Nov. 1, 1955 R. RIQUE 2,722,041

SLIDING AND SWINGING WINDOW STRUCTURE

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Fig. 1

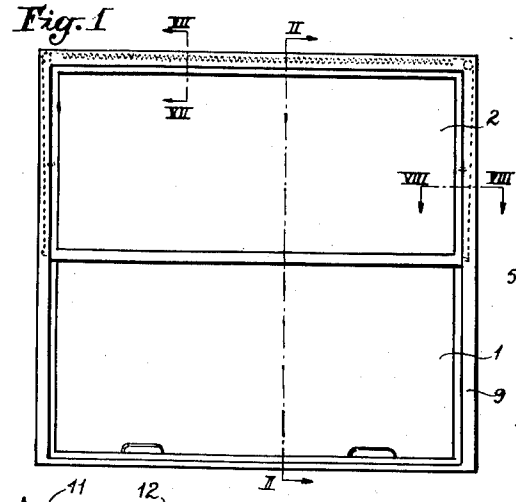


Fig. 2

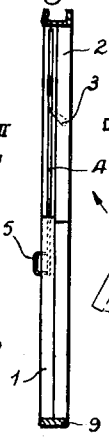
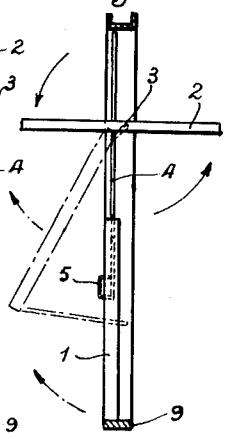


Fig. 3



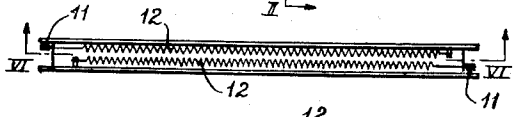
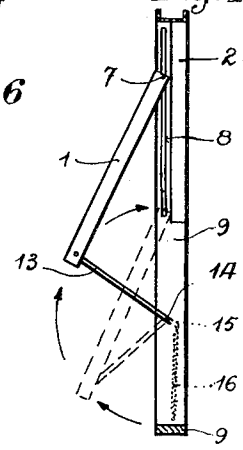


Fig. 5

Fig. 4



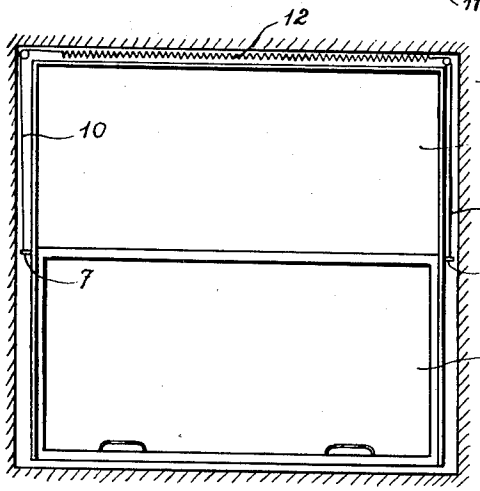


Fig. 6

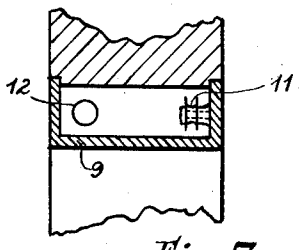
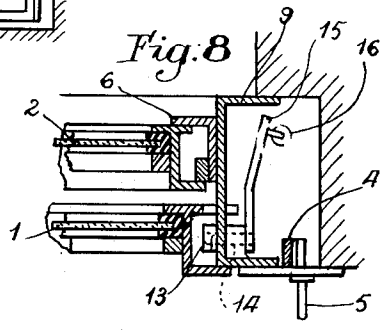


Fig. 7

Fig. 8



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SLIDING AND SWINGING WINDOW STRUCTURE

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3 Claims. (Cl. 20—42)

My invention refers to window construction wherein one at least of the sashes is vertically movable.

It is well-known that in such windows the main difficulty consists in properly balancing the movable sash. This is generally obtained by means of weights vertically movable in passageways which have to be provided in the side members of the window frame. It has been proposed to balance the movable sash by means of springs, but the reactive force exerted by such springs varies as the sash moves and auxiliary mechanical devices have to be provided to make up for this variation. Another difficulty consists in providing means to permit access to the outer face of the sashes for cleaning purposes. This is generally obtained by rotating the sashes about a vertical or horizontal pivot, but this complicates the construction of the window.

My invention has for its object to provide a window structure of simplified construction wherein the movable sash, balanced by horizontal springs disposed within the upper transverse member of the window frame is at the same time swingable about a horizontal axis.

In accordance with my invention the movable sash is supported by means of two cables attached to two lateral pins secured to the upper portion of the side members of the said sash, these pins being verically slidable in the side members of the window frame, and the said sash, which is rotatable about the common transverse axis of the said pins, also carries two lateral arms pivoted on the lower portion of the side members of the sash and on the side members of the frame, and submitted to the action of springs which tend to rotate these arms in the direction corresponding to the ascending movement of the sash. When the sash is at its lowermost position the lateral arms are substantially vertical and therefore the upper horizontal springs are rendered ineffective. When the sash is at its highermost position these arms are again substantially vertical and they therefore prevent the sash from sliding down under the action of its weight which is no more balanced to a sufficient extent by the upper springs. It will also be observed that in the intermediate positions the springs which act on the lateral arms help the upper horizontal springs in balancing the weight of the sash.

The window preferably comprises a second sash pivoted about a transverse axis in the upper portion of the window frame, this second sash being adapted, when in the horizontal position, to form an abutment limiting the ascending movement of the sliding or lower sash.

In the annexed drawings:

Fig. 1 shows the outer face of a window according to this invention.

Fig. 2 is a section thereof taken along line II—II of Fig. 1.

Fig. 3 is a view similar to Fig. 2, but showing the upper sash of the window in the horizontal position.

Fig. 4 is a view similar to Fig. 2, but showing the lower sash in the advanced and partly raised position.

Fig. 5 is a plan view corresponding to Fig. 1.

Fig. 6 is a diagrammatical section taken along line VI—VI (Fig. 5).

Figs. 7 and 8 are enlarged fragmental sections taken along lines VII—VII and VIII—VIII of Fig. 1.

The window illustrated comprises a vertically movable lower sash **1** and an upper sash **2** pivoted about a horizontal transverse axis **3** as shown in Figs. 2 and 3. The upper sash **2** is actuated in the conventional manner by means of a slidable rod **4** provided with a lower handle **5**. The oscillation of sash **2** is effected within an appropriate framing provided with weatherstripping means, such framing being shown at **6** in Fig. 8.

The lower sash **1** is provided with two lateral pins **7** (Figs. 4 and 6) secured at the ends of its upper transverse member and slidable in two vertical guiding grooves provided in the side pillars or jambs of the window frame **9**. To each pin **7** there is attached a cable **10** (Fig. 6) which is passed over an upper pulley **11** rotatable about an axis perpendicular to the plane of frame **9** and attached to a horizontal spring **12** extending along the upper edge of the opening of the window within an appropriate housing provided in the upper transverse member of the window frame, the other end of spring **12** being attached to the said frame. As clearly shown in Fig. 5 the two springs **12** are disposed in parallel relation and in opposed direction, their action thus being such that they tend to raise the sash **1**.

To each end of the lower transverse member of the lower sash **1** there is pivotally fixed a flat lateral arm **13** (Figs. 4 and 8) the other end of which is fixed to the outer end of a transverse shaft **14** rotatably supported by the next jamb of the window frame **9**. This jamb is hollow as shown and the inner end of shaft **14** carries another arm **15** to which there is attached a spring **16**. The action of spring **16** is such that it tends to raise the sash **1**, as indicated by the arrows in Fig. 4.

When the sash **1** is at its lowermost position, springs **16** are extended to the maximum, but arms **15** are substantially vertical and therefore the rotational action of the said springs on shafts **14** is almost negligile. Things may even be so arranged that for this position of sash **1**, arms **15** are somewhat beyond their upper dead centre with respect to springs **16**, whereby the latter tend to rotate the said arms in the direction corresponding to the closing of sash **1**, i. e. in the opposed direction with respect to the arrows in Fig. 4. Arms **13** being also vertical, springs **12** cannot raise sash **1**. The latter therefore remains by itself in the closed or lowered position and the conventional locking devices which may be provided are only used as a matter of safety, for instance against the action of wind. As soon as the lower transverse member of the sliding sash **1** is advanced, as shown in dotted lines in Fig. 4, springs **16** and **12** become effective and therefore the sash tends to rise under their combined action. As the ascending movement of sash **1** proceeds, the elastic action of springs **12** decreases rapidly, since these springs contract in proportion to the rising of the sash. But the action of springs **16** at first increases rapidly substantially in proportion to the sine of the angle of arms **13** with respect to the vertical and this increase in the effectiveness of springs **16** makes up for the decrease in the effectiveness of springs **12**. It results therefrom that the position of equilibrium of sash **1** is substantially high in the opening of the window frame. It may for instance correspond to the position shown in full lines in Fig. 4. In actual practice owing to frictional forces this position is not sharply defined and the sash remains at rest within a substantially wide field of positions. When the sliding sash **1** is fully raised, arms **13** are again vertical and therefore the sash is supported by arms **13**, the residual tension of springs **16** maintaining arms **15** in the vertical position.

Of course the full ascending movement of sash **1** is only possible when the upper sash **2** is in the closed position (vertical position in Figs. 2 and 4). When on the contrary the upper sash **2** is in the horizontal or open position as indicated in Fig. 3, it forms an abutment limiting the ascending movement of sash **1** which remains in the position illustrated in chain lines in Fig. 3 under the action of springs **12** and **16**. It will be noted that at this position access may be had to the outer surface of the said sash **1** for cleaning purposes, whereby the conventional devices adapted to permit rotation of the sash about a vertical or a horizontal axis may be dispensed with.

As shown in Fig. 8 arms **13** are disposed within a lateral space provided between the lateral edges or stiles of sash **1** and the window frame **9**. Sash **1** has a lateral flange **1***a* which applies against the jambs of the window frame to close this space when the sash is at its lowermost position.

The window described is very simple in construction and it comprises no cumbersome lateral passageways for the counterbalancing weights as in the known constructions, such passageways reducing the width of the opening. The sliding and swinging sash **1** may however be safely retained at a number of positions and more particularly at its lowermost and highermost positions. When the sliding and swinging sash is raised against the upper sash pivoted to the horizontal (position of Fig. 3) air may freely pass through the window opening. The outer surface of the glass panes is easily cleaned without having to provide special means for rotating the sashes.

I claim:

1. In a sliding and swinging sash window a window frame including side jambs; a sash movable in said frame, said sash having side stiles; a laterally projecting pin secured to each stile of said sash in the upper portion thereof; means on the jambs of said frame to vertically guide said pins; a cable attached to each of said pins; a pulley rotatable about an axis substantially perpendicular to the plane of said frame at the upper end of each of the jambs of said frame, each of said cables being passed over the pulley situated above the pin to which said cable is attached; a pair of horizontal springs transversely disposed in the upper portion of said frame, each of said springs having one end attached to said frame end the other end being attached to one of said cables to elastically pull the latter; an arm on each side of said sash, each of said arms having an end pivoted to said sash about a transverse axis situated in the lower portion of said sash and the other

end pivoted to the corresponding jamb of said frame in such a manner that when said sash is at its lowermost position in said frame said arms are substantially vertical with their pivot to said frame situated above their pivot to said sash; and spring means acting on said arms to rotate same in the direction corresponding to the opening of said sash.

2. In a sliding and swinging sash window a window frame having hollow side jambs; a sash movable in said frame, said sash having side stiles; a laterally projecting pin secured to each stile of said sash in the upper portion thereof; means on said jambs to vertically guide said pins; a cable attached to each of said pins; a pulley rotatable about an axis substantially perpendicular to the plane of said frame at the upper end of each of said jambs, each of said cables being passed over the pulley situated above the pin to which said cable is attached; a pair of horizontal springs transversely disposed in the upper portion of said frame, each of said springs having one end attached to said frame and the other end attached to one of said cables to elastically pull the latter; an arm on each side of said sash, each of said arms having one end pivoted to said sash about a transverse axis situated in the lower portion of said sash; a transverse shaft passed through each of said jambs and rotatably supported thereby, the second end of each of said arms being fixed to the outer end of the one of said shafts which is situated on the same side with respect to said sash, in such a manner that when said sash is at its lowermost position in said frame said arms are substantially vertical with their pivot to said sash situated below said shafts; an arm on the inner end of each of said shafts; and springs attached to said last-named arms and to said frame in such a manner that when said sash is at its lowermost position said second-named arms are substantially at their upper dead centre with respect to said springs.

3. In a sliding sash window as claimed in claim 2, the upper transverse member of said window frame being hollow and said pulleys and said first-named springs being disposed within said upper transverse member.

References Cited in the file of this patent

UNITED STATES PATENTS

807,703 Wallen ..... Dec. 19, 1905

FOREIGN PATENTS

404,828 Great Britain ..... Jan. 25, 1934