Sept. 23, 1941. F. J. MOSS 2,256,905

WINDOW SASH OPERATING MECHANISM

Filed Feb. 13, 1939

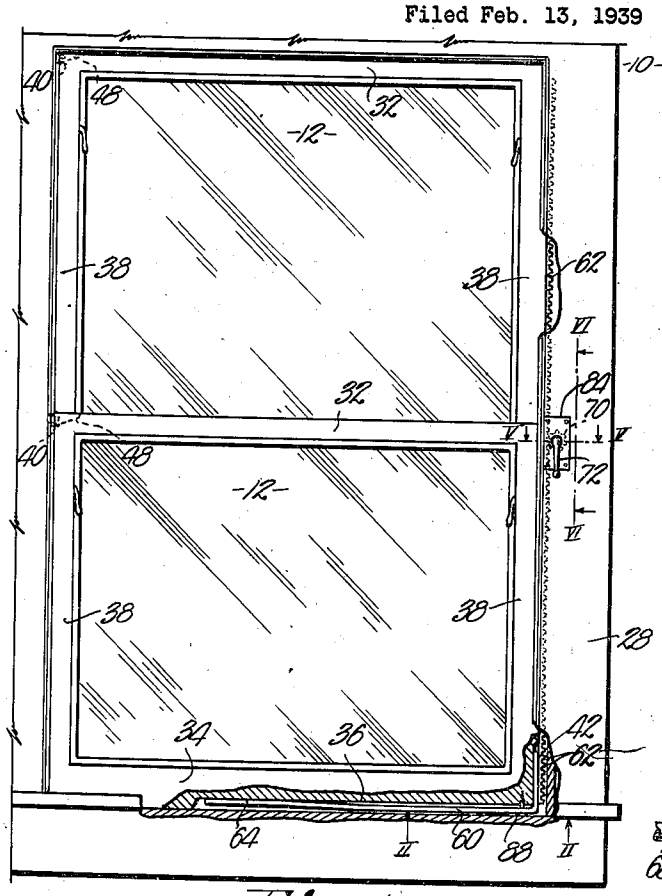


Fig. 1.

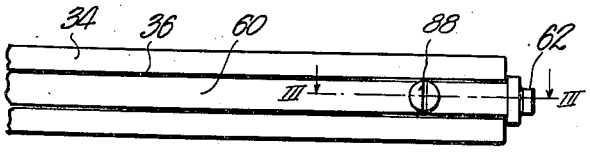


Fig. 2.

Fig. 3.

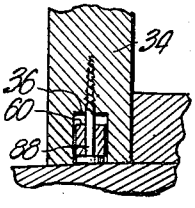
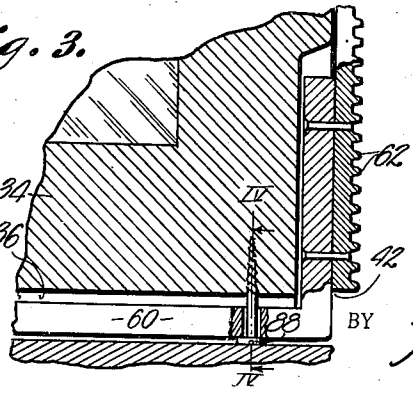


Fig. 4.



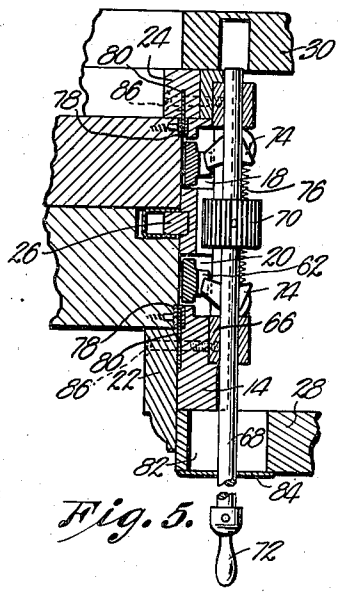


Fig. 5.

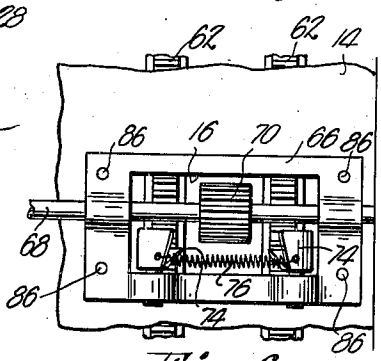


Fig. 6.

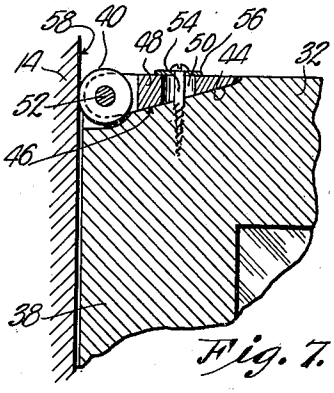


Fig. 7.

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Patented Sept. 23, 1941 2,256,905

UNITED STATES PATENT OFFICE

2,256,905

WINDOW SASH OPERATING MECHANISM

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Application February 13, 1939, Serial No. 256,093

6 Claims. (Cl. 268—132)

This invention relates to window structures of the type wherein is employed vertical slidable sash that are hung in window frames, and the primary object of this invention is the provision of means for operating the sash without the employment of the conventional weights, cords, springs, pulleys, and handles.

One of the important aims of the instant invention is the provision of window sash operating mechanism wherein is included a specially formed rack floatingly mounted between the vertically movable sash and a portion of the window frame so as to constitute a hanger for the associated sash, lifting force to which is applied against the bottom rail at a point adjacent to the vertical center, to the end that tendency to bind is overcome.

A yet further object of this invention is the provision of window sash operating mechanism which may be associated with conventional types of vertically slidable window sash, and the frames therefor, the parts of the mechanism being disposed so that a single operating crank may be manipulated to either raise or lower the two window sashes.

Still further objects of the invention are: to provide sash operating mechanism that has a pair of overlapping L-shaped racks, respectively movable by a single pinion which is selectively brought into engagement with one or the other of the racks, by manual manipulation of an operating crank, a portion of which is disposed exteriorly of the window frame; to provide means for mounting the pinion of the sash on operating mechanism upon the window frame so that all of the working parts associated therewith may be quickly replaced; and to provide a window frame with a specially formed panel through which the operating parts of the mechanism including the rack-engaging pinion, may be withdrawn without dismantling any part of the window structure.

Further objects of the invention will appear during the course of the following specification, referring to the accompanying drawing wherein:

Figure 1 is an elevational view of a window having sash operating mechanism therein, which is made in accordance with the present invention.

Fig. 2 is an enlarged fragmentary detailed sectional view taken on line II—II of Fig. 1.

Fig. 3 is a similar detailed sectional view taken on line III—III of Fig. 2.

Fig. 4 is a vertical sectional view through a portion of the sash operating mechanism taken on line IV—IV of Fig. 3.

Fig. 5 is an enlarged fragmentary detailed horizontal sectional view taken along line V—V of Fig 1.

Fig. 6 is a sectional view taken along line VI—VI of Fig. 1; and,

Fig. 7 is a fragmentary sectional view through one corner of the window sash illustrating the manner of associating an anti-friction roller therewith.

The window frame 10, wherein sashes 12 are mounted, may be of the conventional type which comprises a jamb 14 having a window 16 formed therein intermediate its ends and two channels 18 and 20, respectively milled along the inner face thereof from end to end.

Front and back stops 22 and 24 respectively are mounted upon jamb 14 as is the dividing strip 26. Front and back panels 28 and 30 respectively, combine with jamb 14 in presenting a compartment within the window frame 10 for the reception of parts hereinafter more fully described.

Each vertically slidable sash 12 has an upper rail 32, a lower rail 34, wherein a longitudinal groove 36 is milled, and side rails 38. These sashes 12 always have portions thereof in overlapping relation and each is provided with an anti-friction roller at one corner formed by the meeting of upper rail 32 and one side rail 38. This roller 40 is in opposed relation as regards the position of L-shaped rack 42 and is specially mounted so that adjustment may occur without the use of special tools.

A notch 44 is formed inwardly from the top edge of upper rail 32 and a downwardly and outwardly inclined floor 46 is created to receive a similarly inclined face of bracket 48 wherein slot 50 is formed. The outer or thicker end of bracket 48 is bifurcated to receive roller 40 and the transverse axle 52 rotatably carries roller 40.

A screw 54 is passed downwardly through slot 50 and into upper rail 32. A guard plate 56 through which screw 54 passes, covers slot 50 and presents a smooth upper surface. Tightening screw 54 serves to project roller 40 outwardly against inner face 58 of adjacent jamb 14 and the outermost point on roller 40 extends beyond the vertical edge of side rail 38 so that a narrow space is afforded between face 58 and side rail 38. This roller and its associated parts reduce the friction between jamb 14 and sash 12 to a minimum.

Each sash 12 is provided with an L-shaped rack

42, one leg of which extends along side rail 38 of sash 12 as the other leg 60 thereof rests in groove 36, formed inwardly from the bottom edge of lower rail 34.

The leg of rack 42 which extends along side rail 38 is provided with teeth 62 that lie in groove 20 of jamb 14, as regards lower sash 12. The free end of leg 60 is offset as at 64 so that the zone of contact between normally horizontal leg 60 of rack 42, is to one side of the vertical center of sash 12. When upward force is exerted at or to one side of the vertical center of either sash 12, upward movement is imparted thereto without binding or twisting.

The vertical legs of L-shaped racks 42, like sashes 12 with which they are associated, have portions thereof always in overlapping relation, and when sashes 12 are closed, as illustrated in Fig. 1, the overlapped portions of the vertical toothed legs of rack 42, are reduced to a minimum and the overlap is half-way between the upper and lower edges of the opening formed by the window frame 10.

A bearing frame 66 rotatably carrying shaft 68 is mounted upon the back of jamb 14 so that pinion 70 mounted thereon, projects inwardly through window 16 a sufficient amount to be brought into mesh with teeth 62 of either rack 42.

The position of pinion 70, illustrated in Figs. 5 and 6, is a neutral one and the longitudinal movement of shaft 68 in one direction will cause pinion 70 to engage the rack associated with the upper sash 12, for example, while a movement of shaft and pinion 68 and 70 respectively, in the other direction, will cause a meshing with the teeth of rack 42 associated with lower sash 12. After so positioning and interengaging the desired rack with pinion 70, crank 72 is manually operated to rotate shaft 68 in the desired direction to raise or lower sashes 12.

A pair of dogs 74 mounted on frame 66 in the path of travel of pinion 70, are moved out of engagement with teeth 62 of the racks 42 when pinion 70 reaches a position where its teeth will be in mesh with one of the racks. In other words, dogs 74 are so formed as to be engaged by pinion 70 as it moves towards engagement with either one of the racks. When pinion 70 is in engagement with a rack, the dog 74 associated therewith, is withdrawn therefrom. Obviously, dogs 74 become means for locking rack 42 when pinion 70 is not in engagement therewith.

A spring 76 yieldably retains dogs 74 in the positions shown in Fig. 5.

Racks 42 are not directly attached to sashes 12. When pinion 70 is in engagement with one of the racks there is sometimes a tendency to force the rack inwardly against the edge of side rail 38 which may cause pinion 70 to lift out of engagement with teeth 62. Each sash 12 is provided with a guide channel 78 that extends the entire length of side rail 38. This guide channel 78 slidably grips one edge of guide plate 80, which need be but a relatively short member but which should extend a few inches above and below the line of contact between pinion 70 and rack 42. Each sash 12 is so equipped with a guide channel and there is an inwardly extending guide plate 80 for each sash. The relatively short guide plate reduces friction to a minimum, yet insures that rack 42 and sash 12 will not be moved away from pinion 70 an objectionable amount.

Front panel 28 of the window frame 10 is provided with an opening 82 which is large enough to permit the removal of frame 66 and its associated parts 68, 70 and 74.

An escutcheon 84 removably fastened to the outer face of panel 28 normally covers opening 82. Shaft 68 passes outwardly through the escutcheon so that crank 72 may be positioned.

When it is desired to replace, for example, pinion 70, it is merely necessary to remove screws 86, four of which are provided in such places as to permit their removal without disturbing any of the remaining parts of the operating mechanism, the sashes 12 or the frame 10.

A screw 88 carried by and near one end of lower rail 34 extends through a hole in leg 60 of L-shaped rack 42. When sash 12 is being lowered, the action of gravity will normally draw the same to the closed position as pinion 70 permits rack 42 to drop. If there is a slight retarding force present, leg 60 will move downwardly against the head of screw 88 with sufficient pressure to insure that sash 12 will drop under the control of the operator.

The operation of the mechanism has been made apparent to one skilled in the art, during the course of the foregoing description, setting down one embodiment of the invention. Obviously parts of different form than those illustrated may be used to establish the combination and results desired.

Having thus described the invention, what is claimed as new and desired to be secured by Letters Patent is:

1. The combination with a window sash slidably mounted in a frame for vertical movement, of an L-shaped rack disposed between the sash and said frame; and a pinion rotatably carried by the frame in engagement with said rack, one leg of said L-shaped rack being positioned horizontally along the bottom of the lower rail of the window sash, the other leg of said rack being positioned vertically along one side rail of the sash, the said one leg of the L-shaped rack being laterally offset at the free end thereof for normal engagement with the bottom of said lower rail adjacent to the mid-point between the ends of the latter.

2. The combination with a window sash slidably mounted in a frame for vertical movement, of an L-shaped rack disposed between the sash and said frame; and a pinion rotatably carried by the frame in engagement with said rack, one leg of said L-shaped rack being positioned horizontally along the bottom of the lower rail of the window sash, the other leg of said rack being positioned vertically along one side rail of the sash, the said one leg of the L-shaped rack being offset for normal engagement with the bottom of said lower rail at the free end of said leg, said lower rail being provided with a longitudinal groove to receive the one leg, said lower rail of the window sash being provided with an element for engaging the horizontally positioned leg of the L-shaped rack when the pinion is rotated to move the rack downwardly.

3. The combination with a window sash slidably mounted in a frame for vertical movement, of an L-shaped rack disposed between the sash and said frame; and a pinion rotatably carried by the frame in engagement with said rack, one leg of said L-shaped rack being positioned horizontally along the bottom of the lower rail of the window sash, the other leg of said rack being positioned vertically along one side rail of the sash, the said one leg of the L-shaped rack being offset for normal engagement with the bottom of

said lower rail at the free end of said leg, said lower rail being provided with a longitudinal groove to receive the one leg, said lower rail of the window sash being provided with an element for engaging the horizontally positioned leg of the L-shaped rack when the pinion is rotated to move the rack downwardly, said element being adjacent to one vertical edge of the window sash, the zone of engagement between the lower rail of the window sash and the one arm of the rack being between the vertical center of said sash and the other vertical edge thereof.

4. In a vertically slidable window sash, an L-shaped rack having an arm extending along one vertical rail of the sash and an arm extending along the lower rail of the sash, said arm along the lower rail being offset to engage the bottom of the lower rail between the vertical center thereof and the other vertical rail of the sash.

5. In a window structure of the character described having a frame including a jamb and a stop in abutting relation and provided with a compartment therein, a window sash slidably mounted in the frame for vertical movement having one edge thereof within said compartment in the plane of the abutting edges of the jamb and said stop, a rack along the said one edge of the sash, a pinion, a shaft rotatably supporting the pinion in mesh with the rack, and a bearing frame journalling the shaft mounted in the compartment of the frame; a flat relatively short plate opposite the pinion having a portion thereof projecting into the compartment of the frame and a portion thereof between the stop and said jamb; securing members extending through the stop, said plate, the jamb and into said bearing frame to hold said parts in the operative position; and a guide channel on the said one edge of the sash co-extensive in length with the rack and embracing that portion of the plate projecting into the compartment.

6. In a window structure of the character described having a frame, a sash slidably mounted in the frame for vertical movement, a rack along one vertical edge of the sash, a pinion, a shaft rotatably supporting the pinion in mesh with the rack, and a bearing frame journalling the shaft, whereby upon rotation of the shaft movement is imparted to the rack and said sash; a flat relatively short plate mounted on the window frame to one side and opposite the pinion; a guide member on the sash along the edge thereof, coextensive with the rack and overlapping said plate between the plate and said pinion to preclude movement of the rack from the pinion as the rack is moved thereby; and screws extending through parts of the frame, the relatively short plate and into the bearing frame to hold the same in operative position.

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