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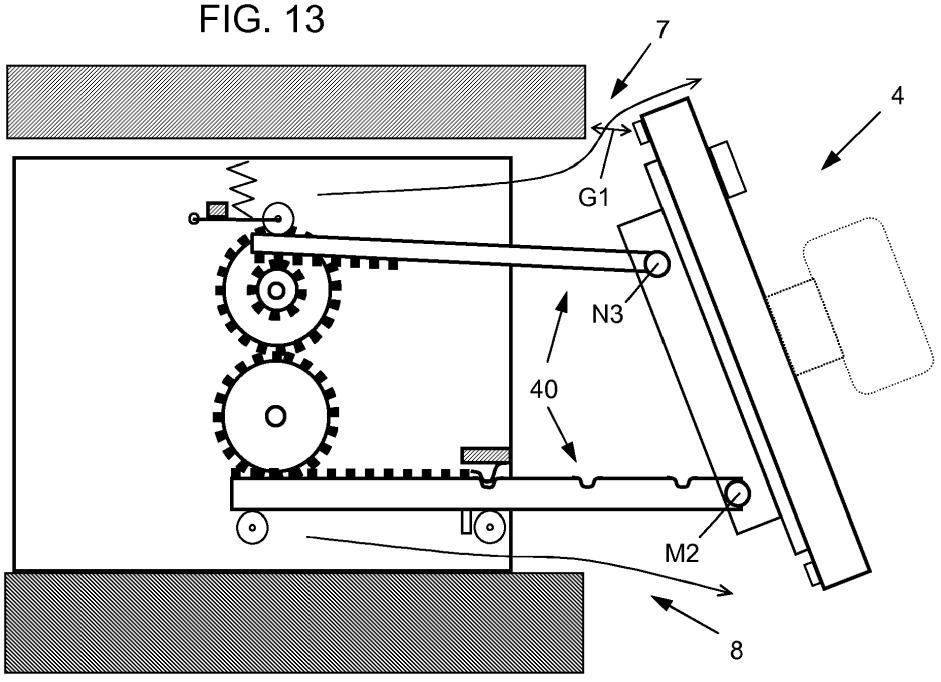
(54) SUPPORT MECHANISM FOR A CLOSURE ELEMENT OF A VENTILATION AND LOCKING SYSTEM

(57) The support mechanism (3') for a closure element (15) of a ventilation and locking system (2') is suitable for being mounted on a pivoting sash of a closure assembly and allows a displacement of the closure element (15) from a locking closed position to at least one ventilation position in which the closure element is inclined relative to its closed position while keeping the ventilation and locking system locked. The support mechanism comprises a hinged structure (30') adapted so that the displacement of the closure element (15) in a ventilation position creates a first air passage (7) between the closure element and a frame member (101) of the closure assembly and creates also a second air passage (8) between the closure element and a frame member (11) of the pivoting sash. The invention also relates to a ventilation and locking system comprising at least one support mechanism.

FIG. 13



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Description

FIELD OF THE INVENTION

[0001] The invention relates to a support mechanism for a closure element of a ventilation and locking system, in particular a ventilation and locking system for a tilting window or the like, the support mechanism being suitable for being mounted on a pivoting sash of a closure assembly in order to support the closure element and to allow a displacement of the closure element from a locking closed position in which the closure element shuts a ventilation passage of the closure assembly to at least one ventilation position in which the closure element is inclined relative to its closed position while keeping the ventilation and locking system locked, a first air passage communicating with the ventilation passage being created in a said ventilation position by increasing a distance between a first longitudinal edge of the closure element and a frame member of the closure assembly.

DESCRIPTION OF THE PRIOR ART

[0002] Such type of support mechanism is found for example in the ventilation and locking system of the published German patent application DE1905074A1 which describes a closure assembly such as a tilting window with a locking mechanism actuated by a closure element like a flap. The locking mechanism provides an intermediate locked position allowing the closure element to set in a single ventilation position without unlocking the locking mechanism. The first air passage created in the ventilation position is between a top longitudinal edge of the closure element and a top frame member This device advantageously allows to ventilate a room through the ventilation passage of the window while keeping the window closed and locked.

[0003] However, the flap is hinged on the sash through hinge elements which allow it to pivot about a stationary axis extending along its lower longitudinal edge, said lower edge always remaining therefore very close to the sash in the ventilation position, typically at a distance less than 2 or 3 mm. Since in the ventilation position the inclination of the flap relative to the sash is typically about 30° or less, this configuration restrains the air flow through the ventilation passage. Indeed, the air passing through the interior opening of the ventilation passage towards the inside or the outside of the room is deflected by the flap, and there is no significant air passage between the lower edge of the flap and the sash, which therefore reduces the air speed and flow. For these reasons, ventilating the room through the ventilation passage, i.e. when the window is closed and locked, is not very efficient.

SUMMARY OF THE INVENTION

[0004] To mitigate those drawbacks, and in particular to increase the air flow capacity through the ventilation passage, the Applicant has found desirable to conceive a support mechanism for a closure element like a ventilation flap allowing a ventilation position with significant air passages between the flap and frame members of the closure assembly to which the flap is in sealing contact when closed. In particular, the invention aims at increasing significantly the distance between a bottom longitudinal edge of the flap and the sash in the ventilation position.

[0005] To this end, the invention provides a support mechanism of the kind in question, comprising a hinged structure adapted so that the displacement of the closure element to a ventilation position creates a second air passage communicating with the ventilation passage by increasing a distance between a second longitudinal edge of the closure element and a frame member of the pivoting sash.

[0006] By means of these dispositions, two significant air passages are provided in a ventilation position between two longitudinal edges of the closure element and frame members of the closure assembly, contrary to the prior art device of DE1905074A1 for which a single significant air passage is obtained.

[0007] In embodiments of a support mechanism according to the invention, the support mechanism comprises one or more of the following dispositions :

- the hinged structure is adapted so that said displacement of the closure element to a ventilation position results from a combination of a translatory motion and a rotary motion ; which allows to obtain any desired distance between a first or a second longitudinal edge of the closure element and a frame member of the closure assembly ;
- said translatory and rotary motions may be performed simultaneously ;
- the hinged structure comprises at least two support arms hinged to the closure element and is adapted so that two support arms move relatively to each other during the displacement of the closure element to a ventilation position ; which allows to incline the closure element;
- the support arms are hinged to a supporting plate to which the closure element is hinged and able to be secured ; which allows to pivot the closure element relative to the support mechanism in an unlocking direction which is different from the direction of displacement of the closure element to a ventilation position ;
- the support arms are hinged to the closure element through a supporting plate which is permanently secured to the closure element ; which provides a simple structure for a ventilation and locking system in which the unlocking direction is the same as the direction of displacement of the closure element to a ventilation position.
- the hinged structure is arranged along a plane which is perpendicular to a longitudinal axis of the closure

element ; which provides a relatively narrow structure for the support mechanism which does not jeopardize the air section of the ventilation passage of the closure assembly ;
the hinged structure comprises :

a supporting casing suitable for being secured to the sash ;
a first and a second pivoting arms each pivotally mounted on the supporting casing, which are arranged parallel to each other ;
a link arm arranged so as to form with the first and second pivoting arms a sensibly parallelogrammatic hinge structure allowing the link arm to be displaced while remaining sensibly parallel to a predetermined direction, the link arm comprising an extension part which forms a first support arm hinged to the closure element ; which provides a compact structure for the support mechanism while allowing a relatively large displacement of the closure element;

the first pivoting arm comprises an extension part which is jointed to an inclination arm which forms a second support arm hinged to the closure element;
the hinged structure comprises two support arms including a first support arm arranged to be displaced in translation, each support arm including a rack rail part, said rack rail parts being interlinked with each other through a reduction gear adapted so that a displacement of a the first support arm over a predetermined travel entails a displacement of the second support arm over a shorter travel;
the hinged structure comprises :

a hinge support providing a curved guide path, suitable for being secured to the pivoting sash;
a hinge mobile part hinged to the hinge support, comprising a curved sliding part adapted to slide along said curved guide path so that said hinge mobile part can rotate about a hinge axis remote from said hinge support, and further comprising a support part on which is mounted the closure element.

[0008] The invention also provides a ventilation and locking system comprising at least one support mechanism of any embodiment as defined here above, and further comprising at least one locking mechanism able to be actuated by the closure element through a linking mechanism which links said locking mechanism to the closure element.

[0009] In embodiments of a ventilation and locking system according to the invention, the ventilation and locking system comprises one or more of the following dispositions :

the linking mechanism provides a free travel adapted so that the locking mechanism is not actuated upon a displacement of the closure element to a ventilation position ; which allows that when the first longitudinal edge of the closure element moves away from a frame member of the closure assembly to create the first air passage communicating with the ventilation passage, a lock fitting comprising the locking mechanism remains locked so that the closure assembly is ventilated while staying closed and locked ;
the closure element is hinged to the support mechanism so as to be able to pivot relative to the support mechanism in an unlocking direction in order to actuate and unlock the locking mechanism, the ventilation and locking system further comprising a latching mechanism adapted to latch the closure element to the support mechanism ; which impedes the closure element to pivot accidentally relative to the support mechanism when displacing the closure element to a ventilation position and therefore ensures that the locking mechanism remains locked in said ventilation position of the closure element;
the locking mechanism comprises a slider actuated by the linking mechanism and at least one locking pin connected to the slider through a lever mechanism, the lever mechanism being adapted so that when the closure element is displaced from its locking closed position to a ventilation position, a corresponding displacement of the slider does not displace the locking pin ; which allows that although the linking mechanism does not provide a free travel, a lock fitting comprising the locking mechanism remains locked in the ventilation position of the closure element.

[0010] The invention also provides a closure assembly comprising :

a ventilation passage adapted to allow an air circulation through the closure assembly when the latter is closed ;
a pivoting sash;
a ventilation and locking system comprising a closure element and a support mechanism of said closure element mounted on said pivoting sash ;
wherein said support mechanism allows a displacement of the closure element from a locking closed position in which the closure element shuts said ventilation passage to at least one ventilation position in which the closure element is inclined relative to its closed position while keeping the ventilation and locking system locked, and a first air passage communicating with said ventilation passage is created in a said ventilation position by increasing a distance between a first longitudinal edge of the closure element and a frame member of the closure assembly, characterized in that said support mechanism comprises a hinged structure adapted so that said displacement of the closure element to a ventilation po-

sition creates a second air passage communicating with said ventilation passage by increasing a distance between a second longitudinal edge of the closure element and a frame member of said pivoting sash.

BRIEF DESCRIPTION OF THE DRAWINGS

[0011] Other characteristics and advantages of the invention appear from the following detailed description of embodiments thereof, given as a non limitative examples and with reference to the accompanying drawings, in which :

- FIG. 1 is a perspective oblique rear and partial view of a ventilation and locking system of the invention, represented in a ventilation position of the closure element and mounted on a pivoting sash of a window assembly, and comprising a support mechanism according to a first embodiment of the invention ;
- FIG. 2 is a perspective oblique rear view of the ventilation and locking system of FIG. 1 represented in the same ventilation position of the closure element, including visible locking mechanisms;
- FIG. 3 is a perspective oblique rear and partial view of the ventilation and locking system of FIG. 2 represented in the closed position of the closure element, the structure of the support mechanism being visible ;
- FIG. 4 represents the ventilation and locking system of FIG. 2 in the same ventilation position of the closure element;
- FIG. 5 is a side and partial view of a pivoting sash of a window assembly equipped with a ventilation and locking system of the invention which comprises a support mechanism according to a second embodiment of the invention ;
- FIG. 6 is a perspective oblique rear and partial view of the ventilation and locking system of FIG. 5 represented in the ventilation position of the closure element, the structure of the support mechanism being visible ;
- FIG. 7 is a perspective oblique rear view of the ventilation and locking system of FIG. 5 represented in the ventilation position of the closure element, including a visible locking mechanism;
- FIG. 8 is a perspective oblique view of a window assembly including the pivoting sash of FIG. 5, the sash being in an open position ;
- FIG. 9 is a perspective oblique rear view of the ventilation and locking system of FIG. 7 represented in the unlocking position of the closure element;
- FIG. 10 is a perspective oblique rear and partial view of the ventilation and locking system of FIG. 7 represented in the closed position of the closure element, the structure of the support mechanism being visible ;
- FIG. 11 is a perspective oblique rear and partial view of the ventilation and locking system of FIG. 7 represented in the same unlocking position of the closure element, the structure of the support mechanism being visible ;
- FIG. 12 is a side partial view of a ventilation and locking system of the invention, mounted on a pivoting sash of a window assembly and comprising a support mechanism according to a third embodiment of the invention ;
- FIG. 13 is a side partial view of the ventilation and locking system of FIG. 12, the structure of the support mechanism being visible in a configuration providing a ventilation position of the closure element;
- FIG. 14 is a side partial view of a ventilation and locking system of the invention, mounted on a pivoting sash of a window assembly and comprising a support mechanism according to a fourth embodiment of the invention ;
- FIG. 15 is a side partial view of the ventilation and locking system of FIG. 14, the structure of the support mechanism being visible in a configuration providing a ventilation position of the closure element.

DETAILED DESCRIPTION OF THE INVENTION

[0012] As represented in FIGS. 1 and 2, a ventilation and locking system 2 comprising a first embodiment of a support mechanism 3 according to the invention is mounted on a pivoting sash 10 of a window assembly 1. The support mechanism 3 supports a closure element 15 consisting in a ventilation flap and is adapted so that the flap can be set in a locking closed position in which it shuts a ventilation passage 5 of the window assembly 1. In FIG. 1, the flap is represented in a ventilation position, i.e. a position in which the flap 15 is inclined while keeping locked the ventilation and locking system. In this embodiment of the window assembly 1, when the window is closed, the ventilation passage 5 is created by a space between a top frame member 11 of the pivoting sash 10 and a top frame member 101 of a main frame of the window.

[0013] The ventilation position represented is the maximum ventilation position provided by the support mechanism 3, i.e. the support mechanism does not allow the flap to be further moved away from the ventilation passage 5, as explained hereafter in reference to FIG. 4. The displacement of the flap 15 from its locking closed position to the maximum ventilation position results from a combination of a translatory motion T1 and a rotary motion R1, due to a hinged structure 30 of the support mechanism 3. The hinged structure 30 is adapted to displace the flap to the maximum ventilation position so that both top and bottom longitudinal edges respectively 15T and 15B of the flap move away from the ventilation passage 5 (FIG. 1). Between the locking closed position and the maximum ventilation position represented, a continuity of intermediate ventilation positions is provided for the flap 15. Alternatively, several discrete intermediate

ventilation positions could be provided.

[0014] As a first and top longitudinal edge 15T of the flap separates from the top frame member 101 of the window with an increasing distance G1, a first air passage 7 communicating with the ventilation passage 5 widens until the flap is brought to the maximum ventilation position (FIGS. 1, 2 and 4). Similarly, as a second and bottom longitudinal edge 15B of the flap separates from the bottom frame member 11 of the pivoting sash 10 with an increasing distance G2, a second air passage 8 communicating with the ventilation passage 5 widens. The hinged structure 30 is adapted to incline the flap 15 so that the second air passage 8 widens more than the first air passage 7, i.e. the distance G2 sets greater than the distance G1. This configuration is advantageous to keep the ventilation and locking system locked, as explained hereafter.

[0015] The top and bottom longitudinal edges 15T and 15B of the closure element 15 are defined in reference to their respective positions relative to the sash 10 on which the closure element is mounted. The top edge is defined as the distal edge, whereas the bottom edge is defined as the proximal edge. Therefore, depending on the position of the ventilation passage in the closure assembly, the top edge of the flap is not necessarily located higher than the bottom edge.

[0016] The ventilation and locking system comprises two locking mechanisms 210 able to be simultaneously actuated by the flap 15. The actuation of a locking mechanism 210 by the flap 15 is performed through a linking mechanism 211 which is at one end hinged to the locking mechanism and is at one other end hinged to the flap at the top longitudinal edge 15T of the flap. The linking mechanism 211 comprises two rods hinged to each other so that they provide a free travel when spreading until they set in alignment. The free travel is adapted so that a locking mechanism 210 is not actuated upon a displacement of the flap 15 to a ventilation position. The smaller the distance G1 sets in the maximum ventilation position, the smaller the free travel of the linking mechanism 211 can be. In order to provide a wide enough first air passage 7 adequate for a good air circulation capacity, the hinged structure 30 is adapted so that the distance G1 sets greater than 5 mm in the maximum ventilation position, and more preferably not less than 8 mm. Thanks to the first and second air passages 7 and 8, a subtantial flow F of fresh air incoming through the ventilation passage may enter down into the room to ventilate (FIG. 2).

[0017] As represented in FIG. 3, the support mechanism 3 comprises a first hinged mechanism 20 and a second hinged mechanism 30 linked to each other. The first hinged mechanism 20 comprises a flap bottom hinge member 22 which is secured to the flap 15 and a latching supporting plate 21 which is hinged to the flap bottom hinge member 22 about a first axis A1 which extends along the bottom longitudinal edge 15B of the flap. The latching supporting plate 21 comprises a linking plate 21B which is jointed to the second hinged mechanism 30. The first hinged mechanism 20 further comprises a latching mechanism 23 adapted to secure the flap onto the latching supporting plate 21 when the flap is in the locking closed position as well as in a ventilation position. Unlatching the latching mechanism allows the flap to be pivoted in an unlocking rotary way about the first axis A1 relative to the latching supporting plate 21, therefore allowing to actuate and unlock the two locking mechanisms 210.

[0018] The second hinged mechanism 30 is the hinged structure of the support mechanism 3 which allows to displace the closure element 15 to a ventilation position. Said hinged structure comprises a supporting casing 300 secured to the sash 10, and a first and a second pivoting arms respectively 31 and 32 which are each pivotally mounted on the supporting casing 300 and are arranged parallel to each other. The hinged structure further comprises a link arm 33 arranged so as to form with the first and second pivoting arms 31 and 32 a sensibly parallelogrammatic hinge structure allowing the link arm 33 to be displaced while remaining sensibly parallel to a predetermined direction.

[0019] When the window assembly is closed and locked, the ventilation and locking system is in the position as represented in FIG. 3. By pulling the flap 15 with a flap handle 16, a user displaces the flap to the maximum ventilation position in which the parallelogrammatic hinge structure of the mechanism 30 reaches an abutment spread position, as represented in FIG. 4 . The parallelogrammatic hinge structure allows a principal part 33A of the link arm 33 to remain sensibly parallel to the direction of the line P1-P2, i.e. the line joining two stationary pivot points P1 and P2 of respectively the first and the second pivoting arms 31 and 32 (FIG. 4). The link arm 33 is hinged to the pivoting arms 31 and 32 at two mobile pivot points P3 and P4 which correspond to both ends of the principal part 33A. It is not necessary that the line P3-P4 joining the mobile pivot points P3 and P4 remains strictly parallel to the line P1-P2. An approximately parallelogrammatic hinge structure which would present a slight angle between the two lines P1-P2 and P3-P4 is acceptable.

[0020] The link arm 33 comprises an extension part 33B which is jointed to the linking plate 21B of the first hinged mechanism 20 at a pivot point P7. The first pivoting arm 31 comprises a principal part 31A and an extension part 31B which is jointed to an inclination arm 34 at a pivot point P5 corresponding to a bottom end of the first pivoting arm 31. The inclination arm 34 is jointed to the linking plate 21B of the first hinged mechanism 20 at a pivot point P6.

[0021] Between its locking closed position and a ventilation position, the flap performs a combined rotatory and translatory displacement which has a rotatory component R1 in a way somewhat opposite the unlocking rotary way and a translatory component T1 which further moves the flap away from the ventilation passage 5 (FIG. 1). The translatory component T2 is performed by the

parallelogrammatic hinge structure through the link arm 33 which is globally displaced like following a translation.

[0022] The rotatory component R1 is performed through the extension part 31B of the first pivoting arm 31. Upon rotation of the first pivoting arm 31, the pivot point P5 rotates around the pivot point P4 following an arc of circle, which entails through the inclination arm 34 a rotary motion of the pivot point P6 relative to the pivot point P7. Therefore, the greater is the length of the extension part 31B the greater is the angular amplitude of the rotatory motion The extension part 33B of the link arm 33 and the inclination arm 34 form two support arms hinged to the flap through the latching supporting plate 21 at the pivot point P6 and P7 and which move relatively to each other during the displacement of the flap to a ventilation position, therefore changing the angle between the line P6-P7 and the stationary line P1-P2. The inclination of the latching supporting plate 21 being determined by the line P6-P7, the flap 15 supported by the latching supporting plate 21 therefore swivels relative to the sash 10 through the hinged structure 30 and inclines such that its bottom longitudinal edge 15B sets farther from the ventilation passage 5 than its top longitudinal edge 15T.

[0023] A support mechanism according to the invention is particularly appropriate for being used in a ventilation and locking system of the kind here above described in which the displacement of the closure element to a ventilation position is performed in a way somewhat opposite the unlocking way. However, the invention is also advantageous when the support mechanism is used to replace the flap hinges of a classical kind of ventilation and locking system like the one described in DE1905074A1 in which the displacement of the closure element to a ventilation position is performed along a path which is a first part of the displacement path to the unlocking position.

[0024] A support mechanism 3' according to a second embodiment of the invention and used in a ventilation and locking system of the above mentioned kind is described hereafter in FIGS. 5 to 11. As represented in FIGS. 5 and 7, a pivoting sash 10 of a window assembly is equipped with a ventilation and locking system 2' mounted on a top frame member 11 of the pivoting sash and comprising two identical support mechanisms 3' which are arranged on both sides of a locking mechanism 410 linked to the closure element 15.

[0025] The locking mechanism 410 operates according to a principle analogue to the prior art locking mechanism described in DE1905074A1. It comprises a slider 412 actuated by the flap 15 through a rigid linking mechanism 413 hinged to the flap and to the slider, and further comprises two locking pins 411 linked to the slider 412 through a lever mechanism not shown. In the locking closed position of the flap 15 (FIG. 5) as well as in the ventilation position of the flap (FIGS. 6 and 7), the locking pins 411 remain in a locking position in which they engage a strike plate 420 mounted on a top frame member 101 of a main frame 100 of the window assembly. As in the device of DE1905074A1, the lever mechanism of the locking mechanism 410 is adapted so that when the flap 15 is displaced from its locking closed position to a stable ventilation position, a corresponding displacement of the slider 412 is performed to a stable intermediate position without actuating the locking pins 411.

[0026] As represented in FIGS. 6 and 7, the flap 15 sets in a stable ventilation position provided by the stable intermediate position of the slider 412. The two support mechanisms 3' comprise each a hinged structure 30', which is analogue to the hinged structure 30 previously described in the first embodiment of support mechanism according to the invention but is arranged inversely. Between its locking closed position and a ventilation position, the flap performs a combined rotatory and translatory displacement which has a rotatory component R2 in the unlocking rotary way and a translatory component T2 which further moves the flap away from the ventilation passage 5.

[0027] Due to its inverse arrangement compared to the first embodiment, the hinged structure 30' inclines the flap 15 so that the first air passage 7 widens more than the second air passage 8, i.e. the distance G1 sets greater than the distance G2 (FIG. 6). A first and main part of the flow F of fresh air incoming through the ventilation passage enters the room through the first air passage 7. A significant second part of part of the air flow F enters the room through the second air passage 8, which improves the air flow capacity compared to a prior art device of the kind of DE1905074A1.

[0028] The hinged structure 30' is arranged so that a further displacement of the flap 15 is allowed from the ventilation position to reach the unlocking position of the flap. To this end, the slider 412 of the locking mechanism 410 is also allowed to be further moved from its stable intermediate position to an unlocking position in which the locking pins 411 of the locking mechanism have been displaced to disengage the strike plate 420, as represented in FIGS. 8 and 9. Advantageously, both hinged structures 30' are arranged to set in an abutment spread position as represented in FIG. 11 when the slider 412 reaches its unlocking position, so that the pulling effort exerted by a user to open the window is distributed to both support mechanisms 3'.

[0029] As represented in FIGS. 10 and 11, the hinged structure 30' comprises the same elements and provides a same parallelogrammatic hinge structure as in the first embodiment described here above in reference to FIGS. 3 and 4. The hinge structure therefore operates in a same manner as explained in the preceding description of the first embodiment. In particular, as illustrated drawn in dash lines, the principal part 33A of the link arm 33, which extends between the mobile pivot points P3 and P4, remains sensibly parallel to the direction of the line P1-P2 defined by the stationary pivot points P1 and P2. The support arms 33B and 34 are hinged to the flap through a supporting plate 21' which is permanently secured to

the flap.

[0030] It can be noted that in the unlocking position of the flap 15 represented in FIG. 11, i.e. in the abutment spread position of the hinged structure 30' limited by a stopper 36 which cooperates with the first pivoting arm 31, the pivoting arms 31 and 32 are inclined relative to the plane of the sash. This arrangement provides a large amplitude of displacement of the flap both in translation and in rotation from the maximum ventilation position to reach the unlocking position, which is advantageous to have a sufficient actuation travel of the flap in order to actuate the locking mechanism 410.

[0031] As represented in FIG. 12, a support mechanism 6 according to a third embodiment of the invention comprises a hinged structure 40 comprising two support arms 43 and 44 including a first support arm 43 arranged to be displaced in translation only. Each support arm includes a rack rail part, the rack rail parts being interlinked with each other through a reduction gear 46 comprising three pinions. The small pinion which engages a second support arm 44 is secured to a larger pinion which meshes with a similar pinion engaging the first support arm 43. Therefore, a displacement of the first support arm 43 over a predetermined travel M1-M2 entails a displacement of the second support arm 44 over a shorter travel N1-N2.

[0032] The displacement of the first support arm 43 is set according to a translatory motion T3, whereas the displacement of the second support arm 44 over the travel N1-N2 results from a combination of the translatory motion T3 and a rotary motion R3 which are performed simultaneously. The distances between the flap 15 and the frame members 11 and 101 of the closure assembly and the inclination obtained for the flap 15 in the maximum ventilation position represented in FIG. 13 depend on the length of the first support arm 43 and on the reduction ration of the reduction gear 46.

[0033] The support mechanism 6 is an alternative to the support mechanism 3 according to the first embodiment of the invention, although the device 6 is not as compact to obtain a same displacement of the flap. The device 6 may easily be motorised, for instance through an electric motor actuating a pinion of the reduction gear 46. Discrete intermediate ventilation positions may easily be provided, for instance by notches of the first support arm 43 each adapted to cooperate with a pressure spring secured to the casing.

[0034] In the first three embodiments previously described, the translatory and rotary motions for the displacement of the closure element to a ventilation position are performed simultaneously. However, the present invention does not limit itself to this disposition. Sequential translatory and rotary motions may be provided for a same result. Furthermore, the present invention does not limit itself to a displacement of the closure element including a translatory motion, as illustrated hereafter by a fourth embodiment performing a sole rotary motion.

[0035] As represented in FIG. 14, a support mechanism 6' according to a fourth embodiment of the invention comprises a hinge support 51 providing a curved guide path 51A along an arc of circle forming part of a circle C1 which has a centre O1 remote from the hinge support 51. The centre O1 is located above the flap 15 at the room side. The hinge support 51 is suitable for being secured to a frame member 11 of a pivoting sash 10. The support mechanism 6' further comprises a hinge mobile part 52 hinged to the hinge support 51, which comprises a curved sliding part 52A adapted to slide along the curved guide path 51A. Therefore, the hinge mobile part 52 can rotate about a hinge axis passing by the centre O1.

[0036] The hinge mobile part 52 further comprises a support part 52B on which the flap 15 is mounted. The flap 15 is hinged to the support part 52B of the hinge mobile part, in order to pivot the flap in an unlocking direction to actuate and unlock at least one locking mechanism. In a same manner as previously described regarding the support mechanism 3 according to the first embodiment of the invention, the flap 15 hinged to the support part 52B can be secured and latched to the support part 52B through a latching mechanism 23.

[0037] When pulling the flap 15 to the maximum ventilation position as represented in FIG. 15, the flap rotates about the hinge axis O1, and the displacement of the flap to a ventilation position results from a sole rotary motion. The hinge axis O1 is located so that a top longitudinal edge of the flap moves away by the distance G1 from a sealing area of a top frame member 101 of the closure assembly. A first air passage 7 communicating with the ventilation passage of the closure assembly is therefore created, allowing a top part of the flow F of fresh air incoming through the ventilation passage to enter the room through the first air passage 7.

[0038] The support mechanisms according to the four embodiment of the invention previously described advantageously comprise each a hinged structure which is arranged along a plane perpendicular to a longitudinal axis of the flap, therefore allowing to mount the hinged structure inside a relatively narrow supporting casing which is not bulky in the ventilation passage of the closure assembly. However, the invention is not limited to such a perpendicular disposition.

[0039] As will be appreciated, the present invention does not limit itself to the embodiments described here above purely as examples; the invention also extends to other embodiments covered by the claims.

[0040] Further, the disclosure comprises embodiments according to the following clauses:

Clause 1. A support mechanism (3; 3'; 6; 6') for a closure element (15) of a ventilation and locking system (2; 2'; 4; 4'), said support mechanism being suitable for being mounted on a pivoting sash (10) of a closure assembly (1) in order to support said closure element (15) and to allow a displacement of the closure element from a locking closed position in which the closure element shuts a ventilation passage (5)

of the closure assembly to at least one ventilation position in which the closure element is inclined relative to its closed position while keeping the ventilation and locking system locked, a first air passage (7) communicating with said ventilation passage (5) being created in a said ventilation position by increasing a distance (G1) between a first longitudinal edge (15T) of the closure element and a frame member (101) of said closure assembly (1), characterized in that it comprises a hinged structure (30; 30'; 40; 50) adapted so that said displacement of the closure element (15) to a ventilation position creates a second air passage (8) communicating with said ventilation passage (5) by increasing a distance (G2) between a second longitudinal edge (15B) of the closure element and a frame member (11) of said pivoting sash (10).

Clause 2. The support mechanism according to clause 1, wherein said hinged structure (30; 30'; 40) is adapted so that said displacement of the closure element to a ventilation position results from a combination of a translatory motion (T1; T2; T3) and a rotary motion (R1; R2; R3).

Clause 3. The support mechanism according to clause 2, wherein said hinged structure (30; 30'; 40) is adapted so that said translatory and rotary motions are performed simultaneously.

Clause 4. The support mechanism according to clause 2 or 3, wherein said hinged structure (30; 30'; 40) comprises at least two support arms (33B, 34; 43, 44) hinged to the closure element (15) and is adapted so that two said support arms (33B, 34; 43, 44) move relatively to each other during said displacement of the closure element to a ventilation position.

Clause 5. The support mechanism according to clause 4, wherein said support arms (33B, 34; 43, 44) are hinged to a latching supporting plate (21) to which said closure element (15) is hinged and able to be secured.

Clause 6. The support mechanism according to clause 4, wherein said support arms (33B, 34; 43, 44) are hinged to the closure element (15) through a supporting plate (21') which is permanently secured to the closure element.

Clause 7. The support mechanism according to clause 1, wherein said hinged structure (30; 30'; 40; 50) is arranged along a plane which is perpendicular to a longitudinal axis (A, A1) of the closure element (15).

Clause 8. The support mechanism according to clause 4, wherein said hinged structure (30; 30') comprises :

- a supporting casing (300; 300') suitable for being secured to the sash (10, 10') ;
- a first and a second pivoting arms (31, 32) each pivotally mounted on said supporting casing (300; 300'), which are arranged parallel to each other ;
- a link arm (33) arranged so as to form with said first and second pivoting arms (31, 32) a sensibly parallelogrammatic hinge structure (31A, 32, 33A) allowing said link arm (33) to be displaced while remaining sensibly parallel to a predetermined direction (P1-P2), said link arm (33) comprising an extension part (33B) which forms a first said support arm hinged to the closure element (15).

Clause 9. The support mechanism according to clause 8, wherein said first pivoting arm (31) comprises an extension part (31B) which is jointed to an inclination arm (34) which forms a second said support arm hinged to the closure element (15).

Clause 10. The support mechanism according to clause 4, wherein said hinged structure (40) comprises two said support arms (43, 44) including a first support arm (43) arranged to be displaced in translation, each support arm including a rack rail part, said rack rail parts being interlinked with each other through a reduction gear (46) adapted so that a displacement (M1-M2) of the first support arm (43) over a predetermined travel entails a displacement of the second support arm (44) over a shorter travel (N1-N2).

Clause 11. The support mechanism according to clause 1, wherein said hinged structure (50) comprises :

- a hinge support (51) providing a curved guide path (51A), suitable for being secured to said pivoting sash (10) ;
- a hinge mobile part (52) hinged to said hinge support (51), comprising a curved sliding part (52A) adapted to slide along said curved guide path (51A) so that said hinge mobile part (52) can rotate about a hinge axis (O1) remote from said hinge support (51), and further comprising a support part (52B) on which is mounted said closure element (15).

Clause 12. A ventilation and locking system (2; 2'; 4; 4') comprising at least one support mechanism (3; 3'; 6; 6') according to any of clauses 1 to 3, and further comprising at least one locking mechanism (210; 410) able to be actuated by said closure element

(15) through a linking mechanism (211; 413) which links said locking mechanism (210; 410) to the closure element (15).

Clause 13. A ventilation and locking system (2; 4; 4') according to clause 12, wherein said linking mechanism (211) provides a free travel adapted so that said locking mechanism (210) is not actuated upon a displacement of the closure element (15) to a ventilation position.

Clauses 14. A ventilation and locking system (2; 4; 4') according to clause 12, wherein said closure element (15) is hinged to said support mechanism (3; 6; 6') so as to be able to pivot relative to the support mechanism in an unlocking direction in order to actuate and unlock said locking mechanism (210), the ventilation and locking system further comprising a latching mechanism (23) adapted to latch the closure element (15) to said support mechanism (3; 6; 6').

Clause 15. A closure assembly (1) comprising :

a ventilation passage (5) adapted to allow an air circulation through the closure assembly (1) when the latter is closed ;
a pivoting sash (10) ;
a ventilation and locking system (2; 2'; 4; 4') comprising a closure element (15) and a support mechanism (3; 3'; 6; 6') of said closure element (15) mounted on said pivoting sash (10) ;
wherein said support mechanism allows a displacement of the closure element (15) from a locking closed position in which the closure element (15) shuts said ventilation passage (5) to at least one ventilation position in which the closure element is inclined relative to its closed position while keeping the ventilation and locking system locked, and a first air passage (7) communicating with said ventilation passage (5) is created in a said ventilation position by increasing a distance (G1) between a first longitudinal edge (15T) of the closure element and a frame member (101) of the closure assembly (1),
characterized in that said support mechanism comprises a hinged structure (30; 30'; 40; 50) adapted so that said displacement of the closure element (15) to a ventilation position creates a second air passage (8) communicating with said ventilation passage (5) by increasing a distance (G2) between a second longitudinal edge (15B) of the closure element and a frame member (11) of said pivoting sash (10).

Clause 16. The support mechanism according to clause 5, wherein said hinged structure (30; 30') comprises :

a supporting casing (300; 300') suitable for being secured to the sash (10, 10') ;
a first and a second pivoting arms (31, 32) each pivotally mounted on said supporting casing (300; 300'), which are arranged parallel to each other ;
a link arm (33) arranged so as to form with said first and second pivoting arms (31, 32) a sensibly parallelogrammatic hinge structure (31A, 32, 33A) allowing said link arm (33) to be displaced while remaining sensibly parallel to a predetermined direction (P1-P2), said link arm (33) comprising an extension part (33B) which forms a first said support arm hinged to the closure element (15).

Clause 17. A ventilation and locking system (2; 4; 4') according to clause 13, wherein said closure element (15) is hinged to said support mechanism (3; 6; 6') so as to be able to pivot relative to the support mechanism in an unlocking direction in order to actuate and unlock said locking mechanism (210), the ventilation and locking system further comprising a latching mechanism (23) adapted to latch the closure element (15) to said support mechanism (3; 6; 6').

Claims

1. A support mechanism (3; 3'; 6; 6') for a closure element (15) of a ventilation and locking system (2; 2'; 4; 4'), said support mechanism being suitable for being mounted on a pivoting sash (10) of a closure assembly (1) in order to support said closure element (15) and to allow a displacement of the closure element from a locking closed position in which the closure element shuts a ventilation passage (5) of the closure assembly to at least one ventilation position in which the closure element is inclined relative to its closed position while keeping the ventilation and locking system locked, a first air passage (7) communicating with said ventilation passage (5) being created in a said ventilation position by increasing a distance (G1) between a first longitudinal edge (15T) of the closure element and a frame member (101) of said closure assembly (1),
characterized in that it comprises a hinged structure (30; 30'; 40; 50), the hinged structure (30;30';40;50) which moves the closure element (15) to a ventilation position with a combination of a translatory motion (Tl; T2; T3) and a rotary motion (R1; R2; R3), the combination of a translatory motion (Tl; T2; T3) and a rotary motion (R1; R2; R3) of the closure element (15) to a ventilation position creating a second air passage (8) communicating with said ventilation passage (5) by increasing a distance (G2) between a second longitudinal edge (15B) of the closure element and a frame member (11) of said piv-

oting sash (10),
said hinged structure (30; 30'; 40) comprises at least two support arms (33B, 34, 43, 44) hinged to the closure element (15) and is adapted so that two said support arms (33B, 34, 43, 44) move relatively to each other during said displacement of the closure element to a ventilation position, and
wherein said hinged structure (40) further comprises:

two said support arms (43, 44) including a first support arm (43) arranged to be displaced in translation, each support arm including a rack rail part, said rack rail parts being interlinked with each other through a reduction gear (46) adapted so that a displacement (M1-M2) of the first support arm (43) over a predetermined travel entails a displacement of the second support arm (44) over a shorter travel (N1-N2).

2. The support mechanism according to claim 1, wherein said hinged structure (30; 30'; 40) is adapted so that said translatory and rotary motions are performed simultaneously.

3. The support mechanism according to claim 1, wherein said support arms (33B, 34; 43, 44) are hinged to a latching supporting plate (21) to which said closure element (15) is hinged and able to be secured.

4. The support mechanism according to claim 1, wherein said support arms (33B, 34; 43, 44) are hinged to the closure element (15) through a supporting plate (21') which is permanently secured to the closure element.

5. The support mechanism according to claim 1, wherein said hinged structure (30; 30'; 40; 50) is arranged along a plane which is perpendicular to a longitudinal axis (A, A1) of the closure element (15).

6. A ventilation and locking system (2; 2'; 4; 4') comprising at least one support mechanism (3; 3'; 6; 6') according to any of claims 1 to 2, and further comprising at least one locking mechanism (210; 410) able to be actuated by said closure element (15) through a linking mechanism (211; 413) which links said locking mechanism (210; 410) to the closure element (15).

7. A ventilation and locking system (2; 4; 4') according to claim 6, wherein said linking mechanism (211) provides a free travel adapted so that said locking mechanism (210) is not actuated upon a displacement of the closure element (15) to a ventilation position.

8. A ventilation and locking system (2; 4; 4') according to claim 6, wherein said closure element (15) is hinged to said support mechanism (3; 6; 6') so as to be able to pivot relative to the support mechanism in an unlocking direction in order to actuate and unlock said locking mechanism (210), the ventilation and locking system further comprising a latching mechanism (23) adapted to latch the closure element (15) to said support mechanism (3; 6; 6').

9. A closure assembly (1) comprising :

a ventilation passage (5) adapted to allow an air circulation through the closure assembly (1) when the latter is closed ;
a pivoting sash (10) ;
a ventilation and locking system (2; 2'; 4; 4') comprising a closure element (15) and a support mechanism (3; 3'; 6; 6') of said closure element (15) mounted on said pivoting sash (10) ;
wherein said support mechanism allows a displacement of the closure element (15) from a locking closed position in which the closure element (15) shuts said ventilation passage (5) to at least one ventilation position in which the closure element is inclined relative to its closed position while keeping the ventilation and locking system locked, and a first air passage (7) communicating with said ventilation passage (5) is created in a said ventilation position by increasing a distance (G1) between a first longitudinal edge (15T) of the closure element and a frame member (101) of the closure assembly (1),
characterized in that said support mechanism comprises a hinged structure (30; 30'; 40; 50), the hinged structure (30;30';40;50) which moves the closure element (15) to a ventilation position with a combination of a translatory motion (TI; T2; T3) and a rotary motion (R1; R2; R3), the combination of a translatory motion (TI; T2; T3) and a rotary motion (R1; R2; R3) of the closure element (15) to a ventilation position creating a second air passage (8) communicating with said ventilation passage (5) by increasing a distance (G2) between a second longitudinal edge (15B) of the closure element and a frame member (11) of said pivoting sash (10),
said hinged structure (30; 30'; 40) comprises at least two support arms (33B, 34, 43, 44) hinged to the closure element (15) and is adapted so that two said support arms (33B, 34, 43, 44) move relatively to each other during said displacement of the closure element to a ventilation position, and
wherein said hinged structure (40) further comprises:

two said support arms (43, 44) including a first support arm (43) arranged to be displaced in translation, each support arm in-

cluding a rack rail part, said rack rail parts being interlinked with each other through a reduction gear (46) adapted so that a displacement (M1-M2) of the first support arm (43) over a predetermined travel entails a displacement of the second support arm (44) over a shorter travel (N1-N2).

10. A ventilation and locking system (2; 4; 4') according to claim 7, wherein said closure element (15) is hinged to said support mechanism (3; 6; 6') so as to be able to pivot relative to the support mechanism in an unlocking direction in order to actuate and unlock said locking mechanism (210), the ventilation and locking system further comprising a latching mechanism (23) adapted to latch the closure element (15) to said support mechanism (3; 6; 6').

11. A support mechanism (6') for a closure element (15) of a ventilation and locking system (4'), said support mechanism being suitable for being mounted on a pivoting sash (10) of a closure assembly (1) in order to support said closure element (15) and to allow a displacement of the closure element from a locking closed position in which the closure element shuts a ventilation passage (5) of the closure assembly to at least one ventilation position in which the closure element is inclined relative to its closed position while keeping the ventilation and locking system locked, a first air passage (7) communicating with said ventilation passage (5) being created in a said ventilation position by increasing a distance (G1) between a first longitudinal edge (15T) of the closure element and a frame member (101) of said closure assembly (1),
characterized in that it comprises a hinged structure (50) adapted so that said displacement of the closure element (15) to a ventilation position creates a second air passage (8) communicating with said ventilation passage (5) by increasing a distance (G2) between a second longitudinal edge (15B) of the closure element and a frame member (11) of said pivoting sash (10),
wherein said hinged structure (50) comprises :

a hinge support (51) providing a curved guide path (51A), suitable for being secured to said pivoting sash (10) ;
a hinge mobile part (52) hinged to said hinge support (51), comprising a curved sliding part (52A) adapted to slide along said curved guide path (51A) so that said hinge mobile part (52) can rotate about a hinge axis (O1) remote from said hinge support (51), and further comprising a support part (52B) on which is mounted said closure element (15).

FIG. 1

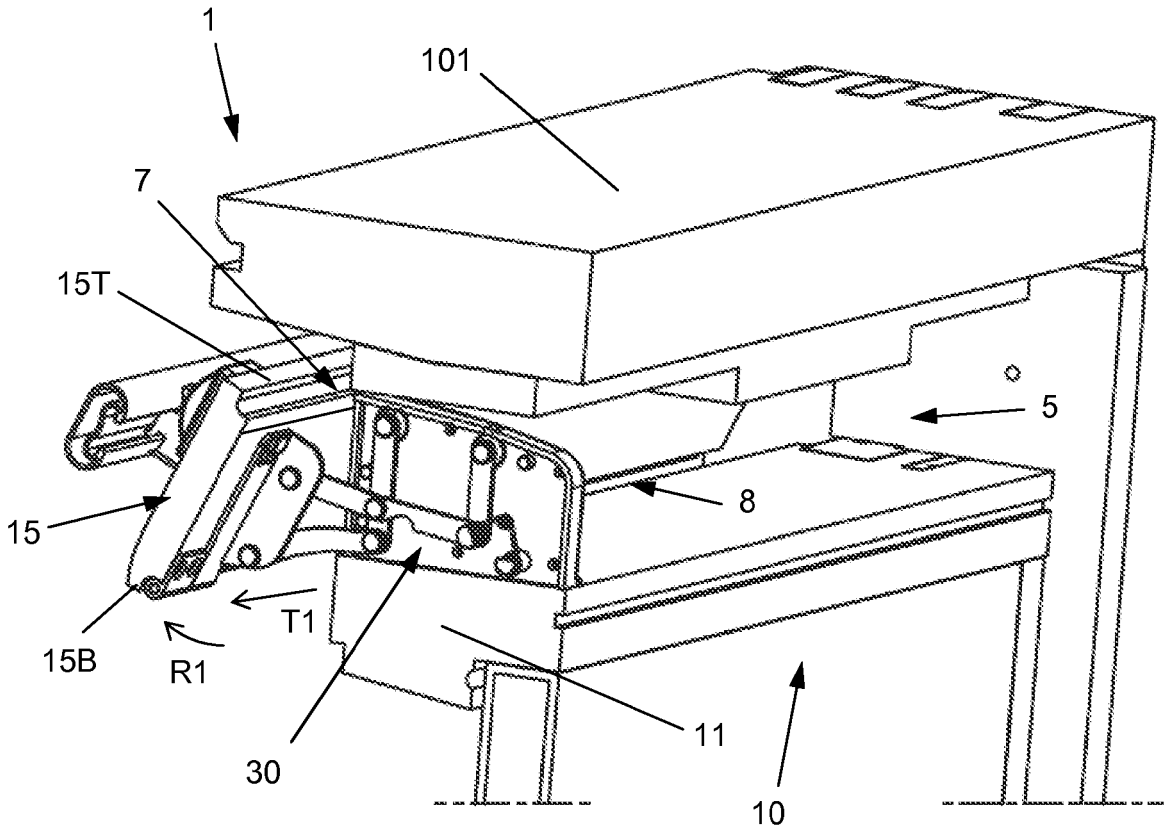


FIG. 2

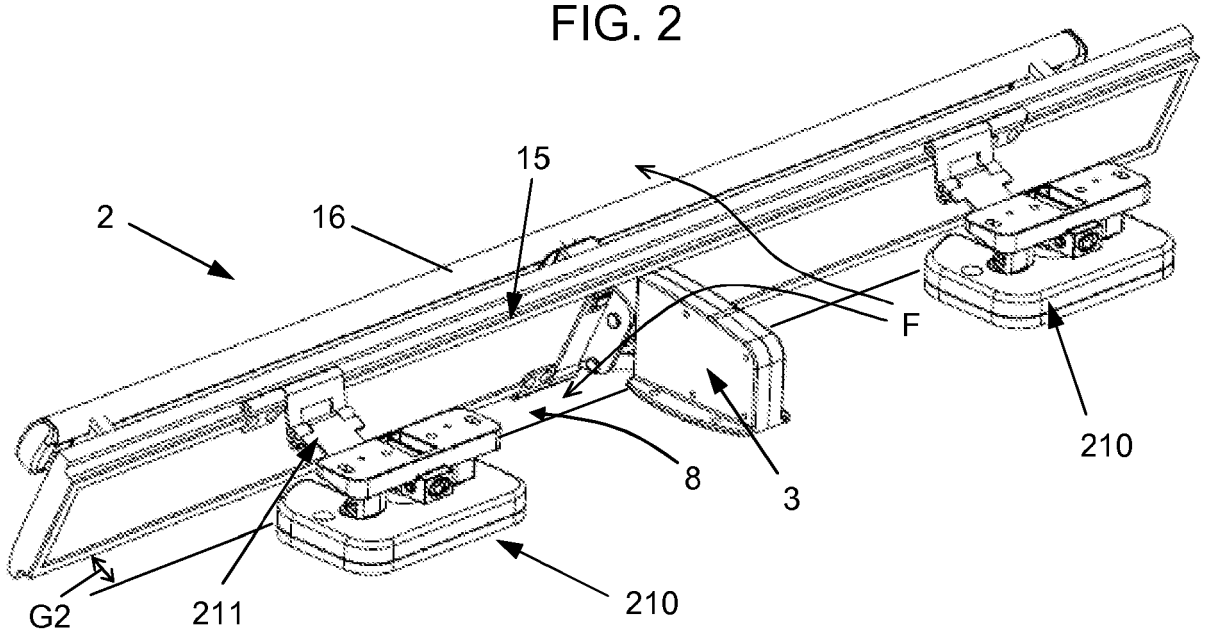


FIG. 3

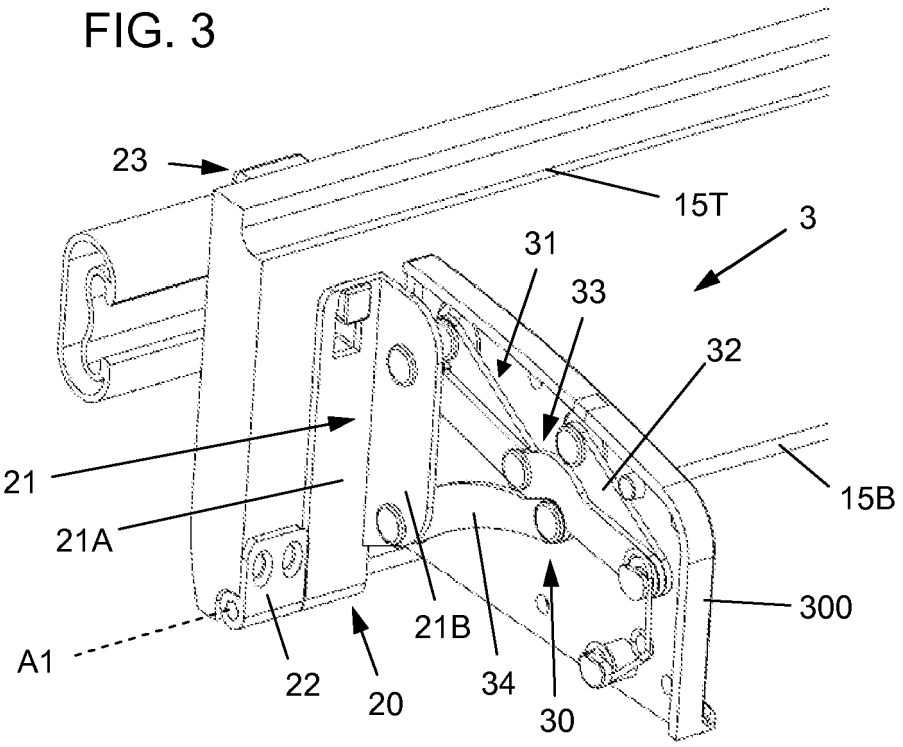

23
15T
3
31
33
32
21
21A
15B
300
A1
22
20
21B
34
30

FIG. 4

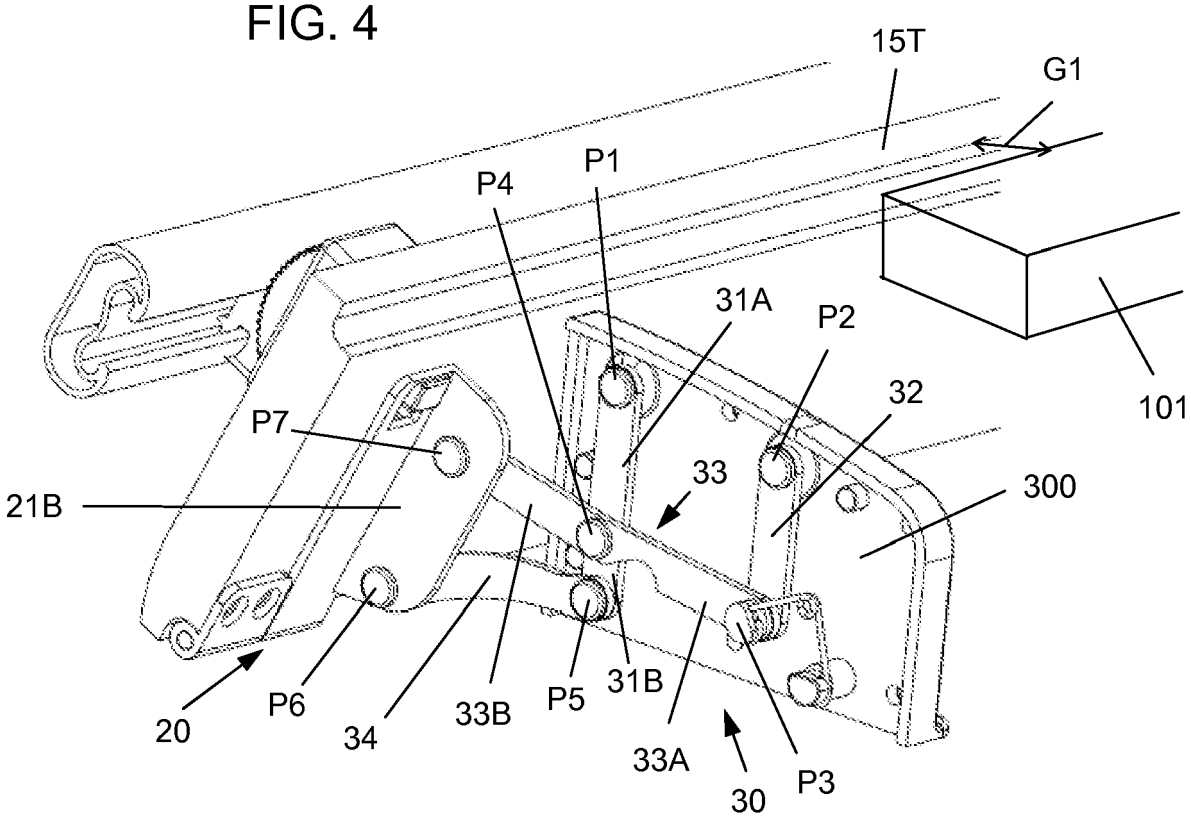

15T
G1
P4
P1
31A
P2
P7
32
101
21B
33
300
20
P6
34
33B
P5
31B
33A
30
P3

FIG. 5

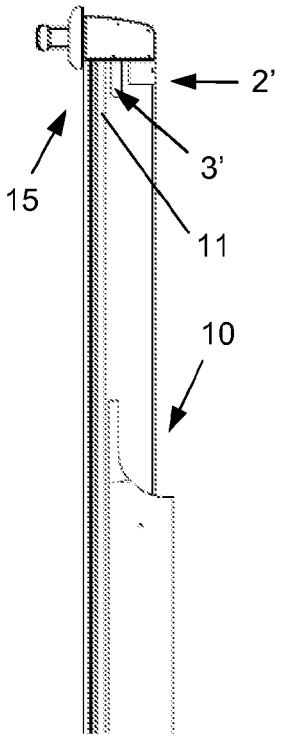


FIG. 6

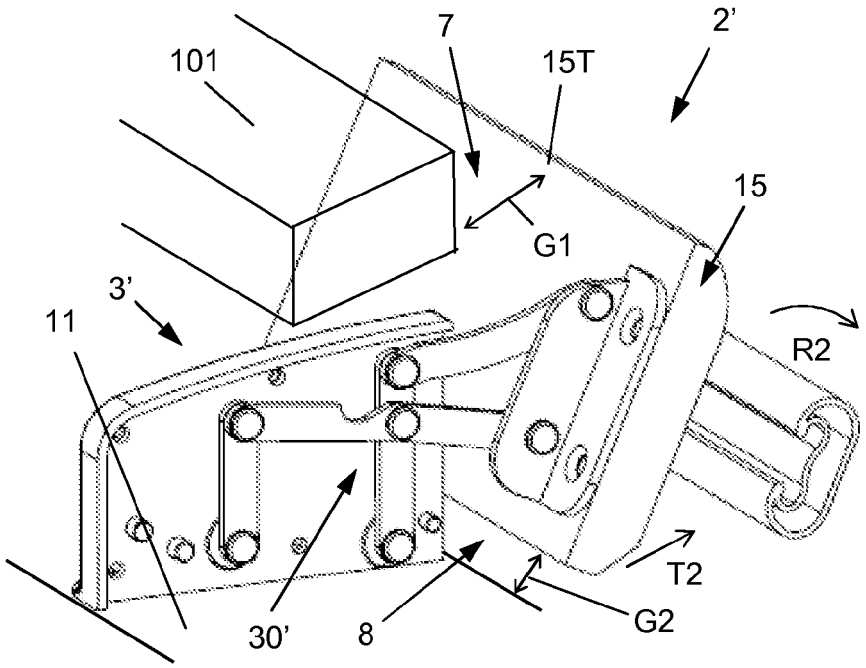


FIG. 7

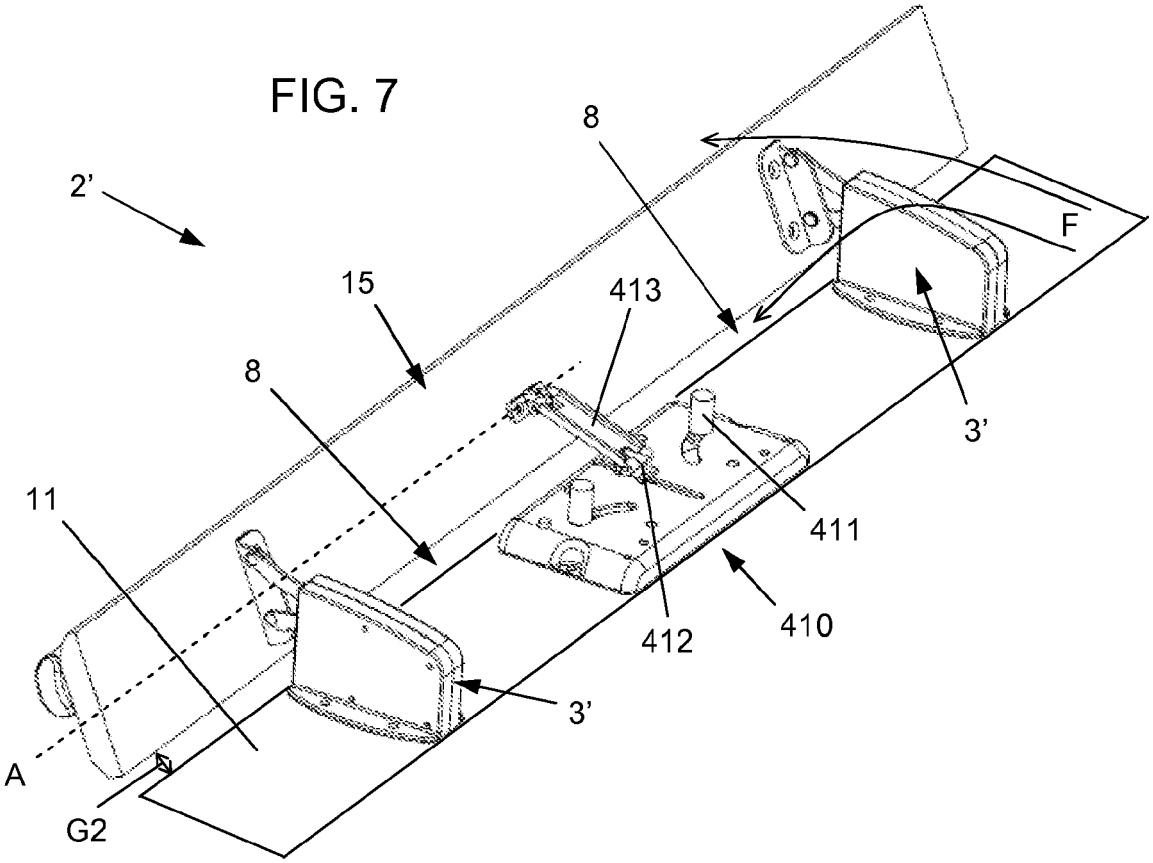


FIG. 8

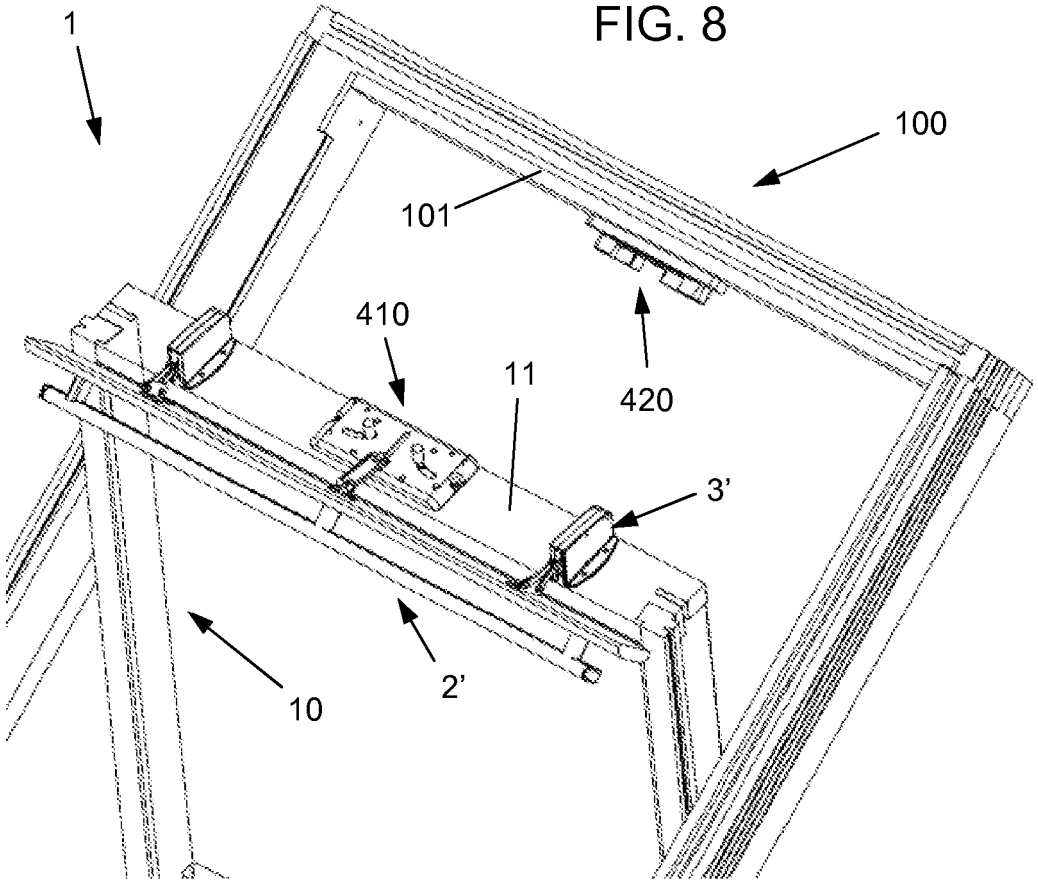


FIG. 9

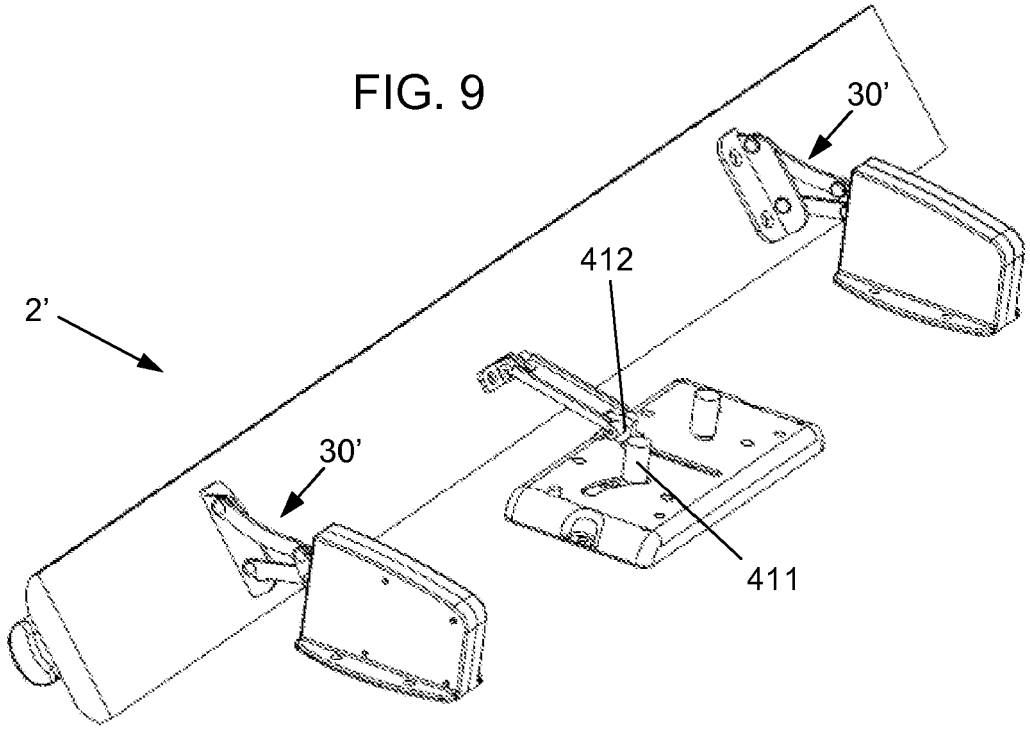


FIG. 10

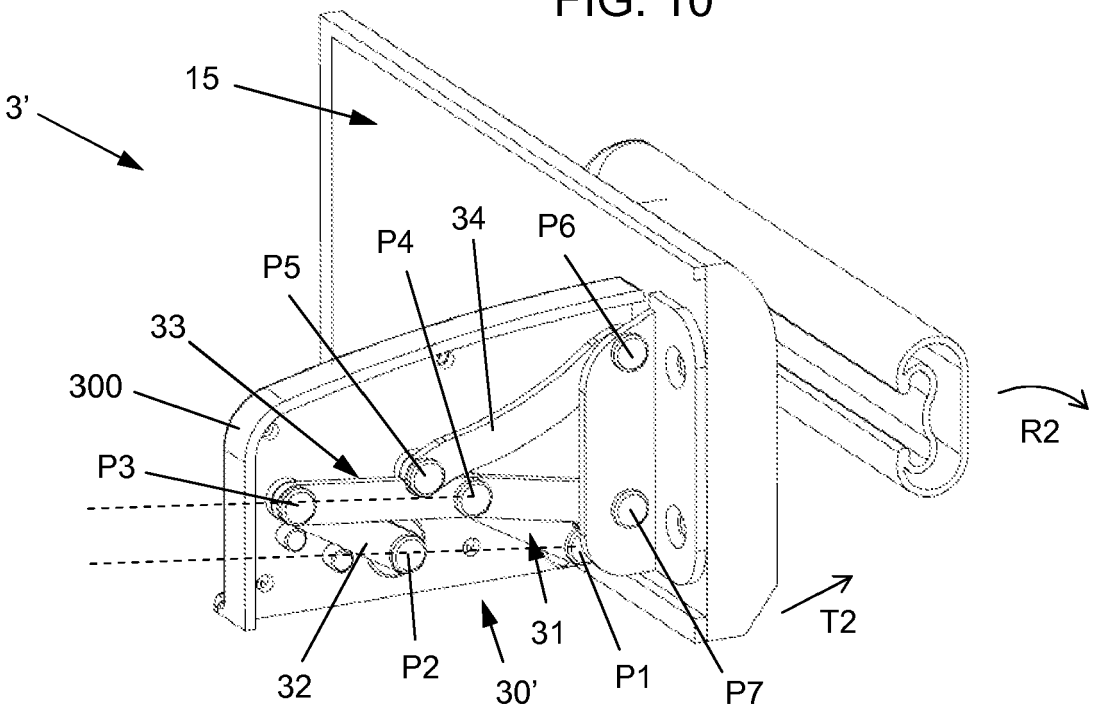

15
3'
34
P4
P6
P5
33
300
P3
R2
T2
31
32
P2
30'
P1
P7

FIG. 11

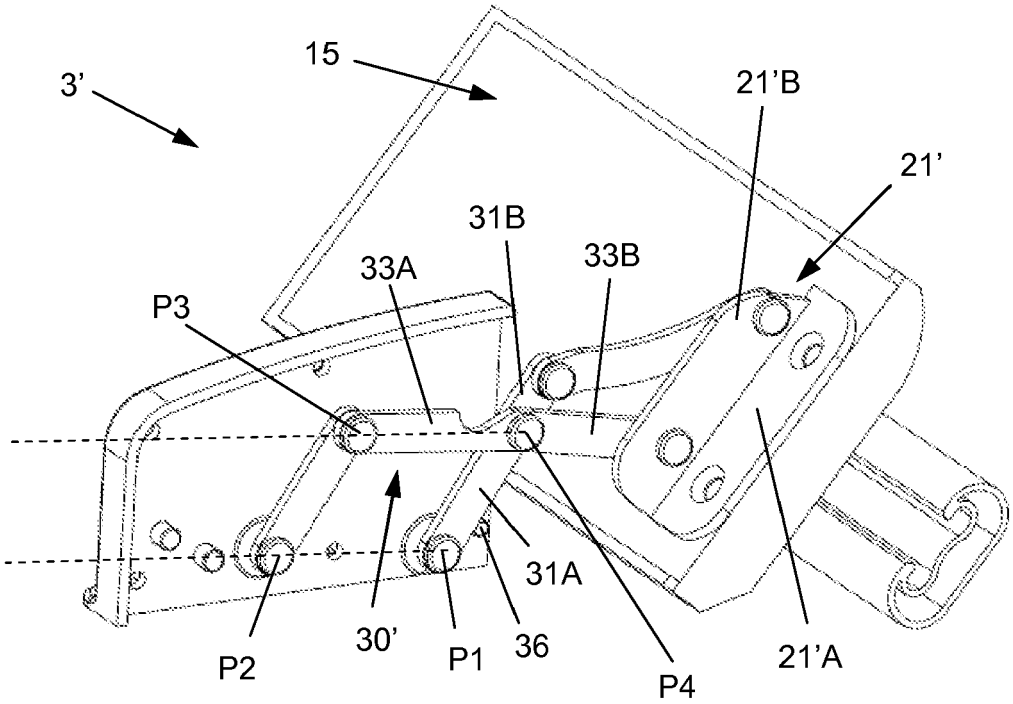

15
3'
21'B
21'
31B
33B
33A
P3
31A
30'
P1
36
P2
P4
21'A

FIG. 12

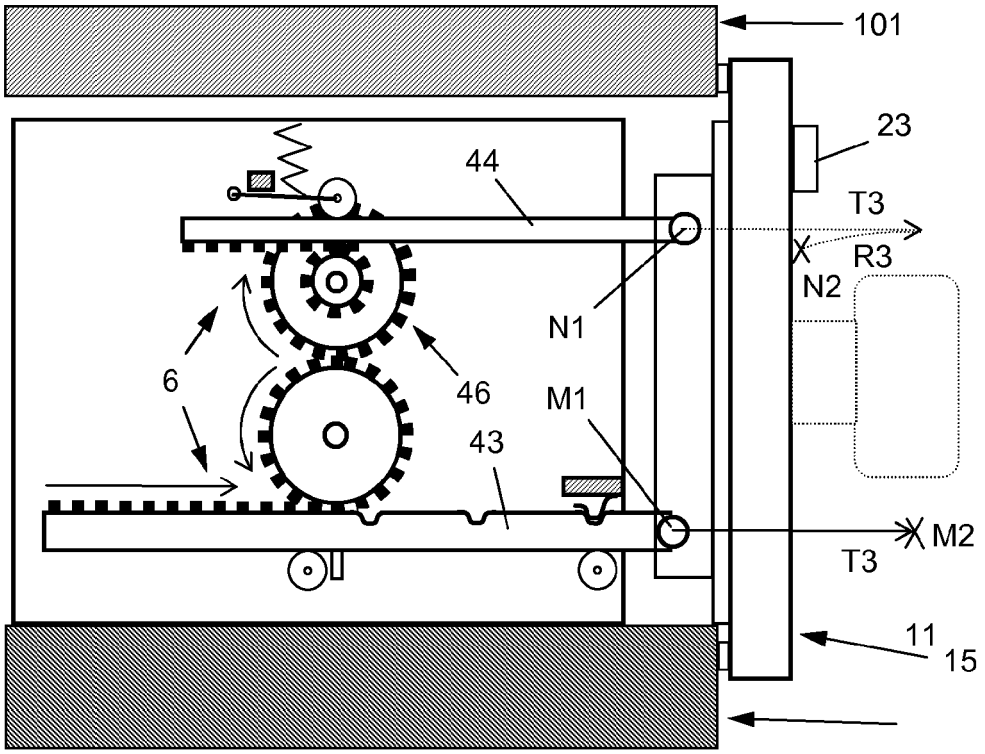


FIG. 13

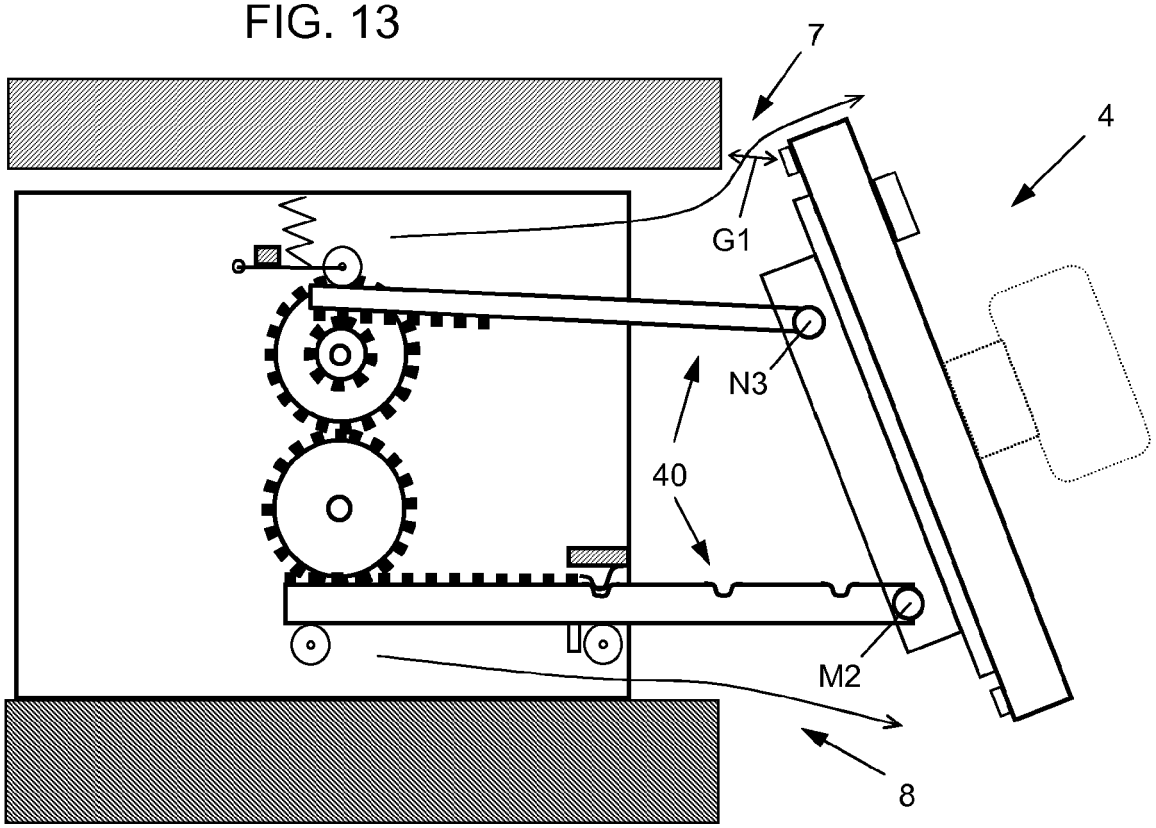


FIG. 14

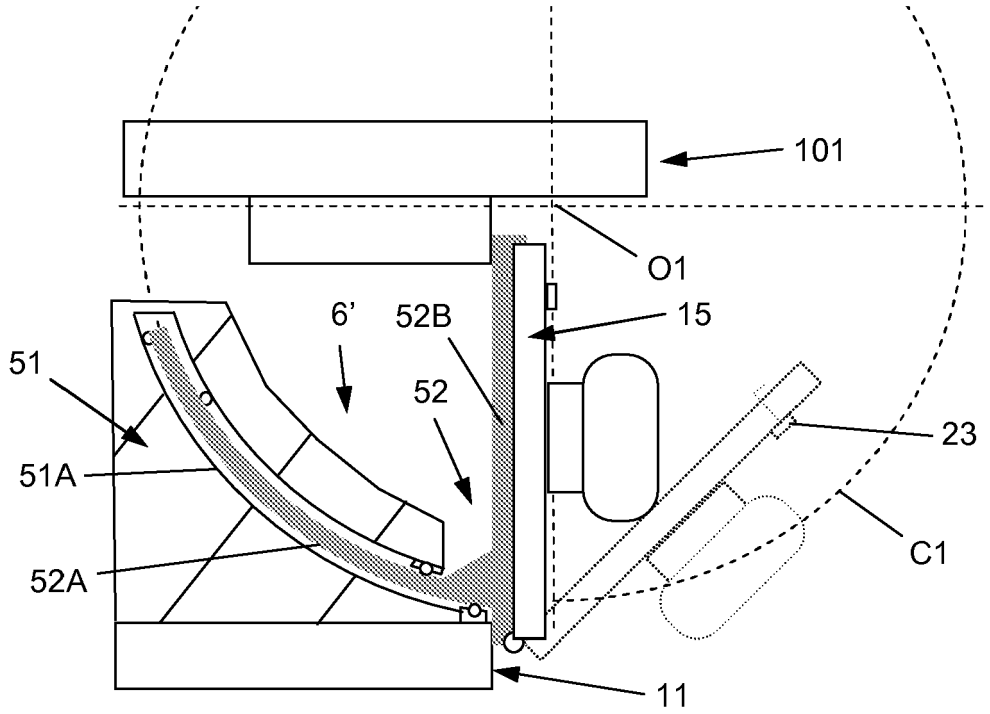
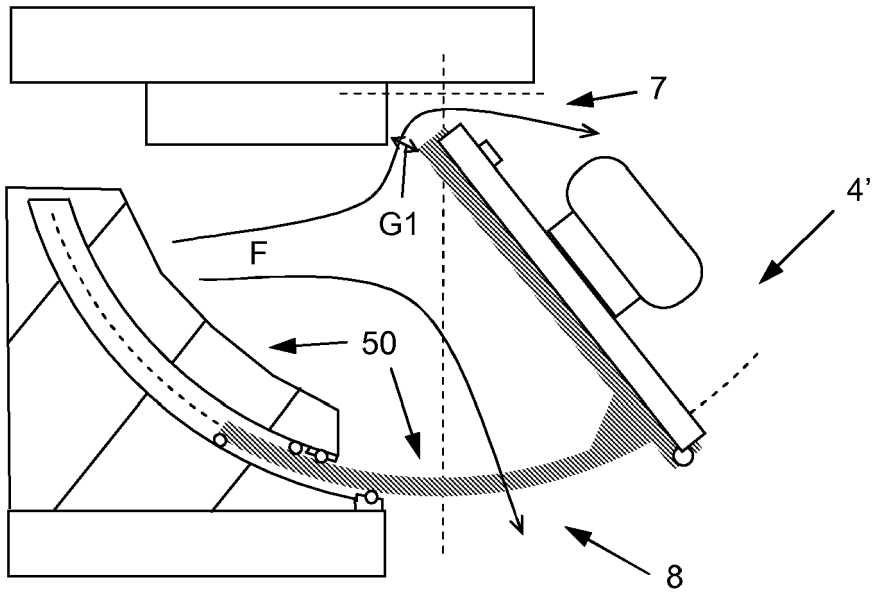


FIG. 15



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EUROPEAN SEARCH REPORT

Application Number
EP 16 18 6486

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Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A	GB 2 194 328 A (HARDWARE & SYSTEMS PATENTS LTD HARDWARE & SYSTEMS PATENTS LTD [GB]) 2 March 1988 (1988-03-02) * page 2, line 104 - page 3, line 27; figures 3,4 *	1-11	INV. E05D7/06 E06B7/06 E06B3/40
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A	DE 19 05 074 A1 (RASMUSSEN & CO V K) 2 October 1969 (1969-10-02) * the whole document *	1-11	
A	DE 35 19 988 A1 (SIEGENIA FRANK KG [DE]) 4 December 1986 (1986-12-04) * abstract; figure 1 *	1-11	

TECHNICAL FIELDS SEARCHED (IPC)

E06B
E05D
E05C

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	8 November 2016	Kofoed, Peter

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08-11-2016

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