Oct. 21, 1952 C. VAN DER PELEN ET AL 2,614,296

WINDOW CONSTRUCTION

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Fig. 1

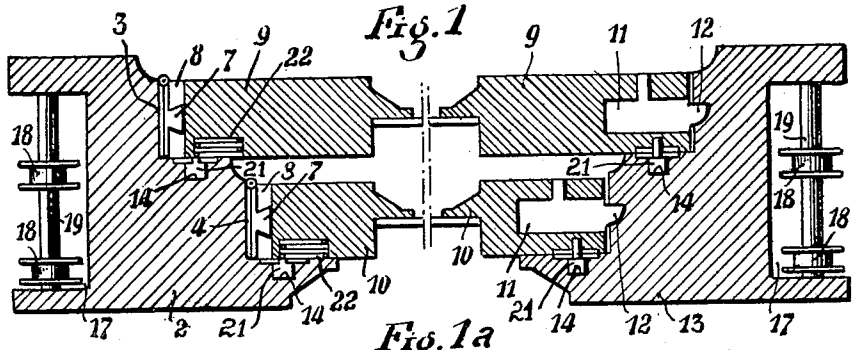


Fig. 1a

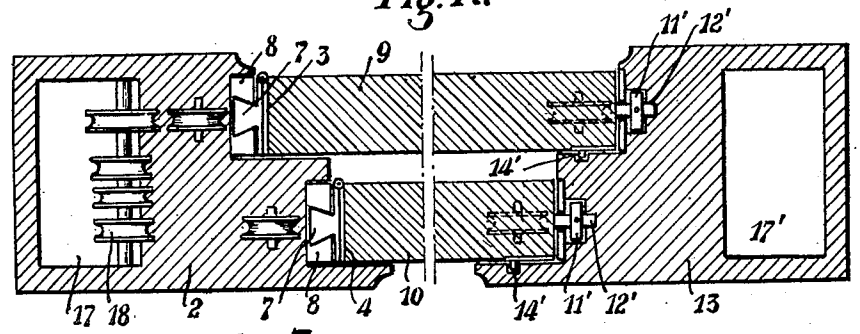


Fig. 7

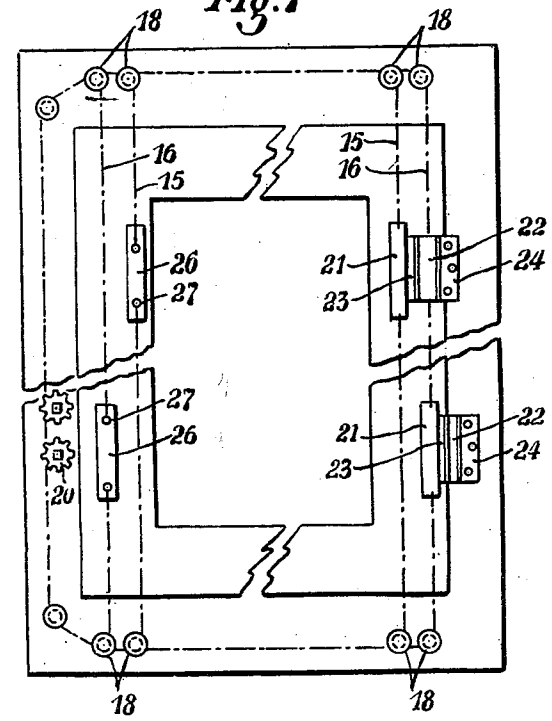


Fig. 3

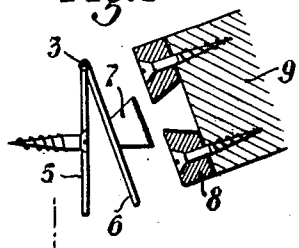
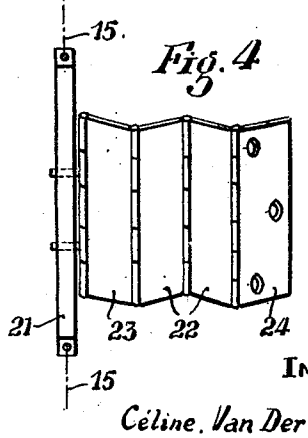


Fig. 4



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Fig. 2

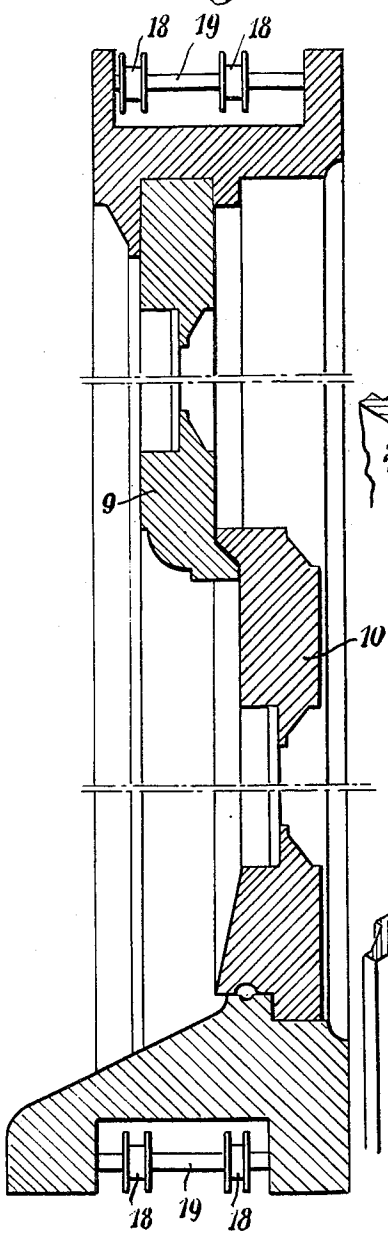


Fig. 5

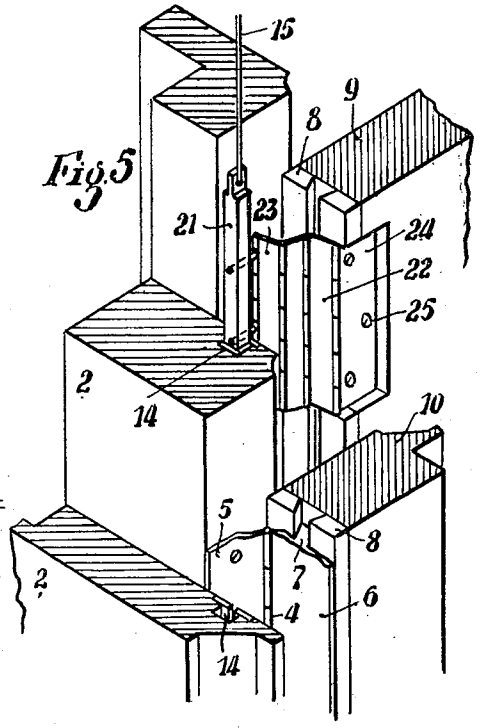
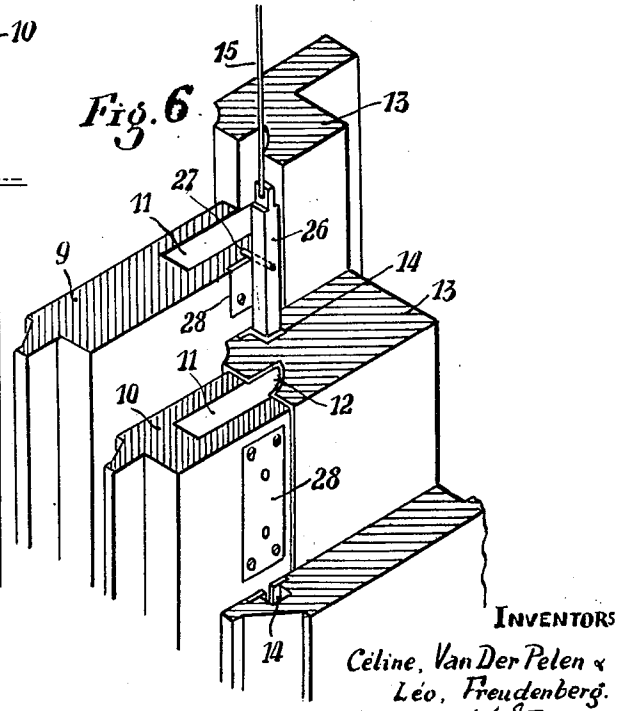


Fig. 6



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Fig. 8.

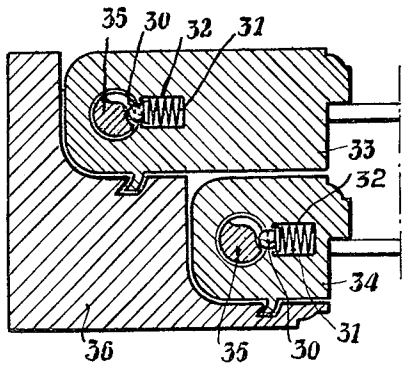


Fig. 9

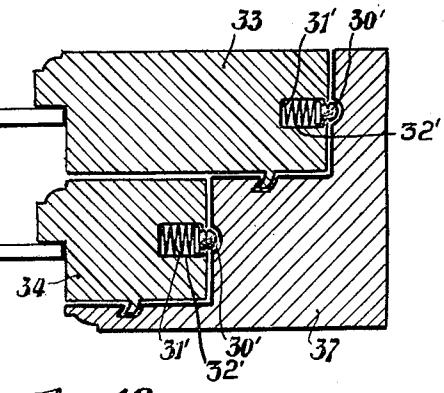


Fig. 10

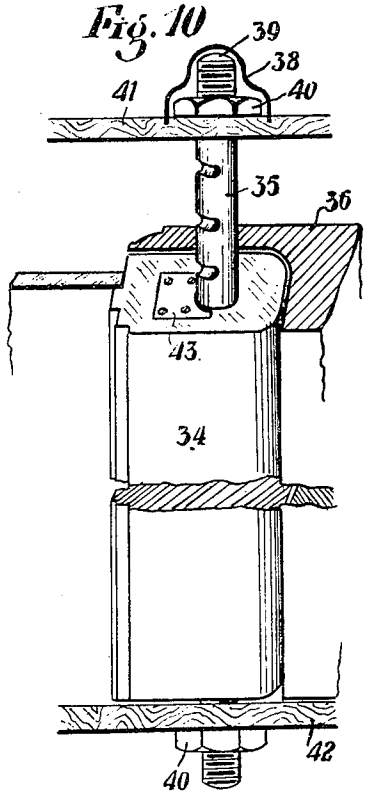


Fig. 12

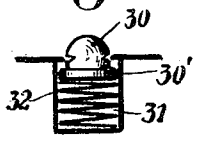
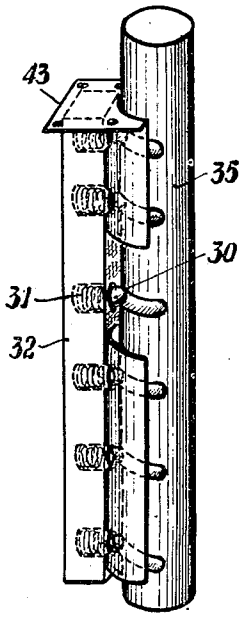


Fig. 11



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WINDOW CONSTRUCTION

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In Belgium January 9, 1946

2 Claims. (Cl. 20—42)

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The invention relates to a window-construction, and more particularly to a window-construction wherein the sashes may be lifted and lowered in vertical direction and may be swung towards the room as well so as to facilitate the cleaning of the window-panes.

An object of the present invention is to provide a window-construction of above described type wherein both sashes may be swung through an angle of 90°, even if one sash is behind the other.

Another object of the invention is to facilitate the operation and maintenance of windows of the above described type.

A further object of the present invention is to improve on the art of window-constructions as now ordinarily made.

With the above and other objects of the invention in view, the invention consists in the novel construction, arrangement and combination of various devices, elements and parts, as set forth in the claims hereof, certain embodiments of the same being described in the specification and being illustrated in the accompanying drawings forming part of this specification, wherein:

Fig. 1 is a horizontal sectional view of a double casement window, the sashes of which are arranged for vertical sliding movement and for swinging movement about the vertical axis of their hinges,

Fig. 1*a* is a horizontal sectional view of another embodiment of a double casement window according to the invention,

Fig. 2 is a vertical sectional view of the window shown in Fig. 1,

Figs. 3 and 4 illustrate two types of hinges used in the window of Fig. 1,

Fig. 5 is a perspective view of the frame of the window at the side of the hinges, some parts being broken away,

Fig. 6 is a perspective view of the frame of the window at the side of the locks, some parts being broken away,

Fig. 7 is a front elevational view illustrating schematically a mechanism for lifting and lowering the sashes,

Fig. 8 is a horizontal sectional view of the pivot-side of the sashes and frame of another embodiment of a window according to the invention,

Fig. 9 is a horizontal sectional view of the opposite side of the sashes and frame of the window shown in Fig. 8, comprising the locking means,

Fig. 10 shows diagrammatically the lay-out of the sliding part on the pivot-side of the window shown in Fig. 8,

Fig. 11 shows in perspective the rack-pivot and the associated set of balls on the pivot-side of the window shown in Fig. 8, and

Fig. 12 shows a detail of the ball arrangement.

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Referring now to Figs. 1–7, 2 generally indicates the frame of the double casement window according to the invention. Said frame is provided with two recesses of different width; one of said recesses is capable of receiving a sash 9 of large width, the other recess is capable of receiving a sash 10 of small width. Hinges 3 and 4 are mounted on the same side of the frame at side walls of said recesses. Said hinges are arranged in different vertical planes and are offset relative to each other. Fig. 3 illustrates such a hinge in detail. The leaf 5 of such a hinge having a vertical axis is secured to the side wall of such a recess of the frame 2. The other leaf 6 of such a hinge carries a tongue 7 of a dove tail joint. Said tongue 7 is in slidable engagement with a corresponding groove of the dove tail joint arranged in a member 8 secured to the sash 9 or 10 respectively.

The tongues 7 of the dove tail joints extend throughout the entire height of the window frame 2, while the length of the members 8 and the grooves of the dove tail joints arranged therein extend merely throughout the height of the sashes 9 and 10 respectively.

The arrangement of the parts described above provides for vertical movements of the sashes while avoiding any lateral play. Moreover, the hinges 3 and 4 permit a swinging movement of the sashes 9 and 10 about their vertical axes towards the inside of the room. Owing to the different width of the recesses of the frame 2 and the offset or staggered arrangement of said hinges 3 and 4, both sashes 9 and 10 may be swung through 90° from the closed position shown in Fig. 1 into the open position shown in Fig. 5, even if the upper sash 9 (see Fig. 2) is lowered substantially into a position behind the lower sash 10.

On the side opposite the hinges 3 and 4, locking means comprising one or several bolts, such as 11, are arranged on the side edges of the sashes 9 and 10 respectively and the locking elements of said bolts are of the conventional curved form to permit automatic closing by engagement with grooves of corresponding shape arranged in the upright 13 of the window frame. To open the sashes 9 and 10 towards the inside, around the hinges 3 and 4, it is merely necessary to open the locks and to draw the sashes towards oneself by means of a key, handle or the like.

In order to lift and lower the sashes 9 and

10 along the vertical guide ways formed by the dove tail joints 7, 8, each sash is connected with a chain, preferably a chain similar to a bicycle chain. Instead of a chain, a cord may be used, or a metallic ribbon, but the chain is to be preferred in order to make crank control easy, as explained in Fig. 7 which shows schematically the disposition of the chains, sprocket-wheels and metallic pieces 21 for the movement of the sashes upwardly and downwardly.

Each upright of the frame is provided with two grooves 14 and a recess 17. The sash 9 is associated with a pair of chains 15 and the sash 10 is associated with a pair of chains 16. Each chain trained around sprocket wheels 18 mounted on shafts 19 is arranged in such a manner, that the chain passes through said groove 14, extends below the lintel of the window, passes through said recess 17 and extends above the window sill.

The chains passing over these sprocket-wheels can be operated by two sprocket-wheels 20, Fig. 7, provided with a square aperture, for inserting a crank, as for mechanical shutters. These chains can also be moved by means of a cord on cog-wheels, just like shutters of apartments are operated.

Figs. 5 and 6 illustrate the connection between the chain 15 and the sash. The connection between the chain 16 and the sash 10 is made in a similar manner.

A metallic piece or sliding body 21 corresponding in shape to the shape of the groove 14, is inserted into each chain and is connected to the ends of the latter (see Figs. 5 and 7). Hinges or guiding elements 22 comprising four sections (Figs. 1, 4 and 5) are connected by a section 23 to the pieces 21, another section 24 of the hinges is connected to a sash 9 and 10, as shown in Figs. 1 and 5. When the sashes are opened from their inward position shown in Fig. 1 into an outward position towards the inside of the room, around the dovetailed hinges 3 and 4, the four-section hinges 22 are unfolded as shown in Fig. 5 and Fig. 6, and they are folded (Fig. 1), when the sashes are swung back into their inward or closing position. Thus, each of said hinges or guiding elements 22 guides the associated sash 9 or 10 respectively to and from its outward position preventing an undesirable bending effect by the weight of the sash on the vertical pivot of the hinge 3 or 4, respectively.

The four-section hinges may be replaced by a system of compass sliders. The latter however has the disadvantage of projecting beyond the sash, towards the inside of the room, when the window is closed.

The four-section hinges 22 are connected to the pieces 21, which must have a sufficient length for solid fixing, by screwed or soldered tenons. These hinges are fixed to the sashes by means of screws 25 passing through bores of the sections 24.

In order to avoid a jamming of the sashes, preferably a metallic piece 26 similar to the piece 21 is arranged in each chain 15 and 16 at the side of the locking means 11. These pieces 26 are provided with two or several pins 27 which may be engaged with corresponding holes of plates 28 secured to the sashes, Fig. 6, when the window is closed. These pins are not indispensable, but they prevent any overstrain on the dovetailed hinges 3 and 4 during the lifting and lowering of the sashes.

The disposition shown may be applied to windows with frame and sashes made of metal as well as to windows with frame and sashes made of wood. The operation is easy and does not need any care or maintenance. However, small apertures may be provided in the frame, in order to lubricate, from time to time, the chains. One may also leave device on hinges to facilitate the eventual replacement of a chain.

A modified embodiment of a window of simplified construction is shown in Fig. 1*a*, in which the corresponding elements are denoted by the same reference numerals.

In this figure, again the sashes 9 and 10 are connected with the frame 2 by hinges 3 and 4 with dovetail 7 and the counter dovetail 8. However, the locks 11 with bolts 12 are replaced by sliding bars 11', traversed by the bolts of the lock 12'. Moreover, the grooves 14 slidably engaged with the metallic pieces 21 are here replaced by simple fixed squares 14', constituting elements of stabilisation. The arrangement of the rollers 18 is here very much the same, except that the system of frame and sprocket-wheels is simplified by counter-weights which move in the recess 17'.

According to the embodiment shown in Figs. 8–12 the sashes 33 and 34 are connected with the upright 36 of the frame by means of a pivot and a system of ball-bearing racks.

Each sash 33, 34 may be swung about a vertical pivot or rod 35 engaged with a longitudinal bore of the sash. The pivot 35 being substantially of the same height as the upright 36 of the frame is secured to the lintel 41 and sill 42 by means of nuts 40 engaged with threaded portions of the pivot. Each pivot 35 is provided with a series of notches constituting a rack-like portion of the pivot for a purpose to be described hereinafter.

Furthermore, each sash 33, 34 is provided at its pivot side with a recess receiving a metal casing 31 secured to the sash by screws. Said metal casing comprises a plurality of compartments of circular or square cross-section. A plate 30' carrying a ball-like portion 30 is inserted in each compartment. A spring 31 interposed between a wall of the casing and said plate 30' tends to urge the member 30', 30 outwardly, so that the rounded portion thereof projects from the casing 32. The series of balls 30 is arranged for cooperative engagement with the notches of the rack-portion of the pivot 35. The length of the casing 32 provided with the series of spring-loaded balls 30 corresponds substantially to the height of the sash. Instead of a casing 32 a solid metal bar having a plurality of recesses receiving the spring loaded balls 30 could be used.

Moreover, each sash 33, 34 is provided at its locking side with another recess receiving a second casing 32' with a series of spring loaded balls 30'. The springs 31' tend to urge the balls 30' in locking engagement with recesses arranged in the upright 37 of the frame.

The construction described above, apparently, permits a swinging of the sashes about the pivots 35, as the spring-loaded balls 30 may slide in the notches of the rack-portion of the pivots. Furthermore, the sashes may be lifted and lowered in vertical direction along the pivots or bars 35. During such a lifting or lowering of the sashes, the balls 30 are urged inwardly against the action of their springs 31 until they may snap into the next notch for holding the sash in a predetermined position above the window sill.

This pivoting and ball-bearing rack system can

be adapted to wooden frames as well as to metallic ones. However, the racks can be replaced by a system of counterweight cords, chains or endless metallic ribbons, worked by a crank or by a starting spring.

The pivoting system with ball-bearing racks does not need any up-keep.

A practical system, however, is provided for the maintenance of the set of balls. In fact, the sashes may be removed from the frame without any difficulty. The cap **38** which covers the upper threaded end **39** and keeps the pivot **35** in position is unscrewed. The nuts **40** are removed from the lintel **41** and from the sill **42** and the pivot **35** is entirely withdrawn. Thus the sash is disconnected from the upright **36** of the frame. Then the lid **43** holding the casing or bar **32** in position is disengaged from the sash, whereupon the casing or bar with the sets of balls may be withdrawn for an inspection of the balls, which may be greased, if necessary, before the parts are reassembled.

It is evident that the invention is not restricted to the embodiments described and shown and that many alterations may be made as to the shape, the size, the arrangement and the number of parts described and shown without departing from the spirit and scope of the invention set forth in the appended claims.

Having now fully described our said invention, what we claim and desire to secure by Letters Patent, is:

1. A window construction comprising: a frame including two upright portions, at least two sashes movable relative to said frame, said sashes being arranged in different planes and being of different width, a first hinge connecting one side of the first sash with one of said upright portions of the frame, a second hinge connecting one side of the second sash with the same upright portion of the frame, each of said hinges including sliding means for lifting and lowering said sashes and including pivots for swinging said sashes about a vertical axis, the pivots of said two hinges being offset relative to each other for a distance in excess of the thickness of the sash and sufficient to permit swinging of both sashes from a normal inward position into an outward position through an angle of at least 90°, a first guiding element connected with said first sash near said first hinge connection, a first sliding body connected with said first guiding element, a second guiding element connected with said second sash near said second hinge connection, a second sliding body connected with said second guiding element, said upright portion of the frame having a first vertical groove slidably receiving said first sliding body and having a second vertical groove slidably receiving said second sliding body, each of said guiding elements being operable to guide the associated sash to and from its outward position, flexible actuating means connected with said sliding bodies, and locking means arranged at the other side of each of said sashes for cooperation with the other upright portion of the frame so as to lock and unlock said sashes.

2. In a window construction as claimed in claim 1, said guiding elements being in the shape of multi-section hinges.

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