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(54) **AN IMPROVED PIVOT WINDOW WITH CHECK MEANS**

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FENETRE BASCULANTE PERFECTIONNEE EQUIPEE D'UN MOYEN DE RETENUE

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Description

[0001] The invention relates to a window comprising a frame and a sash, said sash being connected with the frame by means of a hinge device defining a hinge axis of the window, the frame and the sash each including a first pair of mutually opposite members, and a second pair of mutually opposite members, said hinge device connecting a respective frame and sash member of the second pair of frame and sash members, and a centre line being defined substantially midway between the one and the other of the members of said first pair.

[0002] Windows of the pivoting or centre-hung type have found widespread acceptance, especially as roof windows, inter alia because this kind of window facilitates easy window cleaning, as the sash comprising the pane can be turned essentially 180° to allow cleaning of the outside surface of the pane from inside the building.

[0003] A further advantage of this type of window is that it can be fully opened to a position where the sash is turned approximately 90° in which position air inlet is essentially unrestricted. Eventually, a pivoting window provides for an easy operation, partly due to the position of the operating means at the top member of the sash, partly because the weight of the sash is substantially balanced with the hinge axis situated close to the centre line of the window.

[0004] A window of this kind is known from GB 844492 B. This window as well as several others of its kind, however, suffers from the disadvantage, that the opening area is restricted by the frame bottom and side members and the intersection with the sash including the window pane at the hinge axis is, of course, substantially smaller than in a top-hung window of the same size. This entails, i.a., that pivoting windows are not or only rarely used when a large opening area as defined in the above is desired. Such desired applications may e.g. include the use of the window as an emergency escape or emergency access.

[0005] In the prior art, there are numerous examples of windows in which it has been sought to combine the advantages of top-hung and pivoting windows.

[0006] EP publications Nos. 679774, 679775, 679776 and 972885 each discloses a window, in which a sash is carried in an auxiliary frame or a set of arms. The auxiliary frame or each arm is at one end hingedly connected with the frame top member and at its other end with the sash. The sash is furthermore connected with the frame by means of cooperating sliding means. In this manner, the window may serve as a top-hung window, in which the arms move synchronically with the sash, which is thus rotated about the hinge connection at the frame top member, or as a tilting window. However, due to the desired multiple function of the window, the design is rather elaborate.

[0007] With this background it is the object of the present invention to provide a window, in which the advantages of a top-hung and a pivoting window are com-

bined, but which at the same time is of a simple structure, which may be produced in a cost-effective manner and which is easy to operate.

[0008] This object is attained by the provision of a window of the kind mentioned in the introduction, which is furthermore characterized in that the hinge device comprises a set of pivot hinges mounted in such a position that the hinge axis is situated between said centre line and said one member of said first pair and that at least one of said pivot hinges comprises check means restricting the movement of the window during opening and/or closing thereof.

[0009] By moving the hinge axis towards one member of the frame and sash, respectively, i.e. towards the top or the bottom of the window, a substantially larger opening is obtained. For instance, the same pivot hinge used in existing pivoting window may be placed in another position of the frame and sash side members. By the provision of a larger opening, it becomes possible to utilize the window as an emergency escape.

[0010] A further advantage of moving the hinge axis to a position above the centre line is, that the upper part of the window standing out into the room behind the window becomes smaller. This entails that the risk of e.g. hitting ones head on the window is reduced. In addition it is an advantage when using screens and blinds since these may now be employed even when the window is open for airing or ventilation without having to be passed around a projecting top of the sash.

[0011] The displacement of the hinge axis, however, also means that the weight of the two parts of the sash and pane lying on each side of the hinge axis, when the window is in its open position, is no longer the same. Due to gravitational forces the larger part of the sash and pane will therefore be drawn downwards. If the hinge axis is moved upwards in a traditional pivot window, the window will thus tend to fall back against the closed position, making it difficult or impossible to leave the window in a half-open position. The provision of check means according to the invention solves this problem.

[0012] Further, when the hinge axis is positioned in the interval between 1/3 and 2/3 of the distance between the centre line and said one member of said first pair, preferably at approximately 1/4 of the distance between the centre line and said one member of said first pair, there is a good balance between a relatively large opening on the one hand and a satisfactory operability of the window on the other.

[0013] Check means providing a smooth resistance during operation of the window will be adequate for most purposes. However, if for example heavy winds are to be expected it is preferred that the check means allows the window to be arrested in one or more predetermined positions. For example an only slightly open ventilating position, a more open airing position and a fully open emergency escape position.

[0014] Each pivot hinge in the set of hinges may include a first hinge member for connection with the frame

member of the second pair and a second hinge member for connection with the sash member of the second pair, where one or more parts of each of the hinge members serves as check means by interaction there between. This kind of pivot hinge has proven to provide a structurally simple and well-functioning solution.

[0015] To optimise the checking function it may also be preferable to further provide a leaf spring acting as a check means, arranged on or in connection with the first hinge member.

[0016] To achieve the arresting positions at least one part of the hinge is provided with one or more arresting points, where other parts of the hinge may come into a particularly tight contact therewith. Such arresting points may be depressions, grooves or holes in one of the hinge parts designed to interact with buckles or projections on the other hinge part. Arresting points provided in this manner is capable of arresting the window even when in the fully open position, thus allowing the use as an emergency exit without risking, that the window falls back blocking the exit and possibly hurting someone. However, if a lesser force is needed the arresting points may also be formed as areas of increased roughness causing a locally increased friction between the interacting hinge parts.

[0017] The number of arresting points depends on several factors such as the design of the hinge, the design and size of the window and the intended use of the window. In addition to the three positions mentioned earlier a fourth position might for example be desirable when the window is provided with a screening device, this fourth position corresponding to the maximal possible opening of the window when the screen is in use. It is therefore preferred, that said check means have between two and six arresting points.

[0018] To make the window as user friendly as possible it may be preferable, that the check means has no or little effect when the window is being moved against the force of gravity. The user then only has to lift the actual weight of the window when opening it, while the closing of the window caused by gravity is restricted.

[0019] The invention will now be described in further detail with reference to the schematic drawings, in which

Fig. 1 shows a perspective view of a window according to the invention,

Fig. 2 shows a diagrammatic side view of a window according to the invention, and

Fig. 3 shows a perspective view of an embodiment of the hinge according to the invention.

[0020] The window shown in Fig. 1 comprises a frame 1 with a first and a second pair of mutually opposite frame members. The first pair consists of one member in the form of a top member 3 and another member in the form of a bottom member 4. The two members of the second pair constitutes side members 5 and 6, each extending between the top and bottom members 3 and 4 to form a

substantially rectangular frame 1 intended to be built-in in e.g. an inclined roof (not shown). A sash generally designated 2 is constructed in a similar manner with a top member 7, a bottom member 8 and side members 9, 10. In the sash 2 a window pane 11 of any type, e.g. an insulating unit, is encased.

[0021] The sash 2 is connected with the frame 1 by means of a hinge device, which in the embodiment shown comprises a set of hinges, of which one hinge 12 is shown in Fig. 1, at corresponding side members 5 and 9, and 6 and 10, respectively, of the frame 1 and sash 2. The set of hinges may be designed e.g. as disclosed in Applicant's European patent No. 1038083, the contents of which are incorporated herein by reference. Each hinge 12 thus includes a first hinge member for connection with the frame side member 5, 6 and a second hinge member for connection with the sash side 9, 10 member of the second pair, and the hinge 12 includes cooperating pins and guides as disclosed in further detail in the above-mentioned European patent. The use of a pivot hinge, in particular with cooperating pins and guides, makes it possible to establish an overlap between the sash and the frame in the closed position of the window, without the use of elaborate devices such as linkage mechanisms. This is a particularly important feature in windows installed in a roof. Several other parts of a traditional pivoting window may be simply transferred to the window according to the invention, possibly following a slight adaptation. This includes, i.a., some of the cladding parts that protect the frame and the sash from the weather.

[0022] As shown in Fig. 2, the set of hinges 12 define a hinge axis 13 extending substantially perpendicular to the plane of the Fig. 2. The hinges 12 are positioned between the top members 3 and 7 of the frame 1 and the sash 2, respectively, and a centre line 14 of the window. The centre line 14 is situated substantially midway between the top and bottom members 3 and 4 of the frame 1, corresponding in substance to the position midway between the top and bottom members 7 and 8 of the sash 2. The position of the hinge axis 13 is chosen in such a way that a suitable balance between ease of operation of the window and a suitable opening defined by the bottom member 4, the side members 5 and 6, and the intersection of the sash 2 including the pane 11 at the hinge axis 13. Preferably, the distance d between the hinge axis 13 and the centre line 14 of the window lies in the interval between 1/3 and 2/3 of the distance between the centre line 14 and the top member 3 of the frame 1.

[0023] In order to bring the window from the closed position to an open position, e.g. a ventilating position, operating means are provided. In the embodiment of Fig. 2, the operating means comprises a handle bar 15 on the sash top member 7. In a manner that is well known per se, the handle bar 15 includes engagement means for cooperation with engagement means on the frame top member 3.

[0024] As the hinge axis 13 is displaced from the centre line 14, the unit comprising sash 2 and pane 11 is not

balanced in relation to the frame 1, as is the case in a traditional pivoting window. The force to be exerted by the user when opening the window according to the invention is thus larger than in a traditional window. This, however, may not be experienced as any particular disadvantage.

[0025] Fig. 3 shows a possible embodiment of a hinge for use in a window according to the invention. The hinge comprises two main hinge members 21 and 22 intended for mounting on the frame and sash, respectively. Mounted on the frame hinge member 21 is a leaf spring 23. In use, a pin 25 on the sash hinge member 22 will travel along the spring 23 and due to the limited space between the spring and the guide 26 lying above the spring in Fig. 3, the pin will be forced against the spring. The spring thus constantly exerts a pressure against the pin causing a checking of the movement of the window. The window may thus be left in any desired position and will stay there irrespective of the action of gravity. Preferably the spring force should be strong enough to keep the window in a desired position even when affected by wind forces.

[0026] In the embodiment shown in Fig. 3 the spring 23 is further provided with a number of depressions 24. When reaching one of these depressions the pin 25 will settle into the depression and an extra force therefore has to be exerted to move the window any further. The force needed to bring the pin out of the depression should be large enough to prevent the window from being moved by normal wind forces, but it should still be possible for the user of the window to overcome the force.

[0027] In Fig. 3 the shown depressions 24 are evenly spaced. They may, however, also be arranged corresponding to the window being kept in specially desired positions such as an only slightly open ventilating position, a more open airing position and a fully open emergency escape position. Additionally a position where the top of the sash does not project into the room behind the window may be desirable where the window is to fitted with an insect screen, a roller blind or the like.

[0028] A similar hinge without a spring could also be used. In that case the guide 26 might be provided with one or more projecting resilient members. When opening the window the pin 25 would then travel along the guide meeting little or no resistance until reaching the projecting member. To travel further the pin would have to force aside the resilient member, the necessary force depending on the material and design of the latter.

[0029] The invention should not be regarded as being limited to the embodiments described in the above, but various modifications and combinations may be carried out. For instance, the window may be built-in in a facade, and the sash may be hingedly connected with the frame with the hinge axis extending in parallel with the side members of the frame and the sash.

Claims

1. A window comprising a frame (1) and a sash (2), said sash being connected with the frame by means of a hinge device (12) defining a hinge axis (13) of the window, the frame and the sash each including a first pair of mutually opposite members (3,4;7,8), and a second pair of mutually opposite members (5,6;9,10), said hinge device connecting a respective frame and sash member of the second pair of frame and sash members, and a centre line (14) being defined substantially midway between the one and the other of the members of said first pair, **characterized in that** the hinge device comprises a set of pivot hinges mounted in such a position that the hinge axis is situated in the interval between 1/3 and 2/3 of the distance between said centre line and said one member of said first pair of frame members (3,4), and that at least one of said pivot hinges comprises resilient check means (23) restricting the movement of the window during opening and/or closing thereof, where the further travel of the window overcomes the force of the check means.
2. A window as claimed in claim 1, in which the hinge axis (13) is positioned at approximately 1/2 of the distance between the centre line (14) and said one member of said first pair (3,4).
3. A window as claimed in claim 1 or 2, in which said check means (23) allows the window to be arrested in one or more predetermined positions.
4. A window as claimed in any of the preceding claims, in which each pivot hinge (12) in the set of hinges includes a first hinge member (21) for connection with the frame member of the second pair and a second hinge member (22) for connection with the sash member of the second pair, where one or more parts of each of the hinge members serves as check means by interaction there between.
5. A window as claimed in any of the claims 1-3, in which each pivot hinge (12) in the set of hinges includes a first hinge member (21) for connection with the frame member of the second pair, a second hinge member (22) for connection with the sash member of the second pair, and a leaf spring (23) acting as a check means said spring being arranged on or in connection with the first hinge member.
6. A window as claimed in any of the preceding claims, in which at least one part of the hinge (12) has one or more arresting points (24), where other parts (25) of the hinge may come into a particularly tight contact therewith.
7. A window as claimed in claim 6, in which said arrest-

ing points (24) is depressions, grooves or holes in one of the hinge parts designed to interact with buckles or projections (25) on another hinge part.

8. A window as claimed in claim 6, in which the arresting points is formed as areas of increased roughness causing a locally increased friction between the interacting hinge parts.
9. A window as claimed in any of the claims 3 to 8, in which said check means (23) have between two and six arresting points.
10. A window as claimed in any of the preceding claims, in which the check means has no or little effect when the window is being moved against the force of gravity.

Patentansprüche

1. Fenster, welches einen Blendrahmen (1) und einen Flügelrahmen (2) umfasst, welcher Flügelrahmen mittels einer Scharnierachse (13) des Fensters definierenden Scharniervorrichtung (12) mit dem Blendrahmen verbunden ist, wobei der Blendrahmen und der Flügelrahmen jeweils ein erstes Paar von einander gegenüberliegenden Elementen (3,4; 7,8) und ein zweites Paar von einander gegenüberliegenden Elementen (5,6;9,10) umfassen, wobei die Scharniervorrichtung ein jeweiliges Blendrahmenelement mit einem Flügelrahmenelement des zweiten Paares von Blendrahmen- und Flügelrahmenelementen verbindet, und wobei eine Mittellinie (14) im Wesentlichen auf halbem Wege zwischen dem einen und dem anderen der Elemente des ersten Paares definiert ist, **dadurch gekennzeichnet, dass** die Scharniervorrichtung einen Satz von Pivotscharnieren umfasst, die in einer derartigen Position montiert sind, dass die Scharnierachse im Bereich zwischen 1/3 und 2/3 des Abstandes zwischen der Mittellinie und dem genannten einen Element des genannten ersten Paares von Blendrahmenelementen (3,4) positioniert ist, und dass mindestens eines der genannten Pivotscharniere Arretiermittel (23) umfasst, welche die Bewegung des Fensters während des Öffnens und Schließens des Fensters begrenzen, wobei der weitere Bewegung des Fensters die Kraft der Arretiermittel überwindet.
2. Fenster nach Anspruch 1, bei welchem die Scharnierachse (13) bei etwa 1/2 des Abstandes zwischen der Mittellinie (14) und dem genannten einen Element des genannten ersten Paares (3,4) positioniert ist.
3. Fenster nach Anspruch 1 oder 2, bei welchem die genannten Arretiermittel (23) ein Arretieren des Fen-

sters in einer oder mehreren vorgegebenen Positionen ermöglichen.

4. Fenster nach einem der vorgehenden Ansprüche, bei welchem jedes Pivotscharnier (12) des Satzes von Scharnieren ein erstes Scharnierelement (21) zur Verbindung mit dem Blendrahmenelement des zweiten Paares und ein zweites Scharnierelement (22) zur Verbindung mit dem Flügelrahmenelement des zweiten Paares umfasst, wobei einer oder mehrere Teile von jeweils einem Scharnierelement beim gegenseitigen Zusammenwirken als Arretiermittel dienen.
5. Fenster nach einem der Ansprüche 1 bis 3, bei welchem jedes Pivotscharnier (12) des Satzes von Scharnieren ein erstes Scharnierelement (21) zur Verbindung mit dem Blendrahmenelement des zweiten Paares, ein zweites Scharnierelement (22) zur Verbindung mit dem Flügelrahmenelement des zweiten Paares, und eine Blattfeder (23) umfasst, welche die Funktion eines Arretiermittels aufweist, indem sie auf dem ersten Scharnierelement oder in Verbindung mit diesem angeordnet ist.
6. Fenster nach einem der vorgehenden Ansprüche, bei welchem mindestens ein Teil des Scharniers (12) einen oder mehrere Arretierpunkte (24) aufweist, wobei andere Teile (25) des Scharniers in einen besonders nahen Kontakt mit diesen kommen können.
7. Fenster nach Anspruch 6, bei welchem die genannten Arretierpunkte (24) Vertiefungen, Rillen oder Löcher in einem der Scharnierelemente darstellen, welche zum Zusammenwirken mit Ausbeulungen oder Vorsprüngen (25) an einem anderen Scharnierteil ausgebildet sind.
8. Fenster nach Anspruch 6, bei welchem die Arretierpunkte als Bereiche erhöhter Rauigkeit ausgebildet sind, wodurch sie eine örtlich erhöhte Reibung zwischen den zusammenwirkenden Scharnierteilen verursachen.
9. Fenster nach einem der Ansprüche 3 bis 8, bei welchem die genannten Arretiermittel (23) zwischen zwei und sechs Arretierpunkte aufweisen.

10. Fenster nach einem der vorgehenden Ansprüche, bei welchem die Arretiermittel beim Bewegen des Fensters gegen die Schwerkraft keinen oder wenig Effekt aufweisen.

Revendications

1. Fenêtre comprenant un cadre (1) et un ouvrant (2), ouvrant qui est relié au cadre au moyen d'un dispo-

- stitif de charnière (12) définissant un axe de charnière (13) de la fenêtre, le cadre et l'ouvrant comprenant chacun une première paire de parties l'une opposée à l'autre (3,4;7,8), et une deuxième paire de parties l'une opposée à l'autre (5,6;9,10), dispositif de charnière qui relie respectivement une partie du cadre et une partie de l'ouvrant de la deuxième paire de parties de cadre et d'ouvrant, et une ligne centrale (14) étant définie essentiellement à mi-chemin entre l'une et l'autre des parties de ladite première paire, **caractérisée en ce que** le dispositif de charnière comprend un jeu de charnières à pivotement montées dans une telle position que l'axe de charnière est situé dans l'intervalle entre 1/3 et 2/3 de la distance entre ladite ligne centrale et l'une dite partie de ladite première paire de parties de cadre (3, 4), et **en ce qu'**au moins l'une desdites charnières à pivotement comprend un moyen de retenue élastique (23) limitant le mouvement de la fenêtre lors de l'ouverture et/ou de la fermeture de celle-ci, où le déplacement suivant de la fenêtre surmonte la force de l'élément de retenue.
2. Fenêtre selon la revendication 1, dans laquelle l'axe de charnière (13) est situé à environ 1/2 de la distance entre la ligne centrale (14) et l'une dite partie de ladite première paire (3, 4).
 3. Fenêtre selon la revendication 1 ou 2, dans laquelle ledit élément de retenue (23) permet d'arrêter la fenêtre dans une ou plusieurs positions prédéterminées.
 4. Fenêtre selon l'une quelconque des revendications précédentes, dans laquelle chaque charnière à pivotement (12) dans le jeu de charnières comprend un premier élément de charnière (21) à relier à la partie de cadre de la deuxième paire et un deuxième élément de charnière (22) à relier à la partie d'ouvrant de la deuxième paire, où une ou plusieurs portions de chacun des éléments de charnière servent d'élément de retenue par action mutuelle.
 5. Fenêtre selon l'une quelconque des revendications 1-3, dans laquelle chaque charnière à pivotement (12) dans le jeu de charnières comprend un premier élément de charnière (21) à relier à la partie de cadre de la deuxième paire, un deuxième élément de charnière (22) à relier à la partie d'ouvrant de la deuxième paire, et un ressort à lames (23) servant d'élément de retenue, ressort qui est arrangé sur ou en relation avec le premier élément de charnière.
 6. Fenêtre selon l'une quelconque des revendications précédentes, dans laquelle au moins une portion de la charnière (12) présente un ou plusieurs points d'arrêt (24), où d'autres portions (25) de la charnière peut entrer en contact particulièrement étroit avec ceux-ci.
 7. Fenêtre selon la revendication 6, dans laquelle lesdits points d'arrêt (24) sont des dépressions, des rainures ou des trous dans l'une des portions de charnière adaptées à coopérer avec des bosses ou des saillies (25) sur une autre portion de charnière.
 8. Fenêtre selon la revendication 6, dans laquelle les points d'arrêt sont conçus comme des zones de rugosité accrue, ce qui entraîne une friction localement accrue entre les portions de charnière coopérantes.
 9. Fenêtre selon l'une quelconque des revendications 3 à 8, dans laquelle ledit élément de retenue (23) présente entre deux ou six points d'arrêt.
 10. Fenêtre selon l'une quelconque des revendications précédentes, dans laquelle l'élément de retenue n'a aucun ou peu d'effet, lorsque la fenêtre est déplacée contre la gravitation.

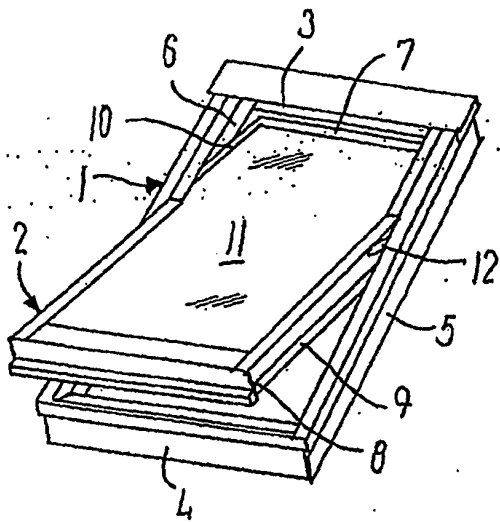


FIG. 1

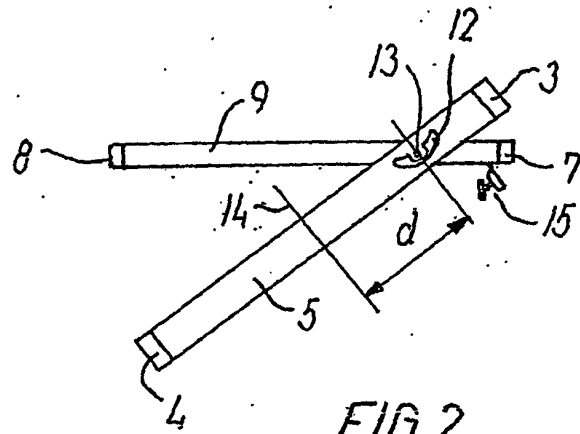


FIG. 2

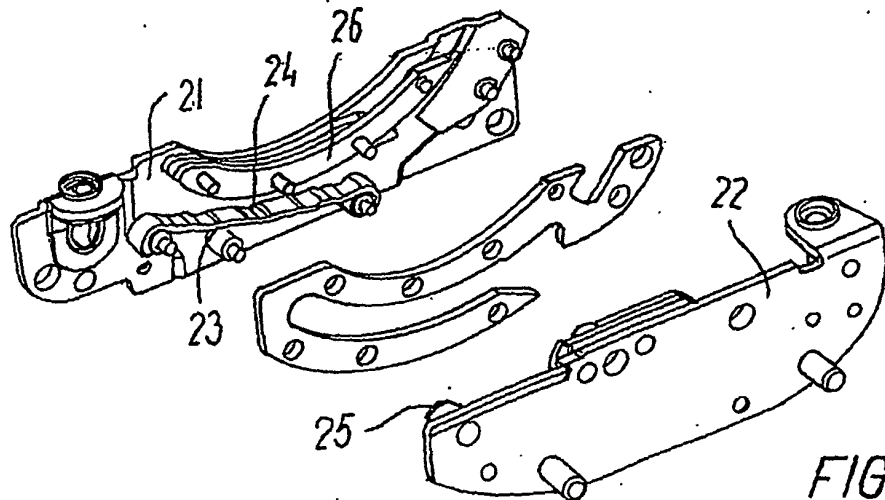


FIG. 3

REFERENCES CITED IN THE DESCRIPTION

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