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

(11) **EP 3 392 442 A1**

(12) **EUROPEAN PATENT APPLICATION**
published in accordance with Art. 153(4) EPC

(43) Date of publication:
24.10.2018 Bulletin 2018/43

(21) Application number: **15910453.8**

(22) Date of filing: **14.12.2015**

(51) Int Cl.:
E06B 7/02 *(2006.01)*

(86) International application number:
PCT/CN2015/097279

(87) International publication number:
WO 2017/100980 (22.06.2017 Gazette 2017/25)

(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
Designated Extension States:
BA ME
Designated Validation States:
MA MD

(71) Applicant: **Ningbo Haishu Sonjin Industrial & Trading Co., Ltd.**
Ningbo, Zhejiang 315159 (CN)

(72) Inventor: **DONG, Zhijun**
Ningbo
Zhejiang 315177 (CN)

(74) Representative: **Cabinet Plasseraud**
66, rue de la Chaussée d'Antin
75440 Paris Cedex 09 (FR)

(54) VENTILATION WINDOW/DOOR AND ARTICULATION APPARATUS THEREFOR

(57) The present invention relates to a ventilation window or door having a main frame, a glass-supporting sash that is arranged to tilt within the main frame, a ventilation passage provided in the sash that extends between an interior opening and an exterior opening of the window, with a locking fitting adapted to lock the sash to the main frame in a closed position, with the lock having a locking mechanism mounted on the sash inside the ventilation passage. According to the invention, the window or door has a pivoting flap mounted on the sash and connected to the locking mechanism, where the pivoting flap is adapted to pivot around a first axis which is stationary relative to the sash, between a closed position in which the flap shuts the interior opening while setting the locking mechanism in a locked position and a first opened position in which the flap is pivoted to open the ventilation passage while setting the locking mechanism in an unlocked position. Further, the present invention includes the pivoting flap adapted to pivot around a second axis which is stationary relative to the sash and parallel to the first axis, between the closed position of the flap and a second opened position in which the flap is pivoted to open the ventilation passage while keeping the locking mechanism in the locked position.

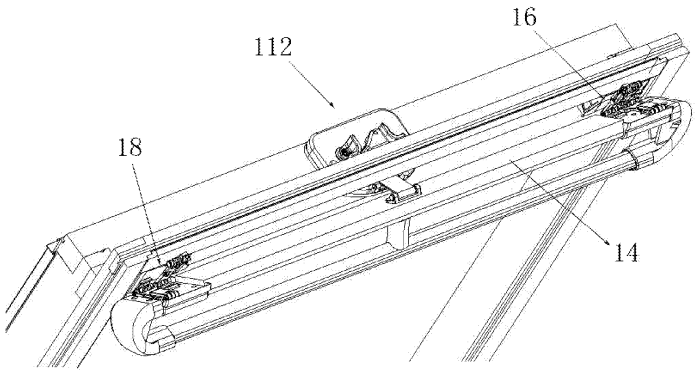

Fig. 3

EP 3 392 442 A1

Description

FIELD OF THE INVENTION

[0001] This invention relates to a ventilation window or door, in particular, a ventilation window or door having a hinged bidirectional pivoting system for tilting roof windows and doors that includes a ventilation flap actuating a lock. This invention further relates to an articulation device for such kind of ventilation window or door.

DESCRIPTION OF THE PRIOR ART

[0002] Inclined roof windows are adapted for inclined roofs, which can provide an abundance of sunshine for buildings and brighten interiors.

[0003] In the prior art, for example, a window includes an inside window frame and an outside window sash structure, i.e., a pivotally mounted glass window structure, wherein the inside window frame is mounted on the wall or the roof, while one end of the outside window sash is pivotally connected with the inside window frame, and the other end can be opened or closed by a locking stay device.

[0004] In order to allow proper and suitable ventilation between the interior and exterior areas of a building, most inclined roof windows are designed to be opened and closed at will by users.

[0005] A simple and elegant design includes that of a small door or window opening, i.e., a ventilation passage, interconnecting the interior and the exterior areas, combined with the door or window, which make it possible to open or close the ventilation opening embedded in doors or windows, so as to achieve an efficient exchange of air and ventilation between the interior and the exterior areas.

[0006] In the prior art related to roof windows, references DE6903921 as well as EP0458725B1 show known structures and mechanisms for achieving air ventilation between exterior and interior areas and as well as present cover members which can pivot in a single direction designed to be connected with a window sash by a locking device. When the window sash is on a locked position relative to the main window frame, this cover member may pivot in a single direction so as to open or close the air passage, while driving a control member connected to a specially designed locking device, allowing the control member to be placed in various positions, such as three different positions. When placed in different positions, the pawls of the locking device are driven accordingly, so as to open or close the window at the same time the ventilation opening is opened or closed when the sash is closed.

[0007] For example, in the design described in WO2007/009685, many disadvantages are visible. Costs are high and manufacturing processes are complicated, thus locking devices such as belonging to this design has definite disadvantages.

[0008] In this prior art design, in order to slide among three different positions, the cover member is connected with the control member by using springs on different pivot points, but in such designs, different metal components clash with each other, thus generating undesirable noise when actuated and used. Some improvements have been proposed for this type of locking device such as in EP053881157 and DKPA200600968, which invariably adds further cost and is subject to wear and tear issues with long term usage. Thus, with long term usage, the problems associated with noise may return as well.

[0009] For instance, because the pivot is set under a cover member, when the cover member is opened and on a ventilation position, the cover member is connected with the sliding control member, while the opening angle of the cover member corresponds to the sliding distance. Therefore, the ventilation angle cannot be too large, while in order to facilitate the usage, its pivot can only be arranged under the cover member. Accordingly, the cover member is positioned so that it blocks the air exchange direction between the interior and the exterior spaces, resulting in an undesirable air exchange effect and low efficiency.

[0010] Further, this design poses a natural and inherent defect. Since the ventilation cover member, i.e., the top ventilation member, connected with the lock system controls the opening of the air passage between the interior and the exterior areas, it is very likely that the window can be opened by acting on the ventilation cover member with a thin steel wire or other elements through the ventilation passage. This increases the possibility of unauthorized entries and penetration such as house burglaries and the like.

[0011] The following known mechanisms (DK2002/000235, WO02/084043, WO99/51832, WO99/10610) propose to partially block the ventilation member (top member) from the exterior area, reducing the possibility of burglaries from occurring, while undesirably increasing the cost and reducing the ventilation effect.

[0012] In WO2009/141447A1, the ventilation member additionally has a self-lock function, whereas in WO2002/08043, this device should be activated manually. However, manual activation can be easily forgotten by a user, making it inconvenient to use, posing further dangers, and resulting in higher costs.

[0013] For the opening and closing processes, various types of locks and/or locking control mechanisms may be provided. The efficient and smart use of a lock has a direct impact on the efficiency of inclined roof windows.

[0014] Classically, the locking stay device contains a bar-shaped locking element which includes a cylindrical pin and a locking device, wherein the bar-shaped locking element is pivotally connected with the outside window sash, on which there are a plurality of position pawls, and the cylindrical pin is arranged on the inside window frame, which cooperates with the position pawls to adjust the opening of a vent, when closed, the inside window frame

and the outside window sash are tightly connected by turning the locking stay device with a handle.

[0015] There are some disadvantages existing in the structure mentioned above. First, the vent opening adjustment device is detached from the locking stay device which results in more parts, difficulty in assembling, higher manufacturing cost, and annoying operation. Secondly, the bar- sharp locking element includes pawls which affect the mechanical strength of the locking element. Moreover, the locking element is easy to slip from the cylindrical pin thereby affecting position and the use.

[0016] Various locking devices have been proposed as well as such as one which includes a tilting sash on which is mounted an actuation assembly movable in translation and including a handle bar as well as a gear mechanism which converts a translation movement of an actuator element into a rotational movement of locking elements (EP 1746232B1). Such mechanism utilizes a magnetic means to actuate the locking elements, which may pose other inherent problems of long term usage and wear and tear. Other prior art propose similar mechanisms such as EP 1762679A1, describing an assembly for securing a closure member in a closed position including the use of attractive magnets. Furthermore, locking devices in prior art typically use at least two hinged levers and two return springs as linking mechanism between the actuation slider and a latching hook. However, the disadvantages of this design include the number of components and complexity of the design mechanism.

[0017] In CN 102812198 A, a new ventilation window is proposed which is improved for the above-mentioned prior art. The new ventilation window may choose the direction of ventilation and whether to lock the window by bidirectional pivoting flap connected with the hinged arm. The pivoting flap may be positioned in various positions, for example, when in a closed position, the flap closes the ventilation passage while setting the locking mechanism in a locked position. In a first opened position, the flap is pivoted to open the ventilation passage while setting the locking mechanism in an unlocked position. In a second opened position, the flap is pivoted to open the ventilation passage while setting the locking mechanism in a locked position and the direction of the second opening position is opposite to that of the first opening position.

[0018] The member mentioned above has disadvantages. Since different users apply pulling force of different direction to the flap, when actuating of the device, the they often pull two axis and two axis sleeves up and down at the same time. Especially in the case of fierce force applied by the user, the mechanism tends to occur bending deformation, the risk of detachment between the axis and the axis sleeve can be increased, mechanism malfunction and noises can occur, damage can be easy to occur to the members and service life can be reduced when operation. In order to reduce such phenomenon, the degree of adaptability between the end of the hinged arm and the circular arc shaped of the flap must be improved. This inevitably increases the requirements of the processing procedure and expensive processing cost.

[0019] There are still other disadvantages in the mechanism mentioned above. Because such a ventilation window or door is mounted in a relatively high position, the user is inconvenient to apply forces when operating; specifically, due to opposite directions of the second opening position and the first opening position, the operator can easily open the ventilation window or door in one of the directions (eg. the first opened position) and to be difficult in opening the ventilation window or door in other directions (eg. the second opened position) and the mechanism does not conform to an ergonomic design. In addition, it is difficult for the existing mechanism mentioned above to ensure that when the ventilation window or door is opened to the first opened position or the second opened position, it can still be reliably maintained in the first opened position or the second opened position without external force, that is, there is still a risk of accidental failure in the existing mechanism mentioned above.

SUMMARY OF THE INVENTION

[0020] In light of prior art mentioned above, the technical problem that the present invention intends to solve is to provide a ventilation window or door having a locking device and a ventilation device, which combines a novel and inventive ventilation opening adjustment and locking mechanism that is simpler, low noise, lower requirements for processing procedure and higher reliability. In addition, it can also provide an operator with an auxiliary force to improve operability, while providing a supporting force to the ventilation window or door to reduce the risk of accidental failure, and when in the first opened position, the second opened position is simultaneously opened. The flap can provide automatic resilience force after releasing the handle and the flap can be in the first opened position, which avoids the risk of the failure of the mechanism when such a structure is pulled out.

[0021] In order to solve the aforementioned technical problems and overcome some of the inherent problems found in the prior art, the present invention, in one aspect, includes a ventilation window or door having a main frame, a glass-supporting sash that is arranged to tilt within the main frame, a ventilation passage provided in the sash, extending between an interior opening and an exterior opening of the window, with a locking device adapted to lock the sash to the main frame in a closed position, with the lock having a locking mechanism mounted on the sash inside the ventilation passage. According to the invention, the window or door has a pivoting flap mounted on the sash and connected to the locking mechanism, where the pivoting flap is adapted to pivot around a first axis which is stationary relative to the sash, between a closed position in which the flap closes the interior opening while setting the locking mechanism in a locked position and a first opened position in which the flap is pivoted to open the ventilation passage while setting the

locking mechanism in an unlocked position.

[0022] Further, the pivoting flap is adapted to pivot around a second axis which is stationary relative to the sash and parallel to the first axis, between the closed position of the flap and a second opened position in which the flap is pivoted to open the ventilation passage while keeping the locking mechanism in the locked position.

[0023] The invention further comprises at least one articulation device, comprising a fixed block, the pivoting flap connected to the articulation device mounted on the sash by the fixed block, the articulation device further comprising:

- a plurality of axis pin, comprising: a first axis pin coaxial with the first axis, a second axis pin coaxial with the second axis, a third axis pin coaxial with a first movable axis parallel to the first axis, a fourth axis pin coaxial with a second movable axis parallel to the first movable axis, and a distance between the first axis pin and the fourth axis pin is equal to a distance between the second axis pin and the third axis pin;
- two connected arms, both ends of one connected arm respectively hinged to the first axis pin and the fourth axis pin, and both ends of the other connected arm respectively hinged to the second axis pin and the third axis pin,
- two rigid connector, wherein one connector is mounted on the fixed block and both ends are respectively hinged to the first axis pin and the second axis pin, the other connector is fixedly mounted on the pivoting flap and both ends are respectively connected to the third axis pin and the fourth axis pin; when the pivoting flap rotates around the axis, said two rigid connector are adapted for delivering partial stress on the connected arm to the fixed block;
- an elastic supporting device, disposed on a middle part of one of the two connected arms, so that the connected arm can elastically pivot around the second axis that the pivoting flap can be kept in the second opened position.

[0024] The elastic supporting device is a torsional spring, one end of which is mounted on the connected arm, and the other end of which has a protrusion, the fixed block further comprises a limiting slot located inside the fixed block to receive the protrusion. Thus, when the ventilation window or door is opened to the second opened position by a user, the protrusion in the limiting slot can provide resilience force for the torsional spring, so as to help balancing the gravity of the pivoting flap by the resilience force, thus the pivoting flap can be kept in the second opened position.

[0025] In another aspect of the invention, in the hinged device:

- the two connected arm comprising a first connected arm and a second connected arm, the first connected arm comprising a first axis sleeve hinged to the first axis pin, and a second axis sleeve hinged to the fourth axis pin; the second connected arm comprising a third axis sleeve hinged to the second axis pin, and a fourth axis sleeve hinged to the third axis pin;
- the two rigid connectors comprising a first rigid connector and a second rigid connector, the first rigid connector comprising a fifth axis sleeve hinged to the first axis pin and a sixth axis sleeve hinged to the second axis pin, and the second rigid connector comprising a seventh axis sleeve hinged to the third axis pin and a eighth axis sleeve hinged to the fourth axis pin;

[0026] The first movable axis and the second movable axis extend along the length of the flap, and when the flap is in its closed position, the first movable axis coincides with the first axis, the second movable axis coincides with the second axis.

[0027] In another aspect of the invention, when the pivoting flap is in its closing position, the first rigid connector and the second rigid connector face each other with a distance in order to avoid interference from occurring.

[0028] In another aspect of the invention, a body of the first rigid connector and the second rigid connector has at least one through hole so that the first rigid connector and the second rigid connector are fixed on the fixed block and the pivoting flap by a bolt with a through hole or a threw. The first rigid connector may be divided into two separate parts, each of the two separate parts has at least one said through hole, wherein one of the separate parts is hinged to the first axis pin, and the other one of the separate parts is hinged to the second axis pin. The second rigid connector may be divided into two separate parts, each of the two separate parts has at least one said through hole, wherein one of the separate parts is hinged to the third axis pin, and the other one of the separate parts is hinged to the fourth axis pin.

[0029] In another aspect of the invention, the third and the fourth axis are wound with torsional springs, a supporting slot for supporting the torsional spring is arranged on the first and the second connected arms so that the flap tends to be kept in the closed position of closing the interior opening by resilience force of the torsional spring.

[0030] According to the invention, the fixed block further comprises: at least one recess arranged in the limiting slot and applying frictional force to the elastic supporting device, and the recess applies frictional force to the elastic supporting device when one part of the elastic supporting device moves into the recess.

[0031] The connector and each axis of the present invention are always connected together during the movement process, which reduces the friction, wear and collision between the members. Especially, the noise can be reduced after the lubricating oil is applied, and the service life can be improved. At the same time, because each of the axis and the axis sleeve is always hinged to operate together, the size of the members can be greatly

reduced, the amount of materials used can be reduced in the production process, and the cost can be reduced. And assembling space of the ventilation holes can be greatly reduced by the device for locking and ventilating windows or doors of the present invention via the hinge device, so that the size of the ventilation plate can be made narrower to increase the light passing area of the window.

[0032] Another aspect of the invention further comprises an articulation device, adapted for use in the ventilation window or door, comprising:

- a fixed block, adapted for mounting on a sash or a door frame,
- a plurality of axis pin, comprising: a first axis pin defining the first axis, a second axis pin defining the second axis, a third axis pin defining a first movable axis parallel to the first axis, a fourth axis pin defining a second movable axis parallel to the first movable axis, wherein a distance between the first axis pin and the fourth axis pin is equal to a distance between the second axis pin and the third axis pin;
- two connected arms, both ends of one connected arm respectively hinged to the first axis pin and the fourth axis pin, and both ends of the other connected arm respectively hinged to the second axis pin and the third axis pin,
- two rigid connector, wherein, one connector is mounted on the fixed block and both ends are respectively connected to the first axis pin and the second axis pin, both ends of the other connector are respectively connected to the third axis pin and the fourth axis pin;
- an elastic supporting device, disposed on a middle part of one of the two connected arms, so that the connected arm can elastically pivot around the second axis or the first axis and be supported relative to the fixed block.

[0033] The articulation device of the present invention allows the user to automatically obtain the resilience force from the elastic supporting device when the user opens the articulation device around the second axis through the elastic supporting device, thereby providing the user with an auxiliary force. At the same time, when the user opens the articulation device around the second axis, the resilience force of the elastic supporting device can be balanced and stabilized in the opened state, further preventing the risk of accidental failure.

BRIEF DESCRIPTION OF THE DRAWINGS

[0034]

Figure 1 is a schematic perspective view of an exemplary window ventilation system according to the present invention.

Figure 2 shows a schematic perspective view of a ventilation window according to one embodiment of the invention, which is mounted with the window ventilation system of Figure 1, wherein a pivoting flap and an articulation device of the window ventilation system of Figure 1 in a close position.

Figure 2A shows a cross-sectional view of an articulation device in a closed position of Figure 2.

Figure 3 is a schematic perspective view of the pivoting flap and the articulation device of the window ventilation system in the first opened position of Figure 1.

Figure 3A is enlarged schematic view of the pivoting flap in the first opened position of Figure 3.

Figure 4 shows a cross-sectional view of a pivoting flap and an articulation device of the window ventilation system in a second opened position of Figure 1.

Figure 4A shows another cross-sectional view of a pivoting flap and an articulation device of the window ventilation system in a second opened position of Figure 1.

Figure 5A shows a schematic perspective view of an exemplary window with the pivoting flap in the first opened position.

Figure 5B shows a cross-sectional schematic perspective view of the window of Figure 5A.

Figure 6A shows a schematic perspective view of an exemplary window with the pivoting flap in the second opened position.

Figure 6B shows a cross-sectional schematic perspective view of the window of Figure 6A.

Figure 7 shows a schematic perspective view of the exemplary window with the sash opened.

Figure 8 shows a schematic view of a locking fitting of the ventilation system of Figure 1.

Figure 9 shows a schematic view of the locking mechanism of the locking fitting of Figure 8 in greater detail.

Figure 9A shows a schematic view of the locking mechanism of the locking fitting of Figure 8 in greater detail.

Figure 10 shows a view of the articulation device in greater detail.

Figure 11 shows another directional view of the articulation device including a fixed block.

Figure 12 shows a view of one embodiment of another improvement of articulation device.

DETAILED DESCRIPTION OF THE INVENTION

[0035] Referring to Figure 1, a ventilation system 10 of the present invention is shown. The ventilation system 10 is mounted against a window or a door. A handle or handle bar 12 is connected to a pivoting flap 14 having a bidirectional function or mechanism, which is connected to two articulation devices 16 and 18 (see Figure 3). The articulation devices 16 and 18 are hingedly connected to the pivoting flap 14.

[0036] Referring to now Figure 2, the pivoting flap 14 and the articulation devices 16, 18 of the window ventilation system 10 of Figure 1 is shown in a close position, at this time, the window is closed.

[0037] Referring to Figure 2A, a cross-sectional view of the articulation device 16 of Figure 2 is shown in a closed position.

[0038] Referring to Figure 3, the pivoting flap 14 and the articulation devices 16, 18 of the ventilation system 10 is shown in a first opened position.

[0039] Referring to Figure 3A, an enlarged view of the articulation device 18 is shown a first opened position of Figure 3.

[0040] Referring now to Figure 4, the pivoting flap 14 and the articulation device 16 of the ventilation system 10 is shown in a second opened position. Please be noted that the cross section is taken along the middle part of the pivoting flap 14, that is, along the middle line of the locking device 112.

[0041] Referring now to Figure 4A, a cross-sectional view of the articulation device 16 of Figure 4 is shown in a second opened position.

[0042] Figure 5A shows an exemplary window 100 with the pivoting flap 14 in the first opened position and Figure 5B shows a cross-sectional schematic perspective view of the window. The main frame 102 is illustrated in relation to ventilation system 10. A glass supporting sash 104 is arranged to tilt within the main frame 102. Here, in Figures 5A and 5B, the sash 104 is shown in a closed position.

[0043] With reference to Figure 5B, a ventilation passage 106 is shown where air from an interior space and an exterior space is exchanged freely without any obstacles. The ventilation passage 106 includes an interior opening 108 and an exterior opening 110 in the window 100.

[0044] Here, in the first opened position, the pivoting flap 14 is opened in a way where the air exchange can occur from a bottom configuration of the flap 14 where the flap 14 is opened with the opening 108 facing upward.

[0045] Figure 6A shows an exemplary window with the pivoting flap 14 in the second opened position and Figure 6B shows a cross-sectional schematic perspective view of the window 100. In the second opened position, the pivoting flap 14 is opened in a way where the air exchange can occur from an upper configuration of the flap 14 where the flap 14 is opened with the opening 108 facing downward.

[0046] As can be seen by the arrows representing the flow of air exchanged from the interior space and an exterior space via the interior opening 108 and the exterior opening 110 in the window 100, the fact that window 100 can provide bidirectional ventilation passages offers the advantage that air can be exchanged in a upward direction as shown in Figure 5B and in an downward direction in Figure 6B. That is, the user may decide that it is more desirable to open the ventilation passage 106 in a downward direction rather than in an upward direction because of heat or cold or humidity control.

[0047] The user may also adjust the size and/or length of the ventilation passage 106 by varying degrees of opening size by adjusting the amount by which the user flips open the bidirectional pivoting flap 14, as desired.

[0048] Referring to Figure 6B, the ventilation system 10 of the present invention is shown in a window 100. The window 100 includes a main frame 202 and a sash unit 204. The sash unit 204 includes a sash component 204A and sash component 204B. This design and arrangement of having two distinct and separate sash components provide the additional advantage of having modular components for manufacturing which can lower costs and provides ease of assembly.

[0049] Referring now to Figure 7, window 100 is shown with the sash 104 in an opened position.

[0050] Now, a more precise mechanism and operation of the bidirectional pivoting ventilation system 10 having the bidirectional pivoting flap 14 will be described in greater detail.

[0051] Referring to Figure 8, a locking fitting 112 of the ventilation system 10 of Figure 1 is illustrated. The locking fitting 112 is adapted to lock the sash 104 to the main frame 102 in a closed position. The locking fitting 112 includes a locking mechanism 114 mounted on the sash 104 inside the ventilation passage 106. The locking mechanism 114 has a single locking function.

[0052] Referring back to Figures 3, 4 and 8, the pivoting flap 14 is mounted on the sash 104 and connected to the locking mechanism 114. With reference to Figure 3A, the pivoting flap 14 is adapted to pivot around a first axis (A1) which is stationary relative to the sash 104, between a closed position in which the flap 14 shuts the interior opening 108 while setting the locking mechanism 114 in a locked position and a first opened position in which the flap 14 is pivoted to open the ventilation passage 106 while setting the locking mechanism in an unlocked position.

[0053] Further, with reference to Figure 4, the pivoting flap 14 is adapted to pivot around a second axis (A2) which is stationary relative to the sash 104 and parallel to the first axis (A1), between the closed position of the flap 14 and a second opened position in which the flap 14 is pivoted to open the ventilation passage 106 while keeping the locking mechanism 114 in the locked position.

[0054] Referring now to Figure 3A, details of the articulation device 18 are described. The articulation device 18 has a fixed block 17 secured to the sash 104. The articulation device 16 is assembled to the sash 104 by the fixed block 17. The pivoting flap 14 is connected to the articulation device 16, 18.

[0055] Specifically, referring to Figures 3 and 3A in combination with Figures 10 and 11, the second rigid connector 600b is fixed on the fixed block 17 by the through hole on its body, for example, by a bolt or a screw or by snapping. In addition, there is no limitation to the number of the through hole. The second rigid connector has a extended end extending from its body, the extend-

ed end has a seventh arranged on the third axis pin 87c coaxial with the first movable axis B1 and an eighth axis sleeve arranged on the fourth axis pin 87d coaxial with the second movable axis B2, so as to enable the second rigid connector 600b respectively pivots the first movable axis B1 and the second movable axis B2. Alternatively, the second rigid connector 600b may be divided into two separate parts, each of which has at least one said through hole, one of which is hinged to the third axis pin 87c, and the other one of which is hinged to the fourth axis pin 87d. The first rigid connector 600a is fixed on the pivoting flap 14 by the through hole on its body, for example, by a bolt or a screw or by snapping. The first rigid connector 600a has a extended end extending from its body, the extended end has a fifth axis sleeve 89d arranged on the first axis pin 87a coaxial with the first axis Aland a sixth axis sleeve arranged on the second axis pin 87b coaxial with the second axis A2. Alternatively, the first rigid connector 600a may be divided into two separate parts, each of which has at least one said through hole, one of which is hinged to the first axis pin 87a, and the other one of which is hinged to the second axis pin 87b.

[0056] When the second rigid connector 600b rotates under stress, the stress of the first and the second connected arms 80a, 80b is distributed on the fixed block by the first rigid connector 600a to reduce the probability of deformation of the first and the second connected arms 80a, 80b.

[0057] The first axis pin 87a and the fourth axis pin 87d are respectively nested in a first axis sleeve and a second axis sleeve on both ends of the first connected arm 80a. The second axis pin 87b and the third axis pin 87c are respectively nested in a third axis sleeve and a fourth axis sleeve on both ends of the second connected arm 80b. A length of the first connected arm 80a is the same as a length of the second connected arm 80b so as to ensure a distance between the first axis A1 and the second movable axis B2 is equal to a distance between the second axis A2 and the first movable axis B1.

[0058] Figure 10 shows another view of the operation of the pivoting flap 14 in relation to the articulation device 16. The first movable axis B1 and the second movable axis B2 extending along a length of the flap 14 coincide with the first and second axis (A1, A2) when the flap 14 is in its closed position.

[0059] In certain embodiment, the third and the fourth axis pin are wound with torsional springs 84, 85, one end of which are supported on supporting slots 92, 93 on the opposite side surfaces on the fixed blocks 17, and the other end of which is supported on supporting slots 90, 91 on the first and the second connected arms which may deform as the first or the second connected arm rotates to obtain the resilience force, and the torsional spring facilitates the flap connected to the articulation device to tend to return to a closed position by the resilience force, thus provide a secondary force.

[0060] Referring now to Figure 9, this view shows the locking mechanism 114 of the locking fitting 112 of Figure 8 in greater detail. An actuation linking device 70 for the locking mechanism 114 is hinged to the flap 14 to pivot around a second movable axis B2. The axis B2 extends along a length of the flap 14 and is displaceable relative to the sash 104 (not shown). The actuation linking device 70 also includes a first rod 71 hinged to the flap 14. The first rod 71 is also hinged to the actuation slider 72 of the locking mechanism 114. The actuation slider 72 controls the locking mechanism 114 in the unlocked or locked position. Among them, the position shown in FIG. 9 is the unlocked position.

[0061] In addition, when the flap 14 pivots between its closed position and its second opened position, the second movable axis B2 coincides with the second axis A2. At this time, the locking mechanism 114 is in the locked position, as shown in FIG. 9A.

[0062] In addition, there is a hollow space in the middle of the second connecting rod 80b within which an elastic supporting device 56 is also provided in. The elastic supporting device is a torsional spring member having elasticity, and is pivotably disposed on an axis pin in the middle of the second connecting rod 80b that runs through the hollow space. Optionally, the elastic supporting device may also be mounted in the middle of the first connecting rod 80a. One end of the elastic supporting device is fixed on the connected arm, and the other end has a protrusion. Preferably, the elastic supporting device 56 is also a torsional spring, and its diameter is smaller than the torsional springs 84, 85 on the first and second axis pins. For example, the torsional springs 84, 85 have a diameter of 1.2 to 1.6 mm. The torsional spring as an elastic supporting device 56 has a diameter of 1.0 to 1.4 mm; most preferably, the torsional spring 84, 85 has a diameter of 1.4 mm and the torsional spring as an elastic supporting device 56 has a diameter of 1.2 mm. Since both ends of the torsional springs 84, 85 on the third and fourth axis pins are respectively supported by the supporting slots in the fixed block 17 and the supporting slots on the first and second connected arms. The diameter of the torsional springs 84, 85 on the third and fourth axis pin are respectively larger than the diameter of the torsional spring as the elastic supporting device 56. Therefore, the resilience force of the torsional springs 84, 85 is greater than the resilience force of the elastic supporting device 56, which plays a limiting function for the opening angle of the elastic supporting device 56, and constitutes a limiting device to ensure that the elastic supporting device does not come out of the limiting slot 55 (see below) due to too large opening angle. Thus, when in the closed state, the torsional springs 84, 85 on the first and second axis pins ensure that the first connecting rod 80a and the second connecting rod 80b remain closed at all times, and fix the pivoting flap 14 in the inner window. In this way, the pivoting flap 14 and the inner window are in a closed state to provide resilience force. When in the first opened position, the second rigid connector 600b under the first connecting rod 80a pivots around the sec-

ond movable axis B2, and the torsional spring 84 provides resilience force to ensure that the pivoting flap 14 is opened. And when the first opened position is to be closed, the torsional spring 84 provides resilience force, which makes closing the window feel better.

[0063] With reference to Figures 2A and 4A, in some embodiments, the interior of the fixed block has a cavity further including a limiting slot 55. The limiting slot 55 is located inside the fixed block 17 to receive the protrusion. In particular, there is also a recess in the limiting slot 55 in the present embodiment. When the pivoting flap is in the closed position and the first opened position, the elastic supporting device 56 is located at the distal end of the limiting slot 55. When the pivoting flap is in the second opened position, the elastic supporting device 56 is located at the proximal end of the limiting slot 55, that is, the proximal end is a recess, so as to provide sufficient friction to the elastic supporting device 56 in the second opening position. The elastic supporting device 56 achieves force balance under the action of its own elastic force and frictional force, and is supported at this position. In particular, the protrusion of the elastic supporting device 56 snaps into the limiting slot 55 to stabilize the turning angle of the pivoting flap. Specifically, the elastic supporting device 56 is maintained in the limiting slot 55 by the tension of the torsional spring so that the flap can be maintained in the selected second opened position.

[0064] In this way, when in the second opened position, the elastic supporting device 56 on the second connecting rod 80b rotates around the axis pin. After the elastic supporting device 56 is opened, the pivoting flap 14 is in a fixed state due to frictional force and resistance force and fails to rebound back causing the pivoting flap 14 to close. When the second opened position is to be closed, the torsional spring 85 on the second connecting rod 80b will provide closing assisting force. In another embodiment, the body of the first rigid connector 600a snaps onto an intermediate plate, which is fixed to the flap 14 by a screw penetrating through a through hole in its surface.

[0065] According to another aspect of the present invention, it provides an articulation device for such ventilation windows or doors mentioned above.

[0066] Such articulation device includes the following components:

Fixed block for fixing to a target object that needs to achieve an articulation function, such as a window frame or a door frame.

[0067] A plurality of axis pins include a first axis pin 87a defining a first axis A1, a second axis pin 87b defining a second fixed axis A2, and a third axis pin 87c and a fourth axis pin 87d. The third axis pin 87c defines a first movable axis B1 parallel to the first axis A1. The fourth axis pin 87d defines a second movable axis B2 parallel to the first movable axis B1. The distance between the first axis pin 87a to the fourth axis pin 87d is equal to the distance between the second axis pin 87b and the third axis pin 87c.

[0068] The first rigid connector 600a, which includes a body having a through hole, can be secured to an external mount, such as by bolts or screws or by snapping. The first rigid connector 600a has an extended end extending from the main body. The extended end of the first rigid connector 600a has a fifth and a sixth axis sleeve. The fifth axis sleeve 89a is disposed on the first axis pin 87a, and the sixth axis sleeve 89b is disposed on the second axis pin 87b. Optionally, the first rigid connector 600a can be divided into two separate parts, each of which has at least one through hole, and one separate part is hinged on the first axis pin 87a, and another separate part is hinged on the second axis pin 87b, in order to save material.

[0069] The second rigid connector 600b includes a body with a through hole, including an extended end extending from the body, an extended end having a seventh and an eighth sleeve, and the seventh sleeve 89c disposed on the third axis pin 87c coaxial with a first movable axis B1, the eighth axis sleeve 89d is disposed on the fourth axis pin 87d coaxial with the second movable axis B2, so that the second rigid connector 600b can respectively pivot around the first movable axis B1 and the second movable axis B2. Optionally, the second rigid connector 600b can be divided into two separate parts, each part has at least one through hole, and one separate part is hinged on the third axis pin 87c, another separate part is hinged on said fourth axis pin 87d.

[0070] For the first and second connected arms 80a, 80b, both ends of the first connected arm 80a are respectively hinged to the first axis pin 87a and the fourth axis pin 87d, and both ends of the second connected arm 80b are respectively hinged to the second axis pin 87b and third axis pin 87c. There is a hollow space in the middle of the second connected arm 80b in which an axis pin is traversed.

[0071] The elastic supporting device 56 is generally a torsional spring including a first end disposed on an axis pin in a hollow space in the middle of the second connected arm 80b, and a second end having a protrusion accommodated in the fixed block 17.

[0072] Specifically, the cavity inside the fixed block 17 further includes a limiting slot 55. The limiting slot 55 is located inside the fixed block 17 to receive a protrusion. In particular, there is also a recess in the limiting slot 55 in the present embodiment. When the articulation device is pivoted around the second axis A2, the elastic supporting device 56 is located at the distal end of the limiting slot 55. When the articulation device is pivoted around the first axis A1, the elastic supporting device 56 is located at the proximal end of the limiting slot 55. The proximal end is a recess, so as to provide sufficient friction to the elastic supporting device 56 during this period. The elastic supporting device 56 can achieve force balance under the action of its own resilience force and frictional force, and is supported at this position.

[0073] In certain embodiment, the third and fourth axis pins are wound with torsional springs 84, 85, one end of

which is supported in the supporting slots 92, 93 of the fixed block 17, and the other end of which is supported in the supporting slots 90, 91 of the first and second connected arms and can be deformed as the first or second connected arm rotates to obtain the resilience force.

[0074] Preferably, the elastic supporting device 56 is also a torsional spring, and its diameter is smaller than the torsional springs 84, 85 on the first and second axis pins. For example, the torsional springs 84, 85 have a diameter of 1.2 to 1.6 mm. The torsional spring as the elastic supporting device 56 has a diameter of 1.0 to 1.4 mm; most preferably, the torsional springs 84, 85 have a diameter of 1.4 mm and the torsional spring as the elastic supporting device 56 has a diameter of 1.2 mm. Since both ends of the torsional springs 84, 85 on the third and fourth axis pins are respectively supported by the supporting slots in the fixed block 17 and the supporting slots on the first and second connected arms, and the diameter of the torsional spring 84, 85 on the third and fourth axis pins is greater than the diameter of the torsional spring as the elastic supporting device 56. Therefore, the resilience force of the torsional springs 84, 85 is greater than the resilience force of the elastic supporting device 56 which provides a limiting function for the opening angle of the elastic supporting device 56 and constitutes a limiting device to ensure that the elastic supporting device does not come out of the limiting slot 55 due to too large opening angle.

[0075] Referring to Figure 12, in another modified embodiment, the protrusion of the elastic supporting device 56 is mounted with a rotatable roller 58 which can roll along the limiting slot 55 of the fixed block 17 between the distal end and the proximal end, this reduces noises during the movement of the articulation device, and because the original sliding friction can be improved into the rolling friction, the loss can be reduced and the service life can be improved. It can be also conceivable that the improvement can also be applied to the embodiment of the ventilation window or door mentioned above.

[0076] In addition, a person skilled in the art can easily conceive that the articulation device can be used not only in ventilation windows or doors but also in other fields to achieve the same or similar functions.

[0077] The above embodiments are only examples, and do not tend to limit the scope of the present invention. On the basis, a person skilled in the art can expect other embodiments that can achieve the same function within the protection scope of the claims of the present invention.

Claims

1. A ventilation window or door comprising:

- a main frame (102),
- a glass-supporting sash (104), the sash arranged to tilt within the main frame,
- a ventilation passage (106) provided in the sash, extending between an interior opening (108) and an exterior opening (110) of the window,
- a locking fitting (112) adapted to lock the sash to the main frame (102) in a closed position, comprising a locking mechanism (114) mounted on the sash inside the ventilation passage (106),
- a pivoting flap (14) mounted on the sash and connected to the locking mechanism, the pivoting flap adapted to pivot around a first axis (A1) which is stationary relative to the sash, between a closed position in which the flap shuts the interior opening (108) while setting the locking mechanism in a locked position and a first opened position in which the flap is pivoted to open the ventilation passage (106) while setting the locking mechanism in an unlocked position, the pivoting flap is further adapted to pivot around a second axis (A2) which is stationary relative to the sash and parallel to the first axis (A1), between the closed position of the flap and a second opened position in which the flap is pivoted to open the ventilation passage while keeping the locking mechanism in the locked position,

it is **characterized in that**, comprising:

- at least one articulation device (16,18), comprising a fixed block (17), the pivoting flap (14) connected to the at least one articulation device (16,18) mounted on the sash by the fixed block, the articulation device (16,18) further comprising:
- a plurality of axis pin, comprising: a first axis pin (87a) coaxial with the first axis (A1), a second axis pin (87b) coaxial with the second axis (A2), a third axis pin (87c) coaxial with a first movable axis (B1) parallel to the first axis (A1), a fourth axis pin (87d) coaxial with a second movable axis (B2) parallel to the first movable axis (B1), and a distance between the first axis pin (87a) and the fourth axis pin (87d) is equal to a distance between the second axis pin (87b) and the third axis pin (87c);
- two connected arms (80a, 80b), both ends of one connected arm respectively hinged to the first axis pin (87a) and the fourth axis pin (87d), and both ends of the other connected arm respectively hinged to the second axis pin (87b) and the third axis pin (87c),
- two rigid connector (600a, 600b), wherein, one connector is mounted on the fixed block and both ends are respectively connected to the first axis pin (87a) and the second axis pin (87b), the other connector is fixedly connected to the pivoting flap (14) and both ends are respectively

hinged to the third axis pin (87c) and the fourth axis pin (87d);

- an elastic supporting device, disposed on a middle part of one of the two connected arms (80a, 80b), so that the connected arm can elastically pivot around the second axis (A2) which enables the pivoting flap to be kept in the second opened position.

2. The ventilation window or door according to claim 1, wherein the elastic supporting device is a torsional spring, one end of which is fixed on the connected arm, and the other end of which has a protrusion, the fixed block further comprises a limiting slot (55) located inside the fixed block (17) to receive the protrusion.

3. The ventilation window or door according to claim 2, wherein a rotatable roller is mounted in the protrusion.

4. The ventilation window or door according to claim 2, wherein a diameter of the torsional spring is in the range of 1.0 mm to 1.4 mm.

5. The ventilation window or door according to claim 1, wherein in the hinged device:

- the two connected arm comprising a first connected arm (80a) and a second connected arm (80b), the first connected arm (80a) comprising a first axis sleeve (88a) hinged to the first axis pin (87a), and a second axis sleeve (88b) hinged to the fourth axis pin (87d); the second connected arm (80b) comprising a third axis sleeve (88c) hinged to the second axis pin (87b), and a fourth axis sleeve (88d) hinged to the third axis pin (87c);
- the two rigid connectors comprising a first rigid connector (600a) and a second rigid connector (600b), the first rigid connector (600a) comprising a fifth axis sleeve (89a) hinged to the first axis pin (87a) and a sixth axis sleeve (89b) hinged to the second axis pin (87b), and the second rigid connector (600b) comprising a seventh axis sleeve (89c) hinged to the third axis pin (87c) and a eighth axis sleeve (89d) hinged to the fourth axis pin (87d);

the first movable axis and the second movable axis extend along the length of the flap, and when the flap is in its closed position, the first movable axis (B1) coincides with the first axis (A1), the second movable axis (B2) coincides with the second axis (A2).

6. The ventilation window or door according to claim 5, wherein the third and the fourth axis pin are wound with torsional springs, a supporting slot (90, 91) for supporting one end of the torsional spring is arranged on the first and the second connected arms.

7. The ventilation window or door according to claim 6, wherein a supporting slot (92, 93) for supporting the other end of the torsional spring is arranged on the fixed block, two supporting slots of the fixed block (17) are respectively located on two opposite side surfaces of the fixed block (17).

8. The ventilation window or door according to claim 6, wherein the torsional spring has a diameter of 1.2 mm to 1.6 mm.

9. The ventilation window or door according to claim 6, wherein the limiting slot (55) comprises at least one recess which is adapted to apply frictional force to the elastic supporting device.

10. The ventilation window or door according to claim 9, wherein when the pivoting flap is in its closing position, the first rigid connector (600a) and the second rigid connector (600b) face each other with a distance.

11. The ventilation window or door according to claim 9, wherein a body of the first rigid connector (600a) and the second rigid connector (600b) has at least one through hole.

12. The ventilation window or door according to f claim 11, wherein the first rigid connector (600a) may be divided into two separate parts, each of which has at least one said through hole, wherein one of the separate parts is hinged to the first axis pin (87a), and the other one of the separate parts is hinged to the second axis pin (87b).

13. The ventilation window or door according to claim 11, wherein the second rigid connector (600b) may be divided into two separate parts, each of which has at least one said through hole, wherein one of the separate parts is hinged to the third axis pin (87c), and the other one of the separate parts is hinged to the fourth axis pin (87d).

14. An articulation device, adapted for use in a ventilation window or door, comprising:

- a fixed block (17), adapted for mounting on a sash or a door frame,
- a plurality of axis pin, comprising: a first axis pin (87a) defining the first axis (A1), a second axis pin (87b) defining the second axis (A2), a third axis pin (87c) defining a first movable axis (B1) parallel to the first axis (A1), a fourth axis pin (87d) defining a second movable axis (B2)

parallel to the first movable axis (B1), wherein a distance between the first axis pin (87a) and the fourth axis pin (87d) is equal to a distance between the second axis pin (87b) and the third axis pin (87c);

- two connected arms (80a, 80b), both ends of one connected arm respectively hinged to the first axis pin (87a) and the fourth axis pin (87d), and both ends of the other connected arm respectively hinged to the second axis pin (87b) and the third axis pin (87c),
- two rigid connector (600a, 600b), wherein, one connector is mounted on the fixed block and both ends are respectively hinged to the first axis pin (87a) and the second axis pin (87b), both ends of the other connector are respectively hinged to the third axis pin (87c) and the fourth axis pin (87d);
- an elastic supporting device, disposed on a middle part of one of the two connected arms (80a, 80b), so that the connected arm can elastically pivot around the second axis (A2) or the first axis (A2), and be supported relative to the fixed block.

15. The articulation device according to claim 14, wherein the elastic supporting device is a torsional spring, one end of which is mounted on the connected arm, and the other end having a protrusion, the fixed block (17) further comprises a limiting slot (55) located inside the fixed block (17) to receive the protrusion, a rotatable roller being mounted in the protrusion.

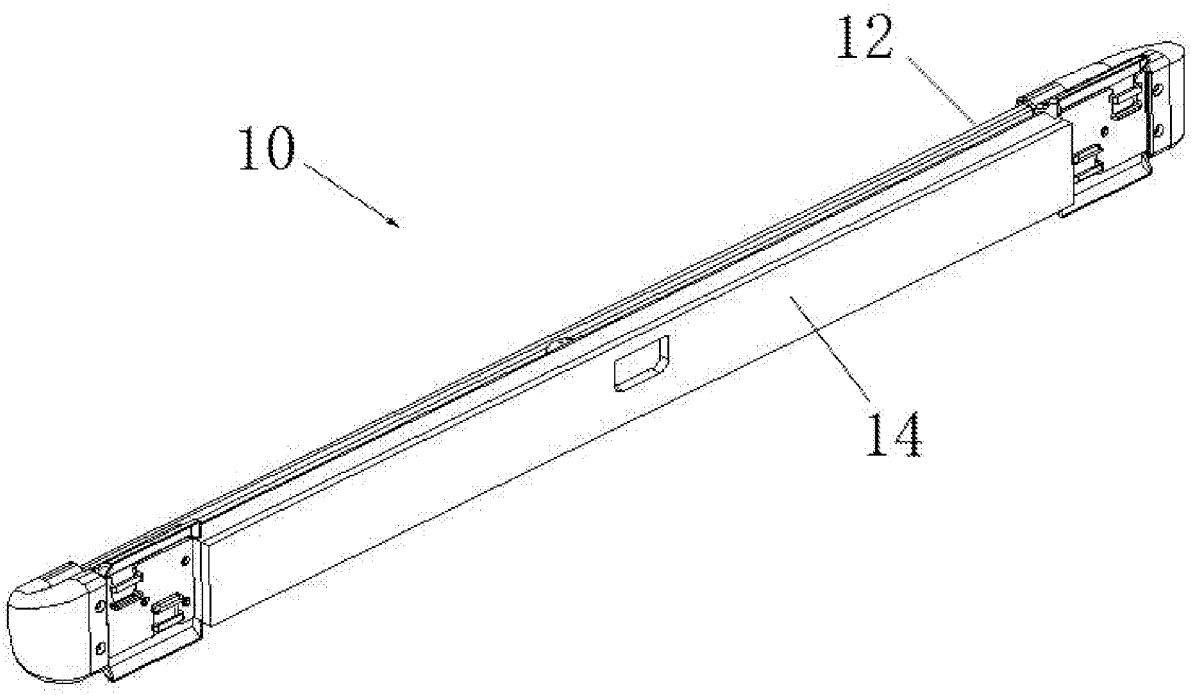

Fig. 1

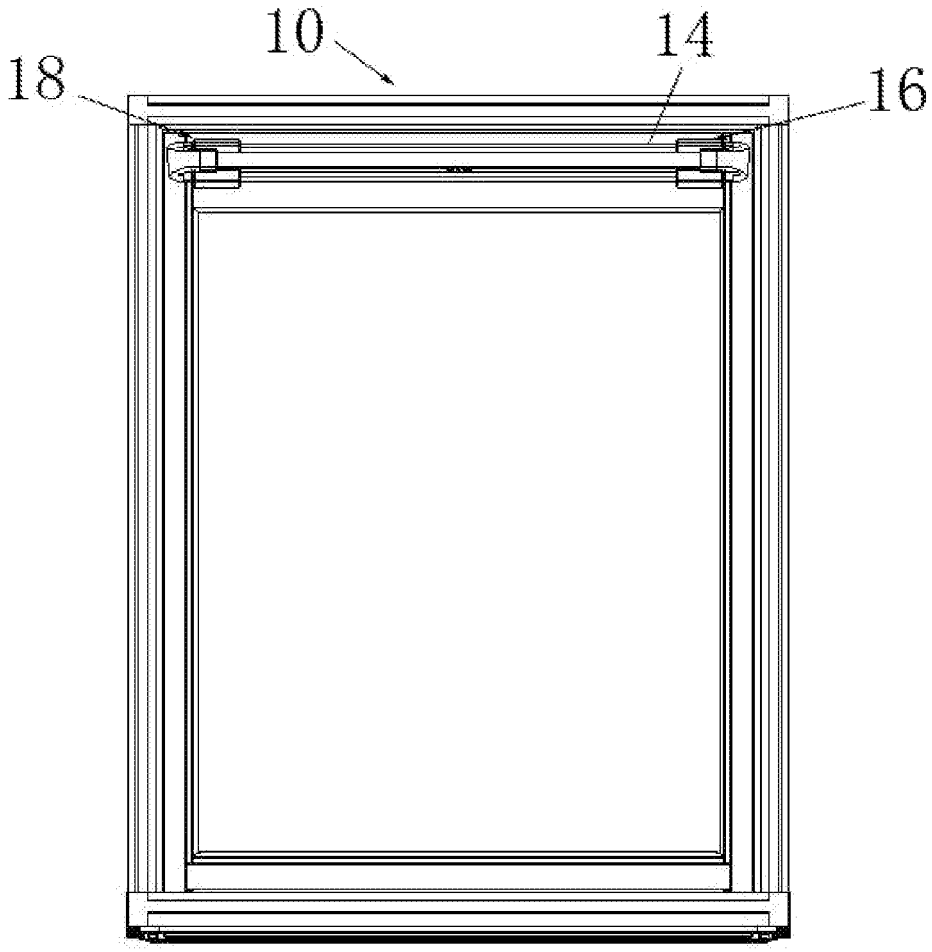

Fig. 2

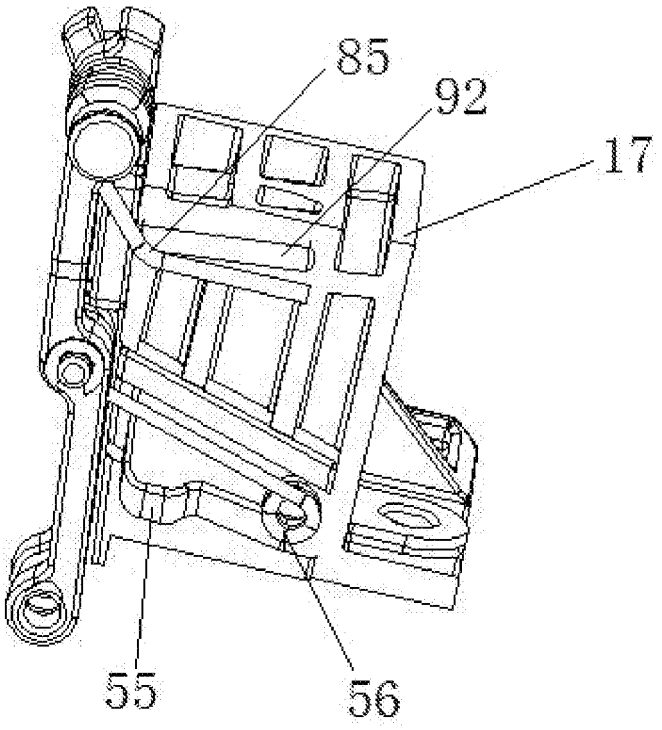

Fig. 2A

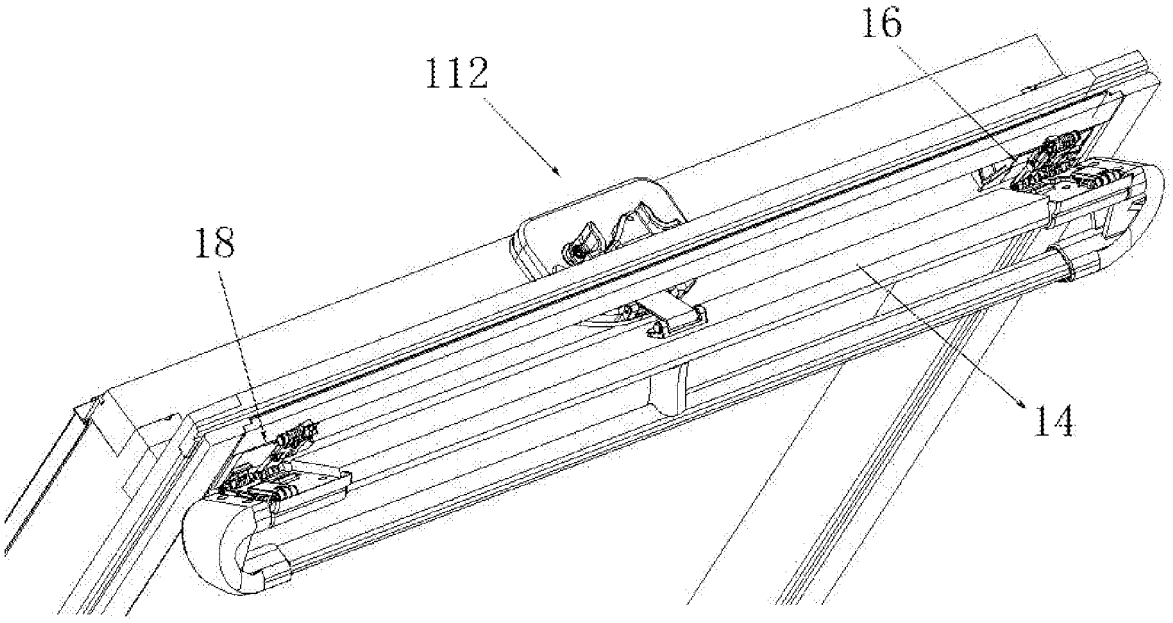

Fig. 3

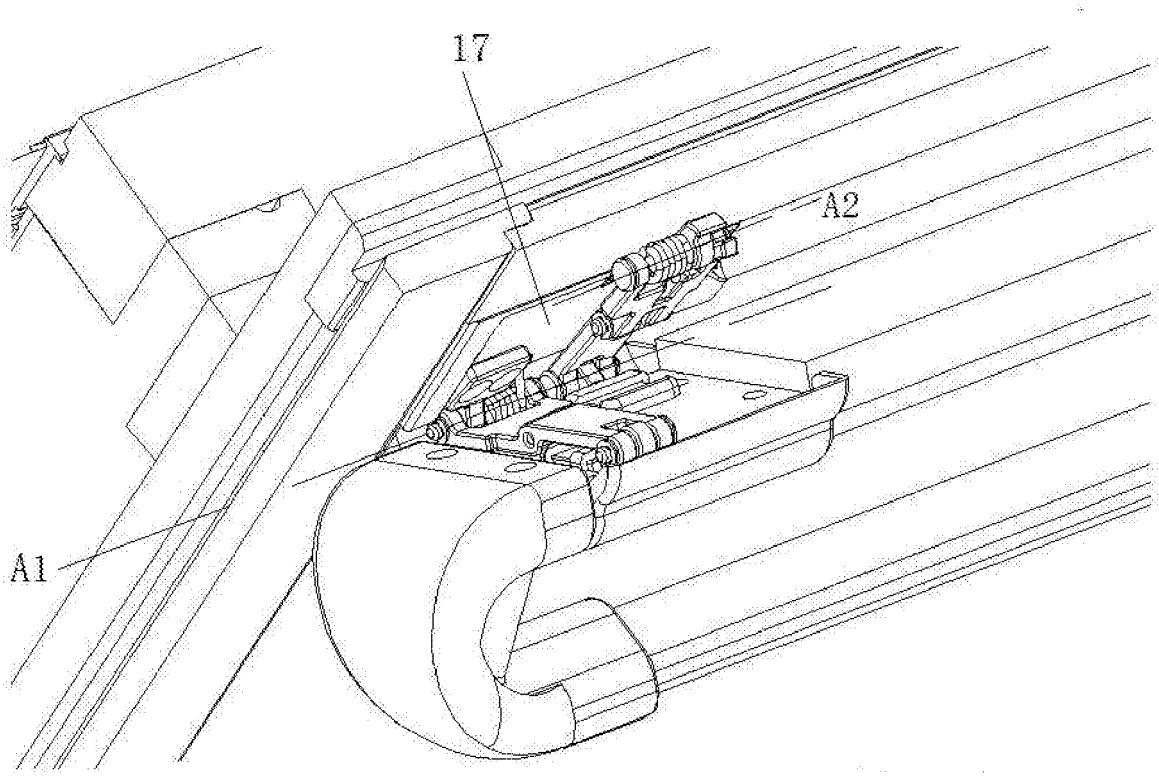

Fig. 3A

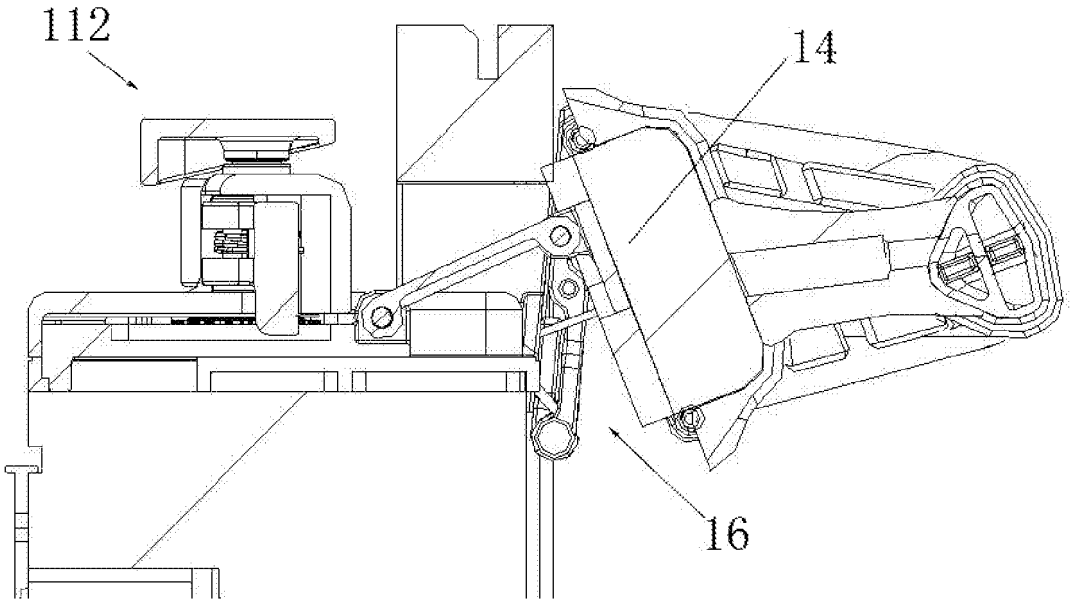

Fig. 4

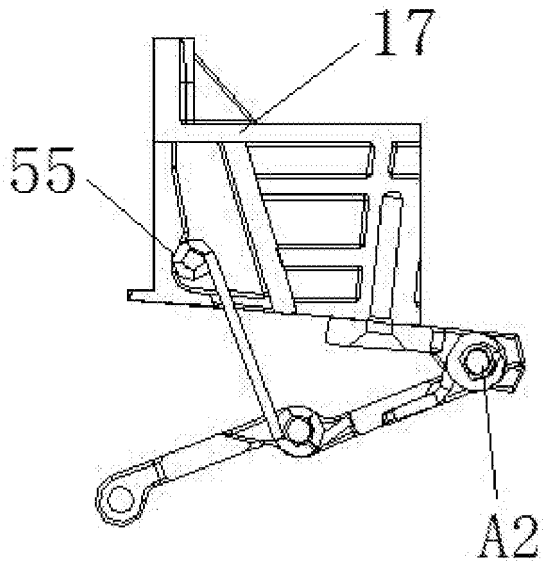

Fig. 4A

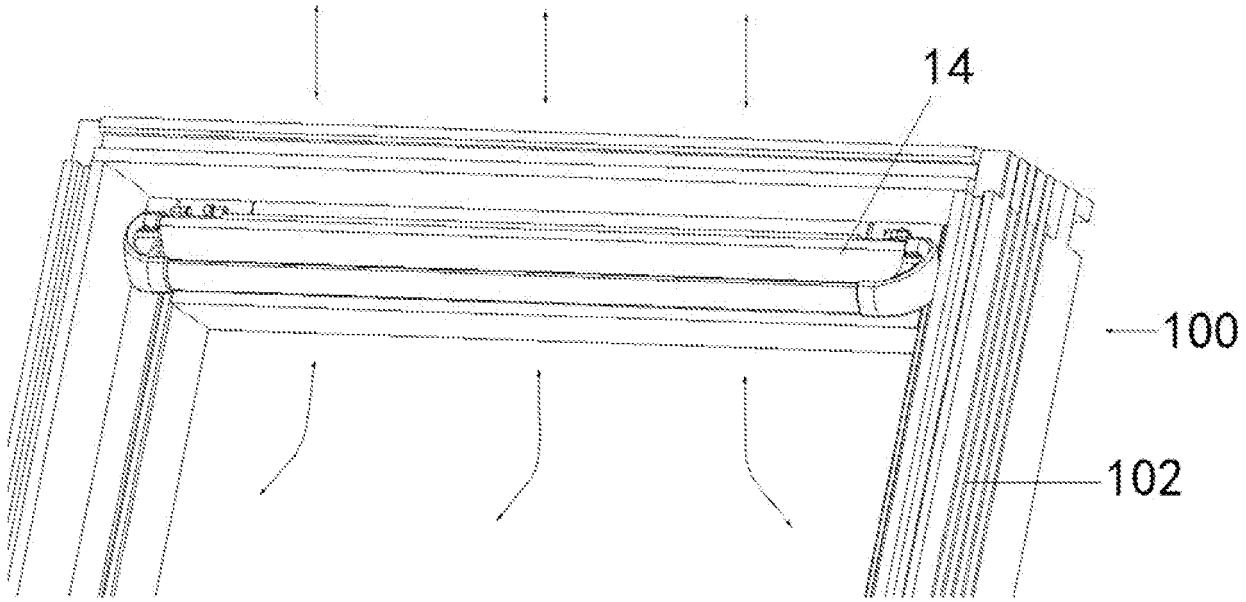

Fig. 5A

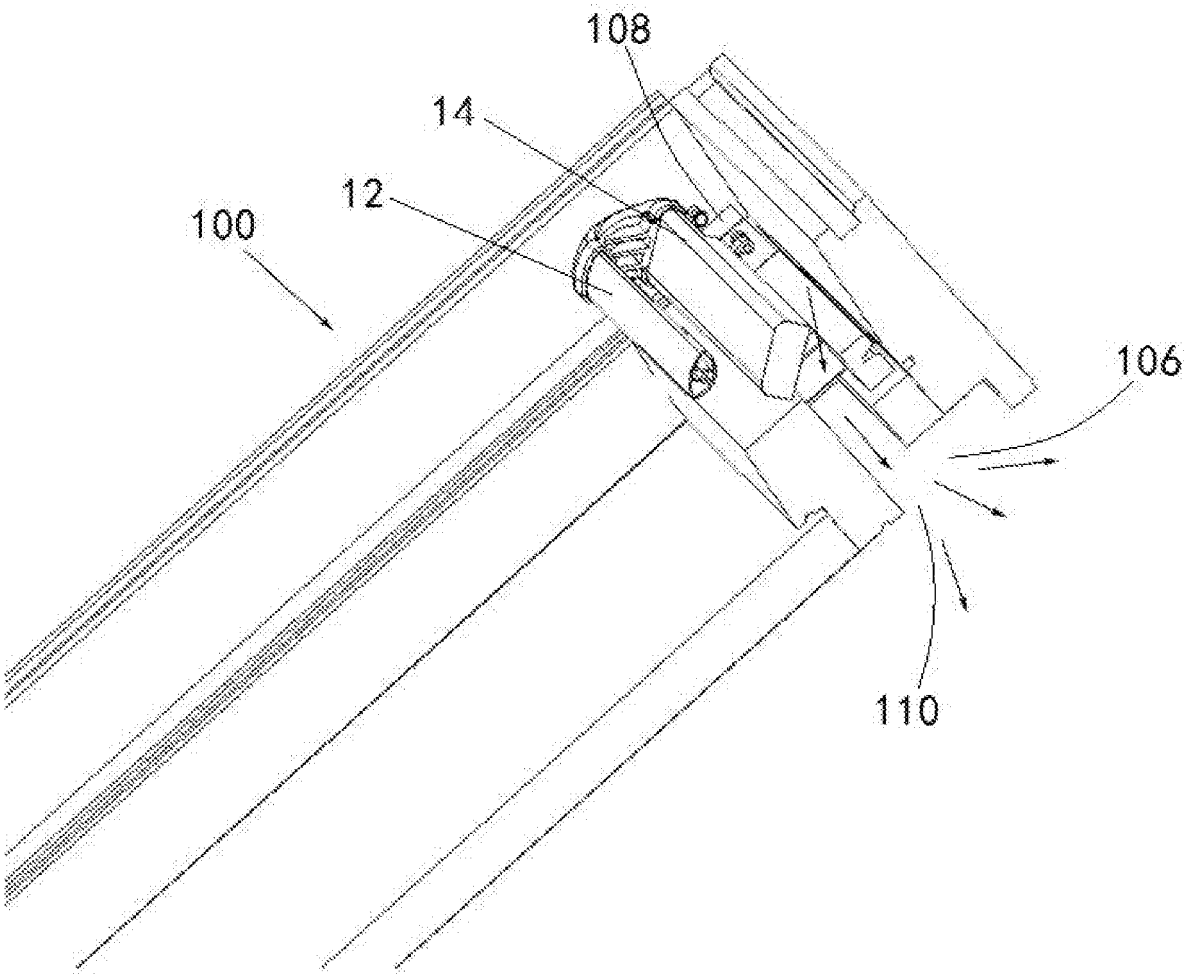

Fig. 5B

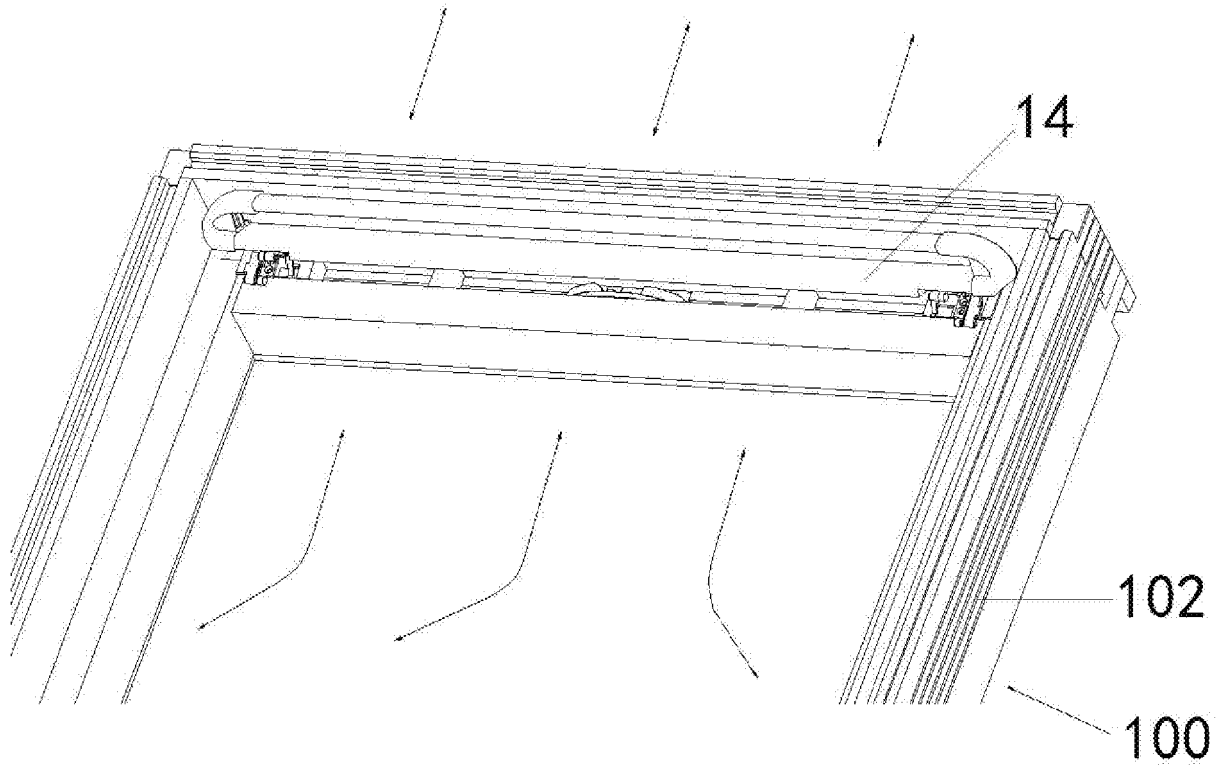

Fig. 6A

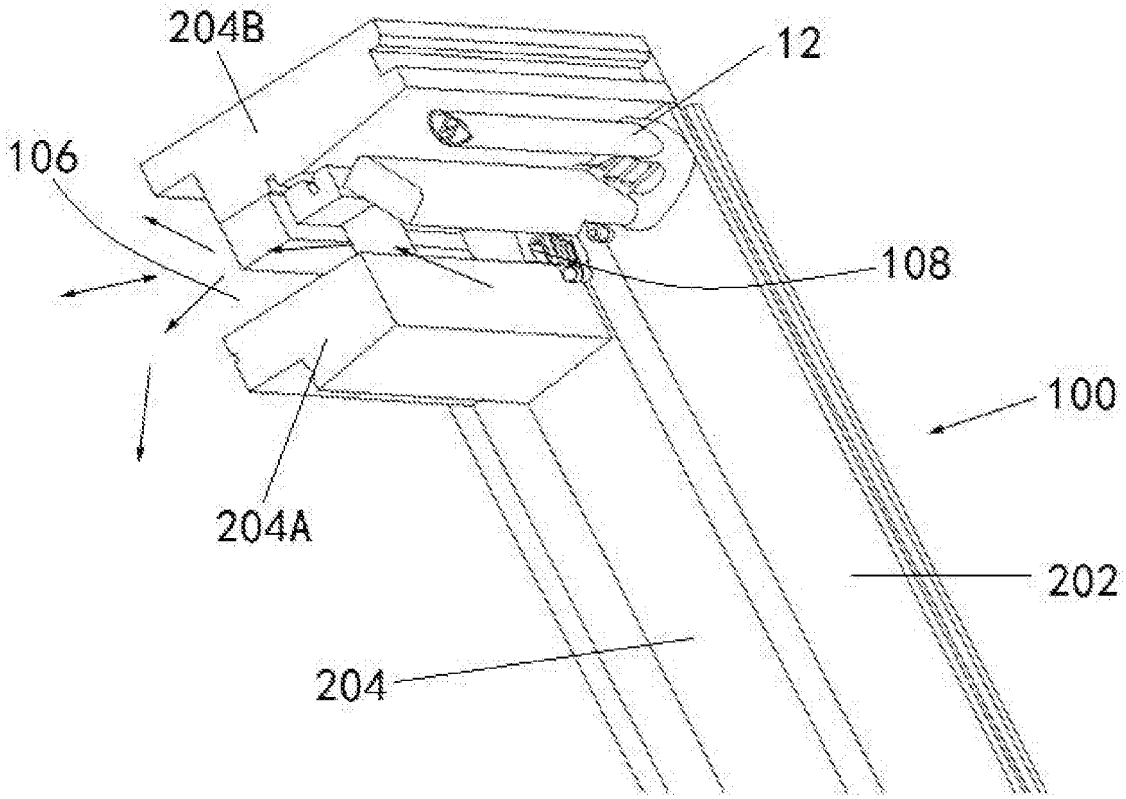

Fig. 6B

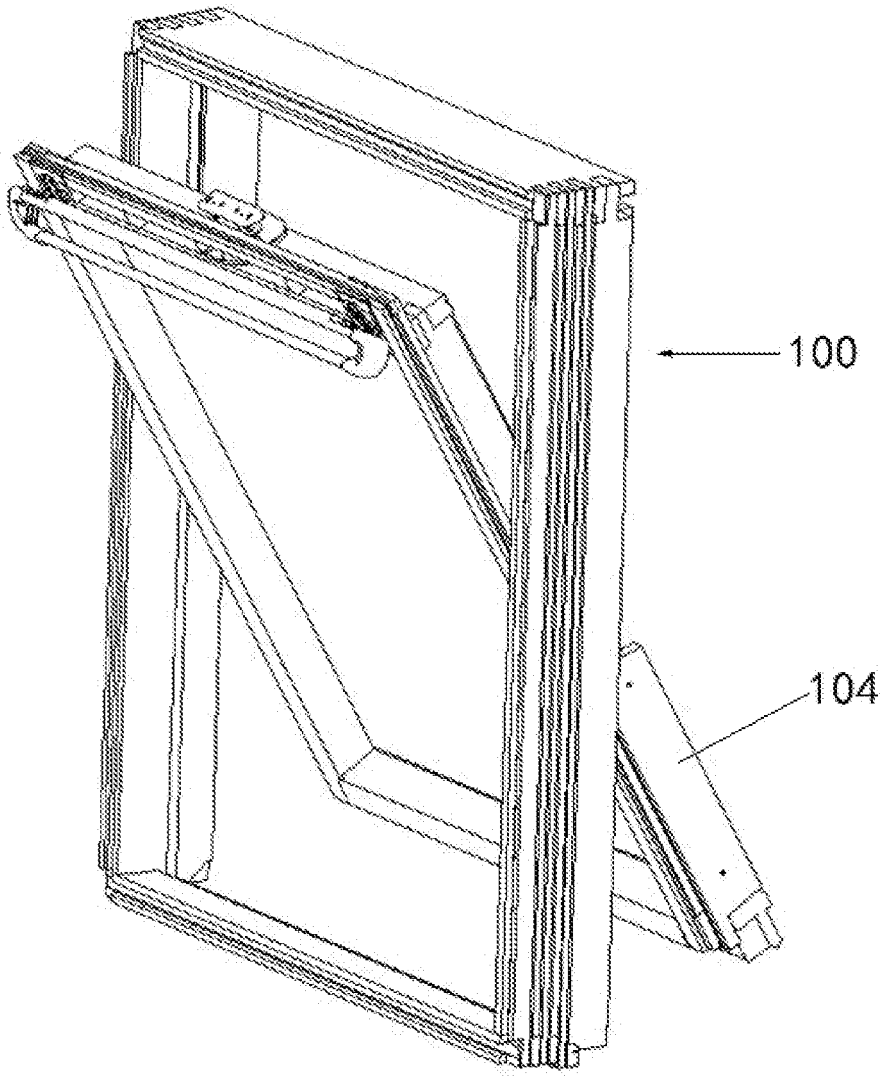

Fig. 7

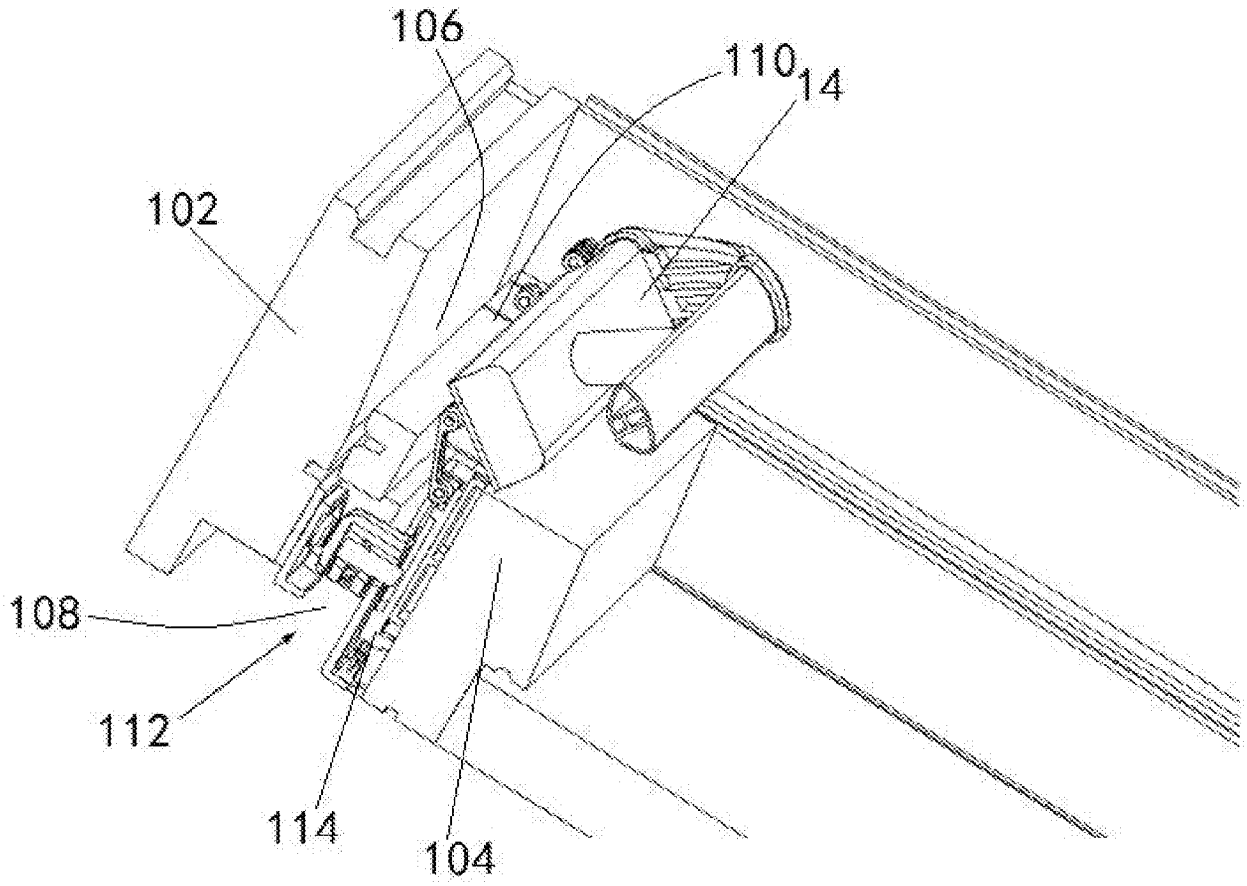

Fig. 8

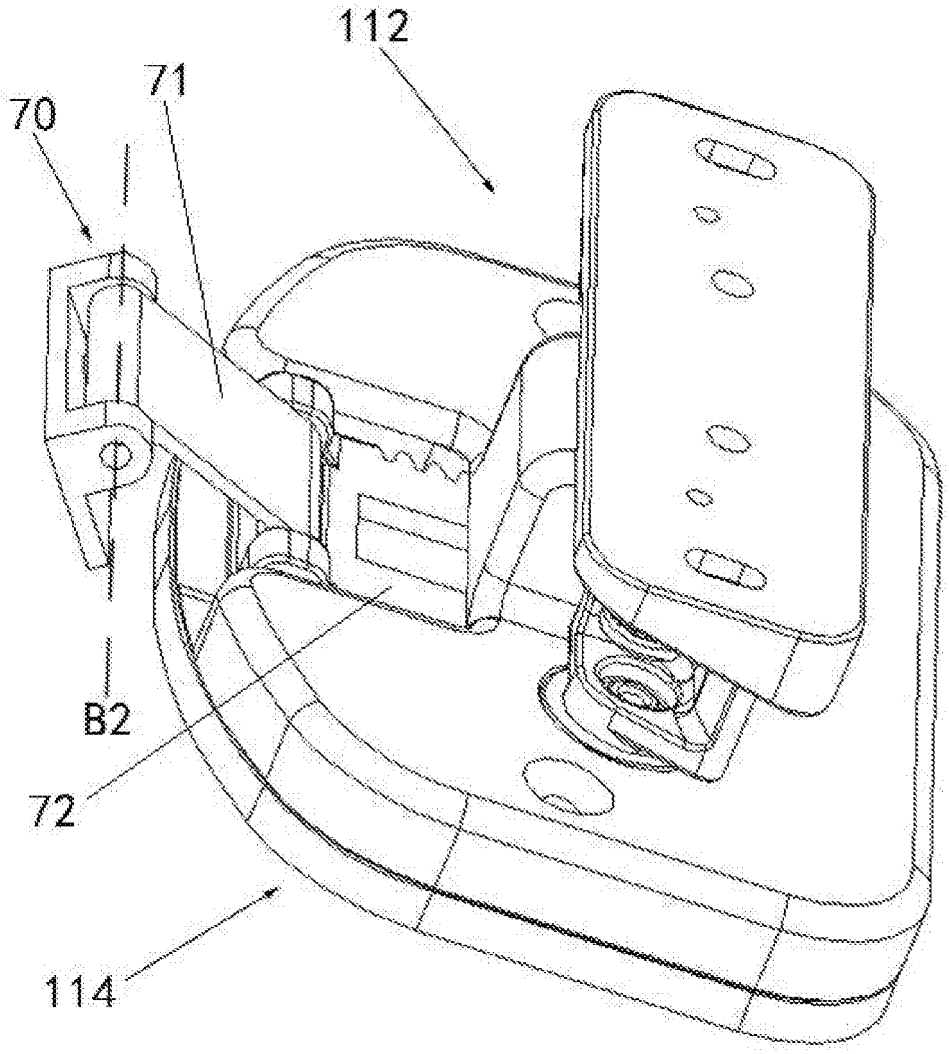

Fig. 9

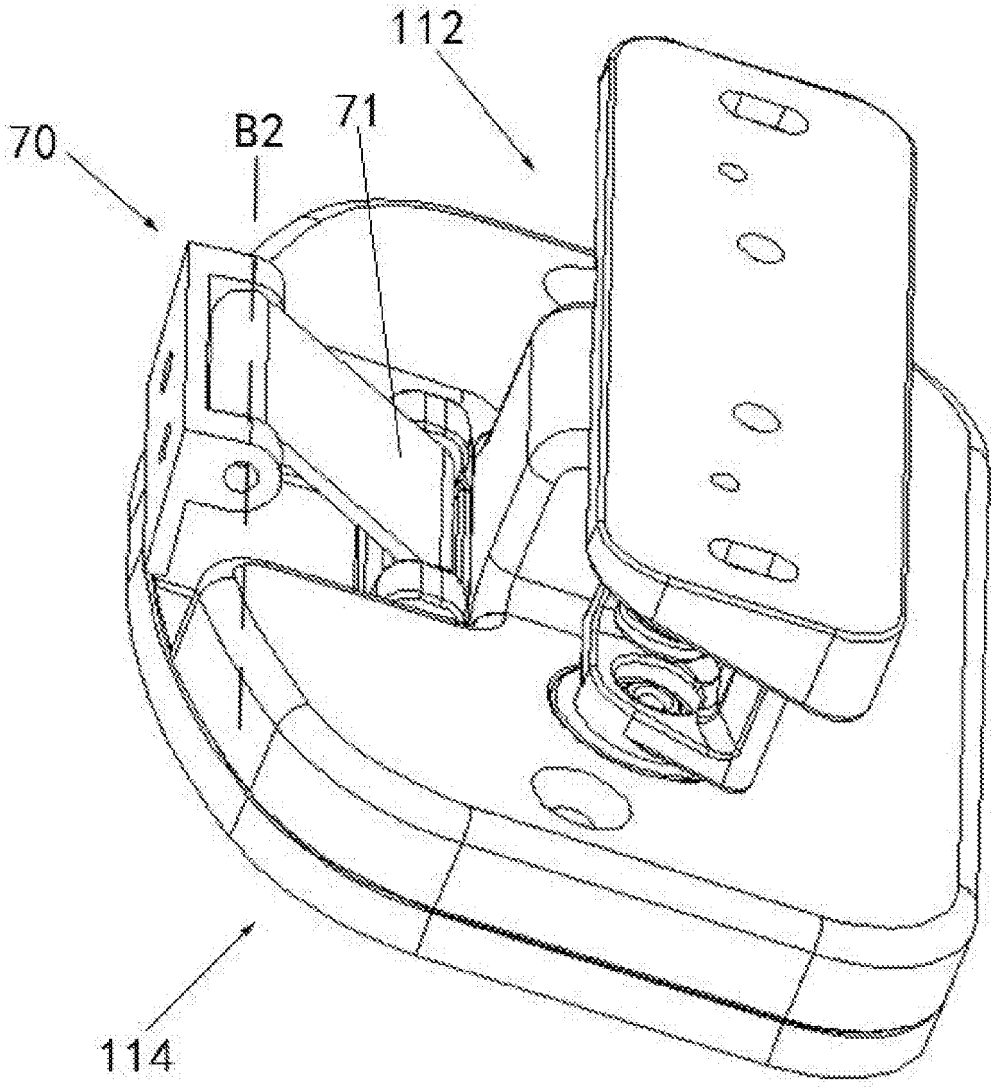

Fig. 9A

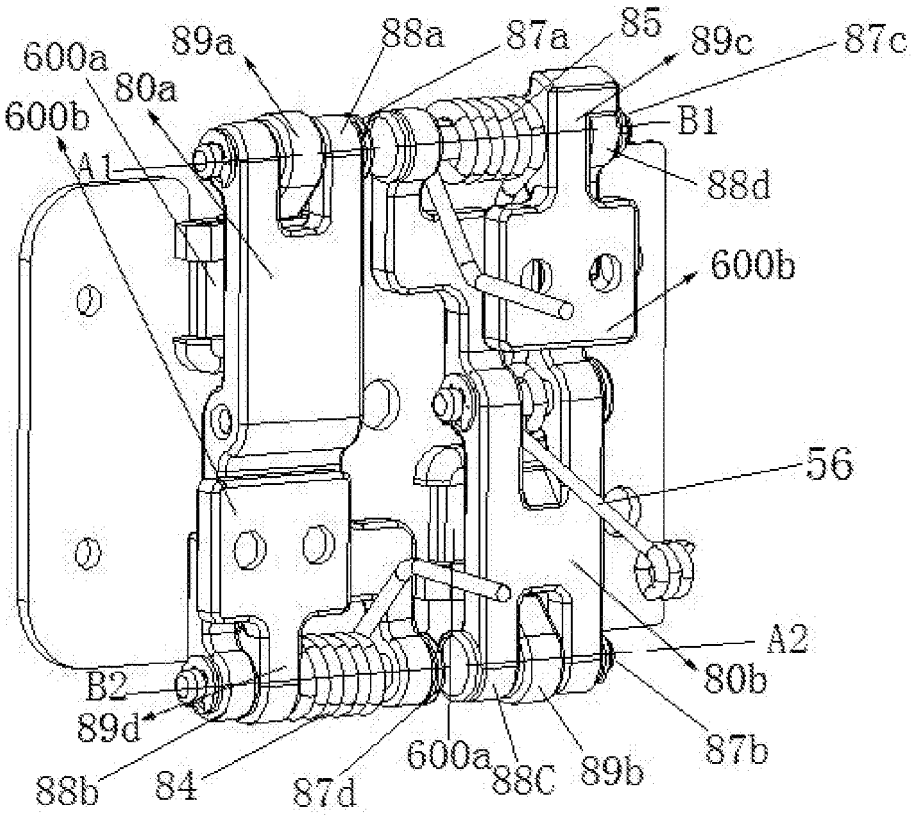
600a
89a
88a
87a
85
89c
87c
80a
600b
B1
A1
88d
600b
56
A2
80b
B2
89d
87b
600a
88C
89b
88b
84
87d

Fig. 10

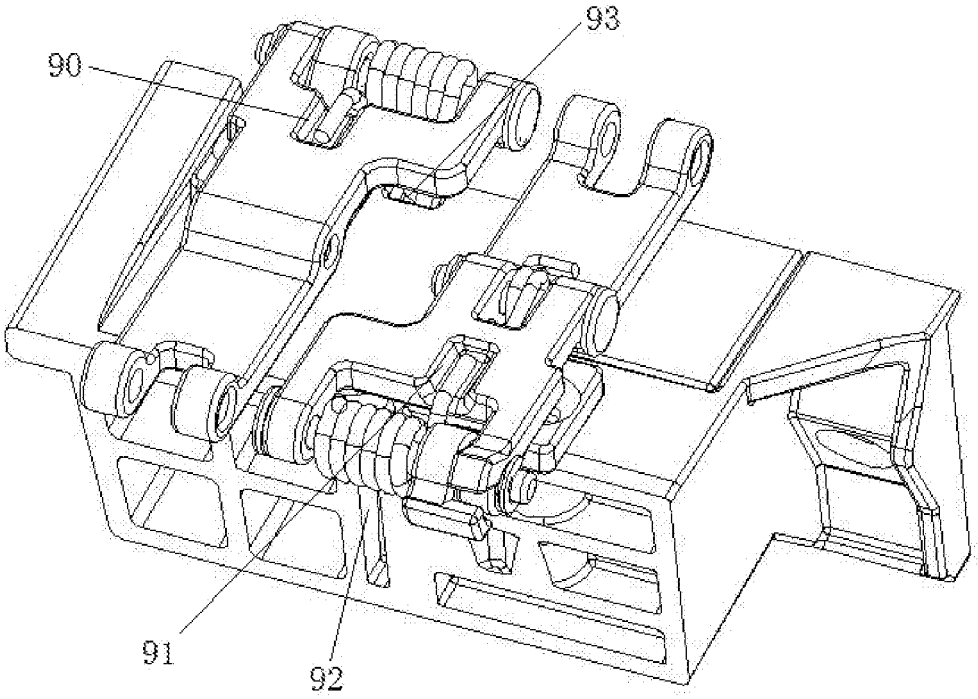

Fig. 11

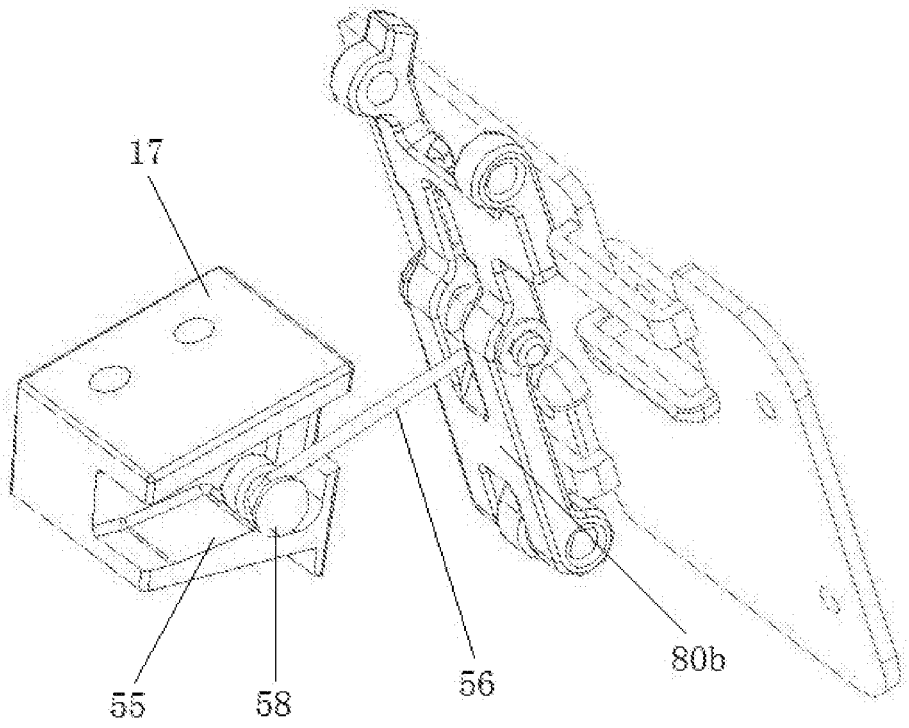

Fig. 12

INTERNATIONAL SEARCH REPORT

International application No.
PCT/CN2015/097279

A. CLASSIFICATION OF SUBJECT MATTER

E06B 7/02 (2006.01) i

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

E06B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

CNPAT, CNKI, EPODOC, WPI: YINZHOU SONJIN; DONG, Zhijun; flap, joint, hinge joint, pivoting, pivoting w flap, ventilation, vent, lock, rotat+

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	CN 102812198 A (NINGBO YINZHOU SONJIN INDUSTRIAL AND TRADING CO., LTD.), 05 December 2012 (05.12.2012), description, paragraphs 45-69, and figures 1-11	1-15
A	CN 103180536 A (DONG, Zhijun), 26 June 2013 (26.06.2013), the whole document	1-15
A	GB 2063460 A (CODE DESIGNS), 03 June 1981 (03.06.1981), the whole document	1-15
A	EP 0458725 A1 (KANN RASMUSSEN HOLDING AS V et al.), 27 November 1991 (27.11.1991), the whole document	1-15

☐ Further documents are listed in the continuation of Box C. ☒ See patent family annex.

* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
11 May 2016 (11.05.2016)	**23 May 2016 (23.05.2016)**
Name and mailing address of the ISA/CN: State Intellectual Property Office of the P. R. China No. 6, Xitucheng Road, Jimenqiao Haidian District, Beijing 100088, China Facsimile No.: (86-10) 62019451	Authorized officer **WANG, Li** Telephone No.: (86-10) **62085034**

Form PCT/ISA/210 (second sheet) (July 2009)

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/CN2015/097279

Patent Documents referred in the Report	Publication Date	Patent Family	Publication Date
CN 102812198 A	05 December 2012	CN 102812198 B	05 August 2015
		WO 2011113213 A1	22 September 2011
		EP 2547855 A1	23 January 2013
CN 103180536 A	26 June 2013	CN 103180536 B	27 May 2015
		EP 2601370 A1	12 June 2013
		WO 2012016371 A1	09 February 2012
GB 2063460 A	03 June 1981	None	
EP 0458725 A1	27 November 1991	EP 0458725 B1	29 June 1994
		DK 9001279 A	24 November 1991
		DE 69102682 E	04 August 1994
		JP H04231576 A	20 August 1992
		DK 127990 A	24 November 1991
		DK 164964 B	21 September 1992
		DK 164964 C	08 February 1993
		AT 107992 T	15 July 1994
		DE 69102682 T2	09 February 1995

Form PCT/ISA/210 (patent family annex) (July 2009)

REFERENCES CITED IN THE DESCRIPTION

This list of references cited by the applicant is for the reader's convenience only. It does not form part of the European patent document. Even though great care has been taken in compiling the references, errors or omissions cannot be excluded and the EPO disclaims all liability in this regard.

Patent documents cited in the description

- DE 6903921 **[0006]**
- EP 0458725 B1 **[0006]**
- WO 2007009685 A **[0007]**
- EP 053881157 A **[0008]**
- DK PA200600968 **[0008]**
- DK 2002000235 **[0011]**
- WO 02084043 A **[0011]**
- WO 9951832 A **[0011]**
- WO 9910610 A **[0011]**
- WO 2009141447 A1 **[0012]**
- WO 200208043 A **[0012]**
- EP 1746232 B1 **[0016]**
- EP 1762679 A1 **[0016]**
- CN 102812198 A **[0017]**