (111) in der vollständig geöffneten Position in einem Winkel (α) zu der Längsrichtung des Seitenrahmenglieds (105) erstreckt.

7. Dachfenster nach einem der vorhergehenden Ansprüche, wobei der Fuß (110) dazu ausgebildet ist, sich während der gesamten Öffnungsbewegung frei entlang der Längsrichtung zu bewegen.

8. Dachfenster nach einem der vorhergehenden Ansprüche, wobei der Fuß (110) dazu ausgebildet ist, in der Längsrichtung zu gleiten, wobei eine Fußgleitfläche (113) während der Öffnungsbewegung auf einer Rahmengleitfläche (114) des ersten Seitenrahmenglieds (105) gleitet.

9. Dachfenster nach einem der vorhergehenden Ansprüche, wobei das erste Seitenrahmenglied (105) eine Schiene (115) umfasst, die sich in der Längsrichtung erstreckt, wobei die Schiene (115) dazu ausgebildet ist, den Fuß (110) während der Öffnungsbewegung in der Längsrichtung zu führen.

10. Dachfenster nach Anspruch 9, wobei die Schiene (115; 215) eine Fußgleitfläche (113; 213) und eine Anlagefläche (216), die den Fuß (110; 210) in einer senkrecht zu der Längsrichtung des Rahmenglieds verlaufenden Richtung stützt, umfasst.

11. Dachfenster nach Anspruch 9 oder 10, wobei die Schiene (115; 215; 315) als eine integrale U-förmige

Nut in dem ersten Seitenrahmenglied (105) vorgesehen ist, wobei die Nut eine Fußgleitfläche (113; 213; 313) und eine gegenüberliegende Anlagefläche (216; 316) umfasst, wobei die Fußgleitfläche (113; 213; 313) und die Anlagefläche (216; 316) durch einen Verbindungsteil (317), der den Fuß zur Bewegung in der Längsrichtung führt, verbunden ist.

12. Dachfenster nach einem der vorhergehenden Ansprüche, wobei ein zweites der Seitenrahmenglieder und ein zweites der Seitenflügelglieder, die dem ersten Seitenrahmen (105) und den Seitenflügelgliedern (!09) des Fensters gegenüberliegen, durch eine entsprechende gespiegelte Druckfederanaordnung mit einem Arm und einem Fuß verbunden sind.

13. Dachfenster nach einem der vorhergehenden Ansprüche, wobei der Arm (111) ein im Wesentlichen gerader Stab ist.

14. Dachfenster nach einem der vorhergehenden Ansprüche, das einen Kettenaktuator umfasst, der zumindest zur Durchführung des Schließens des Fensters ausgebildet ist.

Revendications

1. Fenêtre de toit ayant un cadre (101) et un châssis (102), chacun présentant un organe supérieur (103, 107), un organe inférieur (104, 108) et deux organes latéraux (105, 109),
le châssis (102) étant relié de manière pivotante au cadre (101) de telle sorte qu'un mouvement d'ouverture pivotant du châssis (102) par rapport au cadre (101) déplace la fenêtre entre une position fermée et une position complètement ouverte,
la fenêtre comprenant un ressort de pression (106),
le ressort de pression (106), sur au moins une partie du mouvement d'ouverture, poussant le châssis (102) à l'encontre de la position complètement ouverte de la fenêtre,
le ressort de pression (106), au niveau d'une première position (A), étant fixé de manière rotative à un premier des organes de châssis latéraux (109),
caractérisée en ce que
le ressort de pression (106), au niveau d'une deuxième position (B), est fixé de manière rotative à un bras (111), et
le bras (111), au niveau d'une troisième position (C), est fixé de manière rotative au premier des organes de châssis latéraux (109) et, au niveau d'une quatrième position (D), est fixé de manière rotative à un pied (113),
le pied (113) étant raccordé à un premier des organes de cadres latéraux (105) qui est associé au premier organe de châssis latéral (109) de manière à pouvoir se déplacer dans une direction longitudinale du premier organe de cadre latéral (105) au cours dudit mouvement d'ouverture, ladite direction longitudinale s'étendant depuis l'organe de cadre inférieur vers l'organe de cadre supérieur.

2. Fenêtre de toit selon la revendication 1, dans laquelle la deuxième position (B) est située entre, et à une distance de chacune de, la troisième (C) et la quatrième (D) position.

3. Fenêtre de toit selon la revendication 1 ou 2, dans laquelle chacune des première à quatrième (A, B, C, D) positions sont configurées sous forme de joints rotatifs, chacun ayant un axe de rotation s'étendant sensiblement parallèlement à l'organe supérieur (103, 107) ou à l'organe inférieur (104, 108) .

4. Fenêtre de toit selon l'une quelconque des revendications précédentes, dans laquelle lesdites première (A) et deuxième (B) positions dans ladite position fermée sont situées de telle sorte que ledit ressort de pression (106) soit disposé de manière à s'étendre sensiblement dans ladite direction longitudinale et sensiblement parallèlement audit bras (111).

5. Fenêtre de toit selon l'une quelconque des revendications précédentes, dans laquelle lesdites positions (A, B, C, D), vues depuis l'organe de cadre inférieur (104) vers l'organe de cadre supérieur (103) dans la position fermée de la fenêtre, sont disposées dans l'ordre suivant : première (A), quatrième (D), deuxième (B) et troisième (C).

6. Fenêtre de toit selon l'une quelconque des revendications précédentes, dans laquelle la deuxième position (B), au cours d'une première partie du mouvement d'ouverture, se déplace dans ladite direction longitudinale le long de l'organe de cadre latéral (105) vers l'organe de cadre inférieur (104), et dans une deuxième partie subséquente du mouvement d'ouverture, se déplace également dans une direction à l'écart de l'organe de cadre latéral (105) vers l'organe de châssis latéral (109), et la quatrième position (D), au cours de tout le mouvement d'ouverture, se déplace dans ladite direction longitudinale le long de l'organe de cadre latéral (105) vers l'organe de cadre inférieur (104), le bras (111), dans ladite position entièrement ouverte, s'étendant suivant un angle (α) par rapport à la direction longitudinale de l'organe de cadre latéral (105).

7. Fenêtre de toit selon l'une quelconque des revendications précédentes, dans laquelle le pied (110), au cours de tout le mouvement d'ouverture, est configuré pour se déplacer librement le long de ladite direction longitudinale.

8. Fenêtre de toit selon l'une quelconque des revendi-

cations précédentes, dans laquelle le pied (110) est configuré pour coulisser dans ladite direction longitudinale avec une surface de coulissement de pied (113) coulissant sur une surface de coulissement de cadre (114) dudit premier organe de cadre latéral (105) au cours du mouvement d'ouverture.

9. Fenêtre de toit selon l'une quelconque des revendications précédentes, dans laquelle le premier organe de cadre latéral (105) comprend un rail (115) s'étendant dans ladite direction longitudinale, le rail (115) étant configuré pour guider le pied (110) dans ladite direction longitudinale au cours du mouvement d'ouverture.

10. Fenêtre de toit selon la revendication 9, dans laquelle le rail (115 ; 215) comprend la surface de coulissement de pied (113 ; 213) et une surface de butée (216) supportant le pied (110 ; 210) dans une direction perpendiculaire à la direction longitudinale dudit organe de cadre.

11. Fenêtre de toit selon la revendication 9 ou 10, dans laquelle le rail (115 ; 215 ; 315) est prévu sous forme de rainure intégrale en forme de U dans le premier organe de cadre latéral (105), la rainure comprenant une surface de coulissement de pied (113 ; 213 ; 313) et une surface de butée opposée (216 ; 316), ladite surface de coulissement de pied (113 ; 213 ; 313) et ladite surface de butée (216 ; 316) étant connectées par une partie de connexion (317) guidant ledit pied de manière à le déplacer dans ladite direction longitudinale.

12. Fenêtre de toit selon l'une quelconque des revendications précédentes, dans laquelle un deuxième des organes de cadre latéraux et un deuxième des organes de châssis latéraux opposés audit premier organe latéral (105) et aux organes de châssis latéraux (109) de ladite fenêtre sont raccordés par un agencement miroir correspondant de ressort de pression avec un bras et un pied.

13. Fenêtre de toit selon l'une quelconque des revendications précédentes, dans laquelle ledit bras (111) est une barre sensiblement droite.

14. Fenêtre de toit selon l'une quelconque des revendications précédentes, comprenant un actionneur à chaîne configuré au moins pour effectuer la fermeture de la fenêtre.

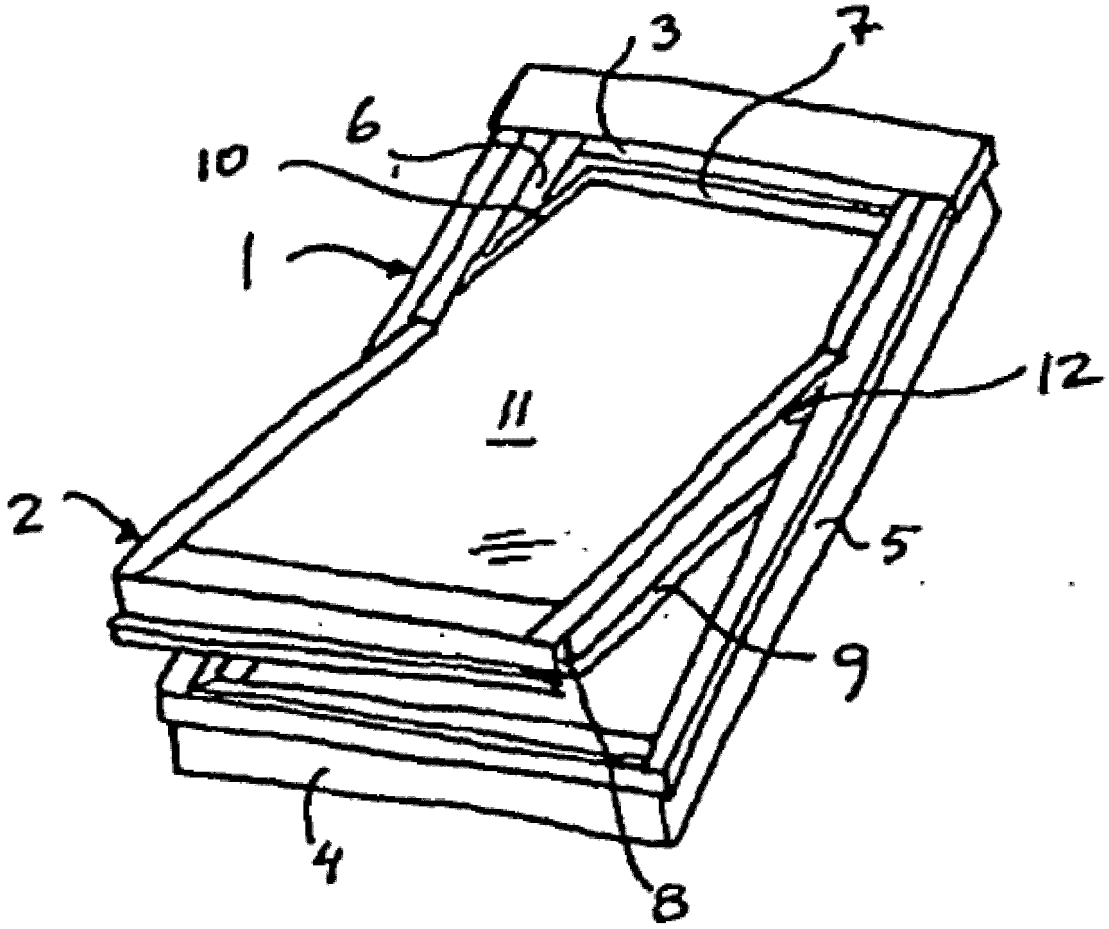


Fig. 1 (Prior Art)

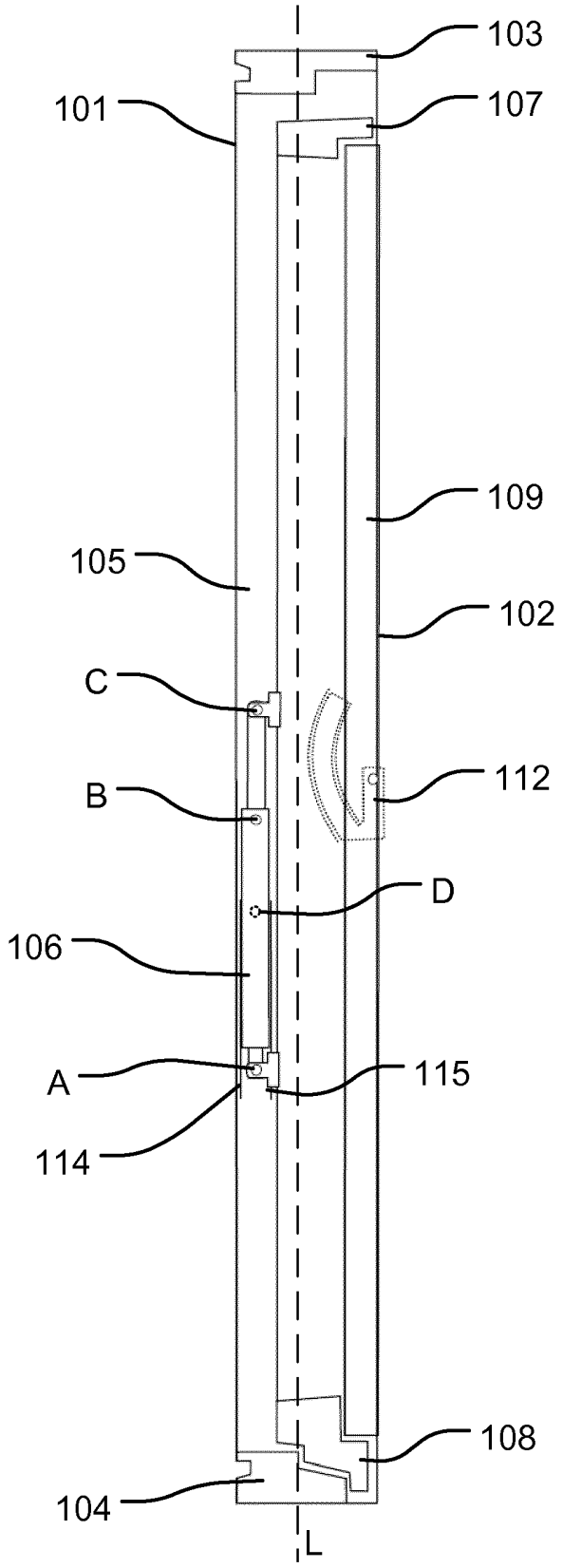


Fig. 2

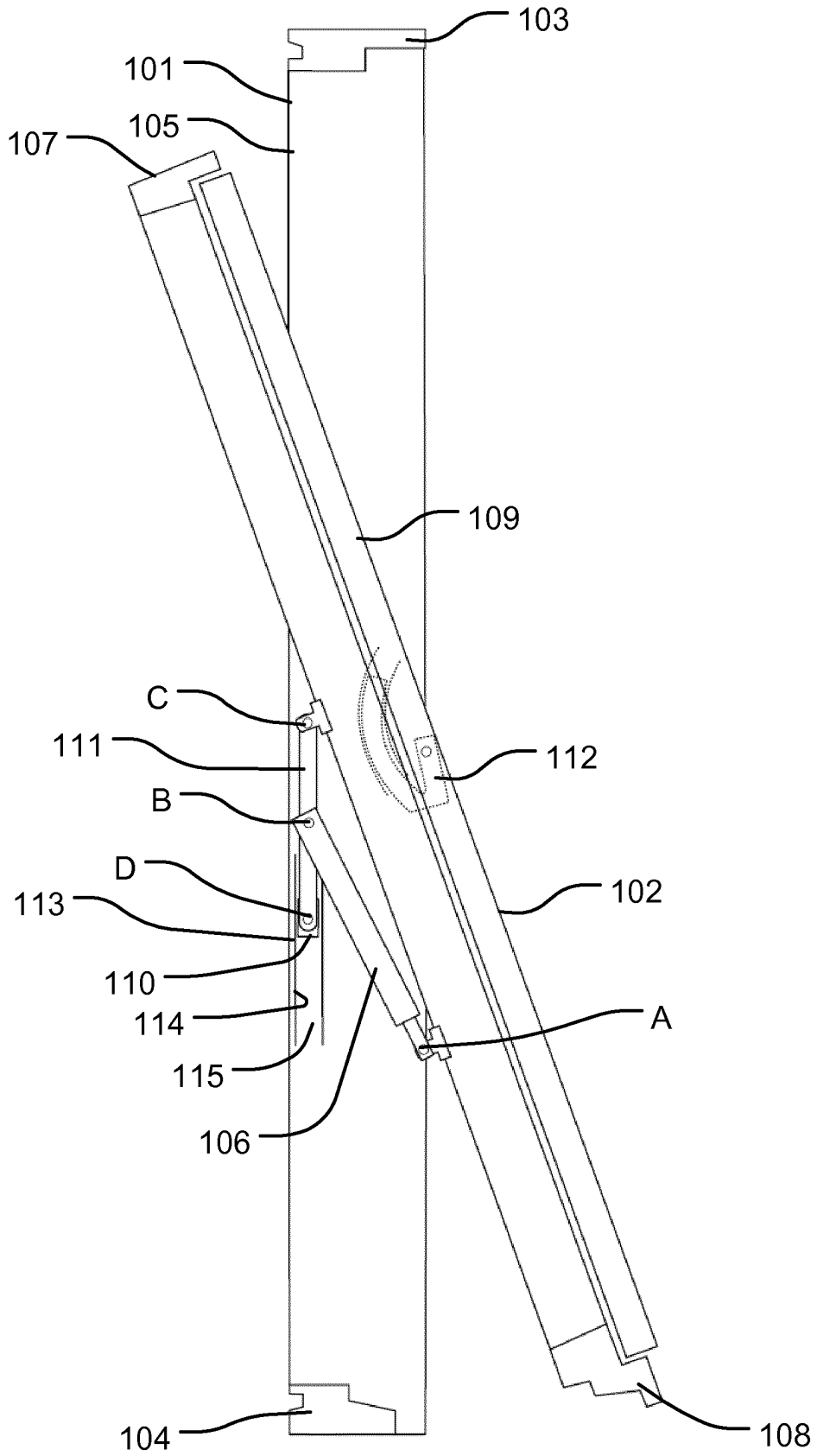


Fig. 3

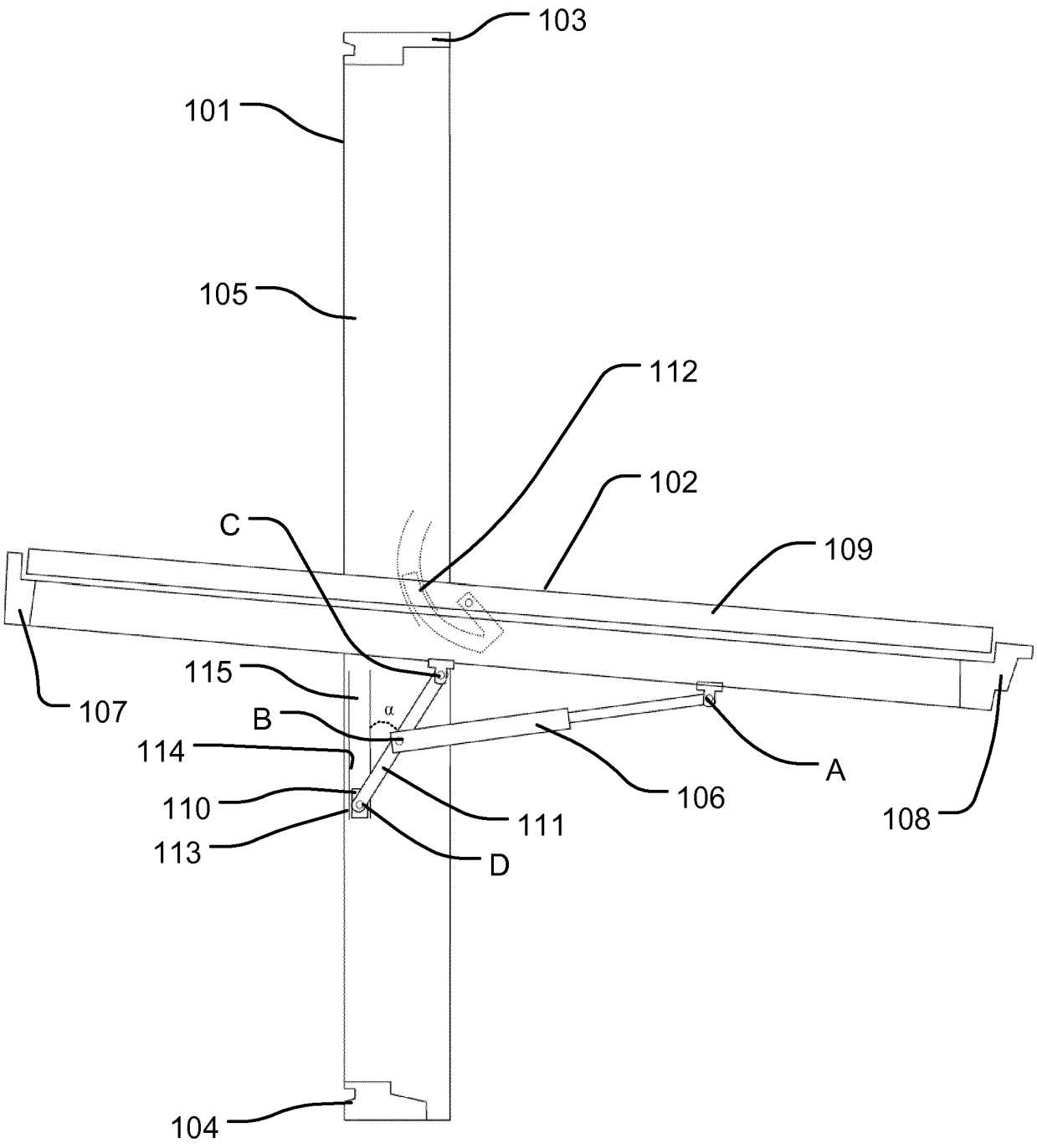

103
101
105
112
102
C
109
115
107
B
α
114
A
106
110
111
108
113
D
104

Fig. 4

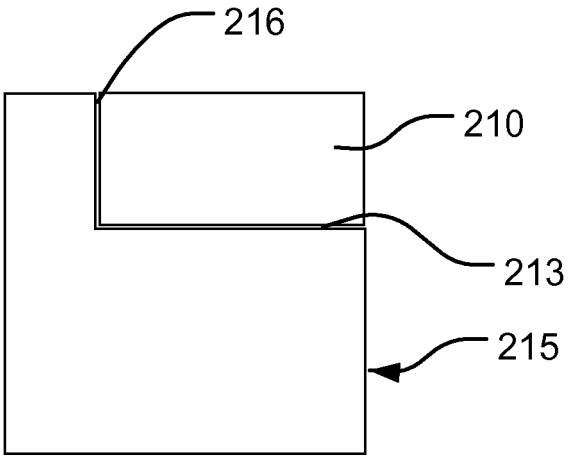


Fig. 5

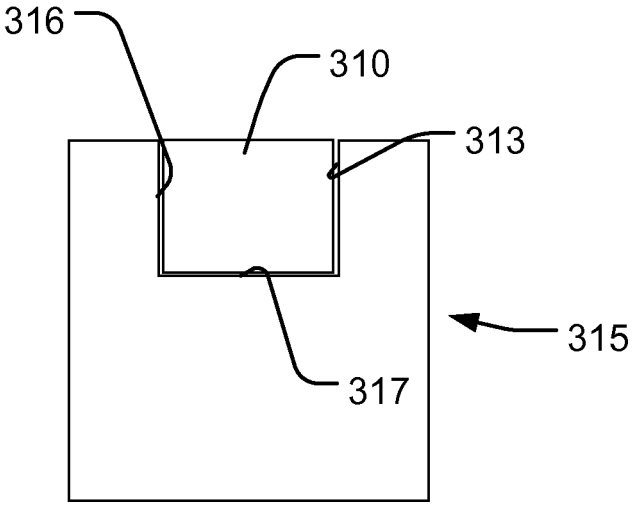


Fig. 6

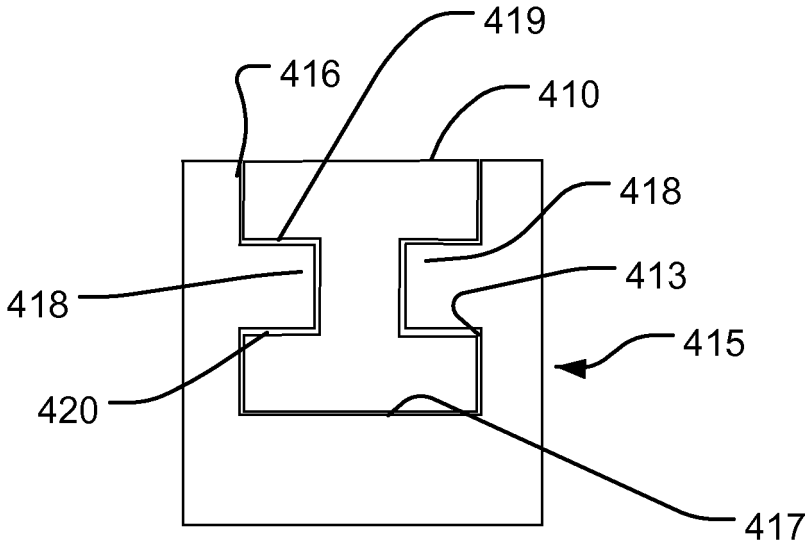


Fig. 7

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

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