A DUAL-MODE TITLING/SWINGING ROOF WINDOW
DOPPELMODUS-KIPP-/SCHWENKDACHFENSTER
TABATIÈRE À DOUBLE MODE D’INCLINAISON/ROTATION

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The object of the present invention is a dual-mode tilting/swinging roof window with a tilt pivot located at the top member of the window frame, and a swing pivot in the midsection of the window sash, positioned close to the glazed surface and not changing its position relative to the window frame at some ranges of the opening angles of the sash, and the window allows only one selected mode to be used at each time the window is opened - the swing or the tilt mode.

US 4 480 406 discloses a skylight, in which the wing may be selectively adjusted into a pivoting and swivel position. The wing is fixed with respect to the auxiliary frame in the pivoted opened position. Flap provided with latch and having a pivoting axis displaced in relation to axial pin in the direction of swivel joint is pivotally mounted on auxiliary frame. Latch arranged at a slight distance from axial pin in the closed position subtends axial pin when wing is pivoted open. In case of faulty operation, the weight of wing causes axial pin to be pressed against latch of flap. This automatically secures a pivotally opened skylight against the results of faulty operation, which is automatically undone.

Further, a dual-mode tilting/swinging roof window is known, with a tilt pivot located at the top member of the window frame, and a swing pivot in the midsection of the window sash, said swing pivot positioned close to the glazed surface and not changing its position relative to the window frame at some ranges of the opening angles of the sash, equipped on both sides with symmetrical locking systems, which, alternatively, after selection of the operating mode on one side of the window, lock either the swing mode while allowing the tilt mode, or lock the tilt mode while allowing the swing mode, simultaneously on both sides of the window. The window is secured against simultaneous operation in both modes.

The window has a frame and a sash mounted in it via intermediate arms. The upper ends of the intermediate arms are pivotally mounted in the side members of the window frame, very close to the upper cross member, and the sash is pivotally mounted in its midsection with the bottom ends of the intermediate arms. The locking system comprises a shift mechanism and two catch systems, upper and lower, which, alternatively, lock the intermediate arms with the window frame while unlocking the sash from the intermediate arms, which prevents the window from being tilted and enables its rotation, or lock the sash with the intermediate arms while unlocking the intermediate arms from the window frame, thus preventing rotation of the sash and enabling its tilt mode.

The window's operating mode is selected on one side of the window, suitable for the user, with a switch, constituting an integral part of the locking system, or with a two-position pre-selector. The window can be alternatively equipped with the switch or the pre-selector. The switch is set in position corresponding to the desired operating mode when the window is closed, which results in switching the locking system to the other operating mode. The pre-selector is set in desired position when the window is open but switching the locking system to the other operating mode takes place after the window is closed. Both the switches and the pre-selectors located on both sides of the window are so coupled, that a change in a position of a switch or a pre-selector on one side of the window involves a change in the position of the switch or pre-selector on the other side of the window and both locking systems are automatically switched to the desired operating mode, selected by switch or pre-selector.

The locking systems, controlled by pre-selectors, allow one selected mode to be used, while preventing the possibility of simultaneously using the other mode, provided the elements of each locking systems on both sides of the window, moving together with the intermediate arms and the sash, approach the frame close enough for the locking systems on both sides of the window to switch simultaneously to the other mode and lock the appropriate catch systems while the window is closed. If, however, the frame is first approached by the elements of the window together with the locking system on one side of the window, which can be caused by the force being applied asymmetrically, only the locking system on this side of the window will switch to the other mode, whereas the other locking system will be still ready to operate in its earlier mode. If, at that point, the sash is not close enough to the frame but re-opened, on one side the window will be ready to operate in the new mode selected by the pre-selector, while on the other side it will be ready to continue operating in the earlier mode. If, however, the window is completely closed, proper functioning of the locking systems will be restored, as the frame will be approached also by the window elements of the other side, with the catch system, which catch system will be switched to the required mode. After the window is re-opened, it will operate in the mode selected by the pre-selector.

The object of this invention is to eliminate above mentioned possibility caused by the force being applied asymmetrically, by providing a system which alternatively prevents the window from operating in one mode, while making available the other one, so that the window will change its operating mode only if the so-far locked catch systems on both sides of the window are simultaneously unlocked, at the time when the so-far unlocked catch systems on both sides of the window are simultaneously locked.

The dual-mode tilting/swinging roof window according to this invention, has a frame and a sash set in it via intermediate arms, whose upper ends are pivotally mounted to the side members of the frame, close to its top member, and the sash is pivotally connected, in its midsection, with the bottom ends of the intermediate arms, and the tilt pivot does not change its position when the window is tilted, and the swing pivot does not change its position relative to the window frame at some ranges of the opening angles of the sash and is positioned close...
The window is equipped with a locking system comprising an upper catch system and a lower catch system, both situated below the tilt pivot on both sides of the window, which systems alternatively lock the sash with the intermediate arm, or lock the intermediate arm with the window frame. Said catch systems are operated by a shift mechanism co-operating with a pre-selector of the window’s operating mode. Catch systems situated on the same side of the window are joined with each other by means of a link.

The link joining the upper catch system and the lower catch system situated on one side of the window, is coupled with the link joining of the upper catch system and the lower catch system situated on the other side of the window, by means of the coupling system, comprising a mechanism forcing their simultaneous switching. Said links are simultaneously switched in position of the operation mode chosen by the pre-selector, which pre-selector is situated on one side of the window together with the shifting mechanism of the link joining the upper catch system and the lower catch system. On the other side of the window there is the check mechanism of the intermediate arm of said other side of the window cooperating with the link joining the upper catch system and the lower catch system of said other side of the window.

The mechanism coupling the link joining the upper catch system and the lower catch system situated on one side of the window with the link joining of the upper catch system and the lower catch system situated on the other side of the window, comprises a rod cooperating on both its ends via toothed elements on the racks of the forks and further on the pin of the link and the pin of the link.

The shifting mechanism comprises for switching in the state of readiness for swing mode a driving switch cooperating with lower slip and the spring and for switching in the state of readiness for tilt mode a pin of the slip cooperating with the surface of the upper catch, spring, lower slip and pin cooperating with the recess of the link.

The pre-selector comprises a bumper. The check mechanism comprises the check switch and its spindle cooperating with the surface of the bumper and pin cooperating with the recess of the link.

In such a way the window is equipped with a locking system which on one side of the sash, called the active side, has catch systems joined with each other, alternatively locking one operating mode and making available the other one, and a shifting mechanism cooperating with these systems, and a pre-selector of the window’s operating mode co-operating with the shifting mechanism. On the other side, called the passive side, the window has catch systems joined with each other, also alternatively locking one mode of the window while making available the other one, and a check mechanism, which allows the catching systems to switch modes only when it is possible to switch to the other mode simultaneously on both sides of the window. The catch systems locking the intermediate arms with the sash or with the frame, positioned on the window’s active and passive sides, are so coupled, that if the catch system is switched to the other mode on one side of the window, this forces the corresponding catch system on the other side of the window to switch to the other mode as well.

The window’s operating modes can be switched only when the catch systems, on both the active and passive sides, reach readiness for switching, which takes place when during shutting, both sides of the sash simultaneously approach the window frame close enough, and then the check mechanism will allow to switch the catch systems.

Each time after the window is opened, the locking system allows the use of only one mode selected earlier by the pre-selector, while completely eliminating the possibility of activating the other mode at the same time.

An embodiment of the window is presented in the drawing, wherein fig. 1 shows schematically parts of the window with the fitting and elements of the locking system on the active side, and fig. 2 on the passive side; fig. 3 shows an exploded view of elements of the window fitting and the elements of the locking system on the active side, and fig. 4 on the passive side; fig. 5 shows an axonometric view of elements of the roof window in the tilt mode on the active side, and fig. 6 on the passive side; and fig. 7 shows an axonometric view of elements of the roof window in the swing mode.

A dual function tilt/swing roof window has a frame 1 with the fitting 2 along its side members and sash 3, connected on both sides with the frame 1 via intermediate arms 4A and 4B. Intermediate arms 4A and 4B are at one end pivotally connected, relative to tilt pivot 5, with fitting 2 which is fastened to the frame 1 by means of fixing elements M and screws W. Tilt pivot 5 is located at the upper member of frame 1. Sash 3 is pivotally connected, relative to swing pivot 6, with the other ends of intermediate arms 4A and 4B. Swing pivot 6 is located in the midst of sash 3. When the window is closed both intermediate arms 4A and 4B are positioned parallel to do the side members of frame 1 and sash 3.

Along intermediate arm 4A, on the window’s side called the active side, elements of the shift mechanism are mounted, comprising upper strip 7 and lower strip 8 which can slide against each other and against arm 4A, and driving switch 9 with spindle 10, with recess 11 and pin 12, set at a considerable distance from tilt pivot 5. Upper strip 7 has hooks 13 and 14 at its ends, and pin 15 in its midsection. Lower strip 8 has hook 16 at the end closer to tilt pivot 5, pin 17 at the other end, and hook 18 in the midsection. Strips 7 and 8 are connected by spring 19 affixed between hooks 14 and 16. Upper strip 7 is also connected with intermediate arm 4A by spring 20, affixed between hook 13 on strip 7 and hook 21 on intermediate arm 4A.

Along intermediate arm 4A, slidable link 22 is set, having pins 23A and 24A at its ends, said pins con-
intermediate arms 4A and 4B, and fork 57 with toothed element 58. One arm of fork 57 has swing pivot 59, and the other arm has rack 60 co-operating with rotary toothed element 58. Pins of toothed elements 58 positioned on both sides of sash 3 are coupled via rod 61. Catch element 56 has in its upper part cut 62 with locking element 63, which, together with fork 57, co-operates on the active side with pin 23A, and on the passive side co-operates with pin 23B. Catch element 56 has a wedge-shaped surface 64 on the side closer to swing pivot 6, which becomes narrow at the top, and is rounded at the bottom, along which slides pin 15 on the active side of the window, and pin 43 on the passive side.

[0025] The roof window is in the tilt mode, when pre-selector 33 is shifted towards swing pivot 6. Then, pins 23A and 23B are positioned under locking elements 63 of catch elements 56 and they lock sash 3 with intermediate arms 4A and 4B, and pins 24A and 24B freely move in cuts 36A and 36B. After the window is opened, intermediate arms 4A and 4B move together with sash 3.

[0026] To switch the window from the tilt mode to the swing mode, pushing notch 35 of pre-selector 33 should be shifted towards tilt pivot 5 while the window is open. Then, on the active side, during closing of the window, pin 12 of driving switch 9 of the shifting mechanism will meet bumper 34 of pre-selector 33 on its way, and will make switch 9 rotate about pin 10, and recess 11 co-operating with pin 17 will move lower strip 8 towards tilt pivot 5. This will put under tension springs 19 and 28, which tend to move upper strip 7 and link 22 towards tilt pivot 5. Upper strip 7 will not move towards tilt pivot 5 as long as pin 15 rests on the wedge-shaped surface 64 of catch element 56, and link 22 will not change its position as long as fork 57 does not rotate under the pressure of pin 23A. Consequently, the active side of the window is in the state of readiness to switch modes of the catch system, but the modes will be switched only when it is possible to switch modes of the catch systems on the passive side of the window.

[0027] On the other hand, on the passive side, fork 57 is locked by pin 24B on link 39 blocked by pin 52 of checking switch 49, which rests in recess 46. But when intermediate arm 4B approaches frame 1 and the window is closed, pin 53 will rest on bumper 55, a pin 52 will leave recess 46, and link 39, together with the catch systems of the passive side, will be ready to shift. Only then link 22, by the action of expanded spring 28, will move towards tilt pivot 5 and pin 23A will rotate fork 57 on the active side, and will also move link 39 on the passive side and via a forcing mechanism composed of elements 57, 58, 60, 61 and pin 24B will shift the link 39. By shifting links 22 and 39, joining together the upper and lower catch systems, towards tilt pivot 5, pin 24A will get under locking element 37A, and pin 24B will get under locking element 37B and intermediate arms 4A and 4B will be locked with frame 1, whereas pins 23A and 23B will automatically slide from under locking elements 63 and unlock sash 3 from intermediate arms 4A and 4B. After the window is opened, it will operate in the swing mode.
To prevent links 22 and 39 from shifting spontaneously during opening of the window, the links are kept in the desired position by springs 20 and 44, affecting links 22 and 39 via strips 7 and 40 and pins 15 and 43, co-operating with oblong slots 27 and 48.

During closing of the window operating in the swing mode, pins 15 and 43 slide along wedge-shaped surfaces 64 of catch elements 56 and move strips 7 and 40 towards swing pivot 6. The change in the position of strip 40 does not have any effect on the passive side, as pins 42 and 43 move freely in oblong slots 47 and 48 and in link 39. On the active side, upper strip 7 moves towards the swing pivot puts spring 19 under tension, which pulls lower strip 8 similarly towards swing pivot 6. Strip 8 is kept in a fixed position, because pin 12 of driving switch 9 rests on bumper 34, and then recess 11, via pin 17, keeps strip 8 in the position shifted towards tilt pivot 5.

To come back to the tilt mode, one should, while the window is open, move the pushing notch 35 of pre-selector 33 towards swing pivot 6 what results the catch systems on the active side will be in the state of readiness for shift. On the passive side, intermediate arm 4B is still locked with frame 1, pin 53 of checking switch 49 rests on bumper 55, and pin 52 is outside recess 46, and link 39 is ready to be moved what results the catch systems are in the state of readiness for shift.

During closing of the window, on the active side of the window, pin 15 slides along the wedge-shaped surface 64 of catch element 56 and shifts the upper strip 7 what results putting spring 19 under tension, which pulls the lower strip 8 towards swing pivot 6. As pin 12 of the driving switch 9 is not supported by bumper 34 of pre-selector 33, lower strip 8 is no longer locked by pin 17 cooperating with recess 11 in the driving switch 9. In spite of that, lower strip 8 will not move towards swing pivot 6, because the movement of pin 17 is now limited by recess 26 in link 22, and link 22 cannot move towards swing pivot 6, as long as pin 23A moves in recess 62 of catch element 56. But when pin 23A gets into position under locking element 63 in catch element 56, which takes place on closing the window, link 22, as a result of pin 17 applying pressure to recess 26, will move towards swing pivot 6 and pin 23A will get under locking element 63. Pin 23A, when moving to the position under locking element 63, exerts force onto fork 57 on the active side and changes its position, and via a mechanism composed of elements 57, 58, 60 and 61 also changes the position of fork 57 on the passive side. Fork 57 on the passive side, when exerting pressure on pin 23B, moves link 39 towards swing pivot 6. The catch systems on both sides of the window switch their modes. Now pins 23A and 23B lock sash 3 with intermediate arms 4A and 4B, whereas pins 24A and 24B move freely in cuts 36A and 36B. After re-shutting, the window will be ready to operation in the tilt mode.

When the window is closed and during using basic the tilt mode, the pins 23A and 24A of the catch systems support the sash 3 on its both sides, near to its upper corners.

**Claims**

1. Dual-mode tilting/swinging roof window, with a tilt pivot located at the upper member of the window frame, and a swing pivot in the midsection of the sash, positioned close to the glazing surface and not changing its position relative to the window frame at some ranges of the opening angles of the sash, comprising a window frame with fitting at its side members, and a sash situated in the frame via intermediate arms, said window equipped with an upper catch system and a lower catch system, both situated below the tilt pivot on both sides of the window, which systems alternatively lock the sash with the intermediate arm, or lock the intermediate arm with the window frame, said catch systems operated by a shift mechanism cooperating with a pre-selector of the window’s operating mode, and said catch systems situated on the same side of the window joined with each other by means of a link **characterised in that** the link (22) joining the upper catch system (23A),(63) and the lower catch system (24A),(37A) situated on one side of the window, is coupled with the link (39) joining of the upper catch system (23B), (63) and the lower catch system (24B),(37B) situated on the other side of the window, by means of the coupling system, comprising a mechanism forcing their simultaneous switching, and said links (22),(39) are simultaneously switched in position of the operation mode chosen by the pre-selector (33), which pre-selector (33) is situated on one side of the window together with the shifting mechanism (9), (8), (7), (28) of the link (22) joining the upper catch system (23A),(63) and the lower catch system (24A),(37A) and on the other side of the window there is the check mechanism (55), (49), (46) of the intermediate arm (4B) of said other side of the window cooperating with the link (39) joining the upper catch system (23B),(63) and the lower catch system (24B), (37B) of said other side of the window.

2. Dual-mode tilting/swinging roof window according to claim 1, **characterised in that** the mechanism coupling the link (22) joining the upper catch system (23A),(63) and the lower catch system (24A),(37A) situated on one side of the window with the link (39) joining of the upper catch system (23B), (63) and the lower catch system (24B),(37B) situated on the other side of the window, comprises a rod (61) cooperating on both its ends via toothed elements (58) on the racks (60) of the forks (57) and further on the pin (23A) of the link (22) and the pin (23B) of the link (39).

3. Dual-mode tilting/swinging roof window according to claim 1, **characterised in that** the shifting mecha-
4. Dual-mode tilting/swinging roof window according to claim 1, characterised in that the pre-selector (33) comprises a bumper (34).

5. Dual-mode tilting/swinging roof window according to claim 1, characterised in that the check mechanism comprises the checking switch (49) and its spindle (52) cooperating with the recess (46) of the link (39).

Patentansprüche

1. Doppelmodus - Kipp-/Schwenkdachfenster mit einer Kippachse am oberen Element des Fensterrahmens sowie mit einer Drehachse im Mittelteil des Fensterflügels, die sich in geringer Entfernung von der Verglasungsfläche befindet und ihre Lage in Bezug auf den Fensterrahmen in bestimmten Bereichen des Öffnungswinkels des Fensterflügels nicht verändert, bestehend aus einem Fensterrahmen mit Beschlägen auf den Seitenelementen und einem auf ihm mittels indirekten Schenkels ausgerüstetem Fensterflügel; das Fenster ist mit einer oberen und einer unteren Befestigungsbaugruppe ausgerüstet, bestehend aus der obere Befestigungsbaugruppe (23A), (63) mit der unteren Befestigungsbaugruppe (24A), (37A) verbindende Leiste (22), und die die obere Befestigungsbaugruppe (23B), (63) mit der unteren Befestigungsbaugruppe (24B), (37B) verbindende Leiste (39) und die untere Leiste (19), (61) besitzt, der an seinen beiden Enden durch die Zahnelemente (58) mit dem verzahnten Schenkel (60) der Gabeln (57) zusammenarbeitet und weiter auch mit dem oberen Arretierstift (23A) der Leiste (22) sowie dem oberen Arretierstift (23B) der Leiste (39).

2. Doppelmodus - Kipp-/Schwenkdachfenster nach Anspruch 1, dadurch gekennzeichnet, dass der Kopplungsmechanismus für die obere Befestigungsbaugruppe (23A), (63) mit der unteren Befestigungsbaugruppe (24A), (37A) verbindende Leiste (22), und die die obere Befestigungsbaugruppe (23B), (63) mit der unteren Befestigungsbaugruppe (24B), (37B) verbindende Leiste (39) und die untere Leiste (19), (61) besitzt, der an seinen beiden Enden durch die Zahnelemente (58) mit dem verzahnten Schenkel (60) der Gabeln (57) zusammenarbeitet und weiter auch mit dem oberen Arretierstift (23A) der Leiste (22) sowie dem oberen Arretierstift (23B) der Leiste (39).

3. Doppelmodus - Kipp-/Schwenkdachfenster nach Anspruch 1, dadurch gekennzeichnet, dass die Umschaltmechanismus eine zum Umschalten des Fensters in die Schwingfunktion dienende Antriebsweiche (9) besitzt, die mit der unteren Leiste (8) und der Feder (28) zusammenarbeitet; sowie zum Umschalten des Fensters in die Klapppfunktionen mit der obere Leiste (17) zusammenarbeitet; die obere Befestigungsbaugruppe (23A), (63) mit der unteren Befestigungsbaugruppe (24A), (37A) verbindende Leiste (22), und die die obere Befestigungsbaugruppe (23B), (63) mit der unteren Befestigungsbaugruppe (24B), (37B) verbindende Leiste (39) und die untere Leiste (19), (61) besitzt, der an seinen beiden Enden durch die Zahnelemente (58) mit dem verzahnten Schenkel (60) der Gabeln (57) zusammenarbeitet und weiter auch mit dem oberen Arretierstift (23A) der Leiste (22) sowie dem oberen Arretierstift (23B) der Leiste (39).

4. Doppelmodus - Kipp-/Schwenkdachfenster nach Anspruch 1, dadurch gekennzeichnet, dass der PreSelect-Schalter (33) einen Anschlag (34) besitzt.

5. Doppelmodus - Kipp-/Schwenkdachfenster nach Anspruch 1, dadurch gekennzeichnet, dass die Kontrollmechanismus eine Kontrollweiche (49) und ihren mit der Fläche des Anschlags (55) zusammenarbeitenden Arretierstift (53) und den mit der Aussparung (46) der Leiste (39) zusammenarbeitenden Sperrstift (52) besitzt.

Revindicaciones

1. Tabatière à double mode d’inclinaison/rotation - pivotante avec un axe basculant auprès de l’élément
supérieur du cadre dormant et un axe de rotation dans la partie centrale du battant de fenêtre, se trouvant à petite distance de la surface du vitrage et ne changeant pas sa position par rapport au cadre dormant dans certaines portées de l'angle d'ouverture du battant, composée d'un cadre dormant avec de la ferrure sur les éléments latéraux et d'un battant de fenêtre encastré dans le cadre dormant par des bras intermédiaires, la lucarne est équipée d'ensemble d'accrochage supérieur et inférieur, encastrés au-dessous de l'axe basculant sur les deux cotés de la lucarne, les ensembles bloquent alternativement le battant de fenêtre avec le bras intermédiaire ou le bras intermédiaire avec le dormant de fenêtre, ils sont commandés par un mécanisme de commande coopérant avec un présélecteur de choix de fonction utilitaire, et en outre, les ensembles situés sur le même coté de la fenêtre sont assemblés avec soi à l'aide d'une latte, caractérisée en ce que la latte (22) de raccordement de l'ensemble d'accrochage supérieur (23 A), (63) avec l'ensemble d'accrochage inférieur (24A), (37A), est encastrée sur un des cotés de la fenêtre et est accouplée à la latte (39) de raccordement de l'ensemble d'accrochage supérieur (24B), (63) avec l'ensemble d'accrochage inférieur (24B), (37B) encastrée de l'autre coté de la fenêtre, à l'aide d'un dispositif d'accouplage, équipé d'un mécanisme forçant leur commutation simultanée et les lattes (22), (39) sont commutées simultanément en position choisie à l'aide du présélecteur (33), ce présélecteur étant encastré d'un coté de la fenêtre avec le mécanisme de commande (9), (8), (7), (28) de la latte (22) de raccordement de l'ensemble d'accrochage supérieur (23A), (63) à l'ensemble d'accrochage inférieur (24A), (37A), et de l'autre coté de la fenêtre se trouve le mécanisme de contrôle (55), (49), (46) du bras intermédiaire (4B), coopérant avec la latte (39) de raccordement de l'ensemble d'accrochage supérieur (23B), (63) à l'ensemble d'accrochage inférieur (24B), (37B) de l'autre coté de la fenêtre.

2. Tabatière à double mode d'inclinaison/rotation - pivotante selon la revendication 1, caractérisée en ce que le mécanisme d'accouplage de la latte (22) de raccordement de l'ensemble d'accrochage supérieur (23 A), (63) avec l'ensemble d'accrochage inférieur (24A), (37A), encastrée sur un coté de la lucarne et la latte (39) de raccordement de l'ensemble d'accrochage supérieur (23B), (63) avec l'ensemble d'accrochage inférieur (24B), (37B) encastrée de l'autre coté de la lucarne, est équipé d'une barre (61) coopérante sur ses deux extrémités à l'aide d'éléments dentés (58) avec un bras denté (60) de la fourche (57) et plus loin agissant sur le goujon d'arrêt supérieur (23A) de la latte (22) et le goujon d'arrêt supérieur (23B) de la latte (39)
Fig. 5
REFERENCES CITED IN THE DESCRIPTION

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