Jan. 5, 1954 R. H. SMITH 2,664,600

SLIDING WINDOW STRUCTURE

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Fig. 1

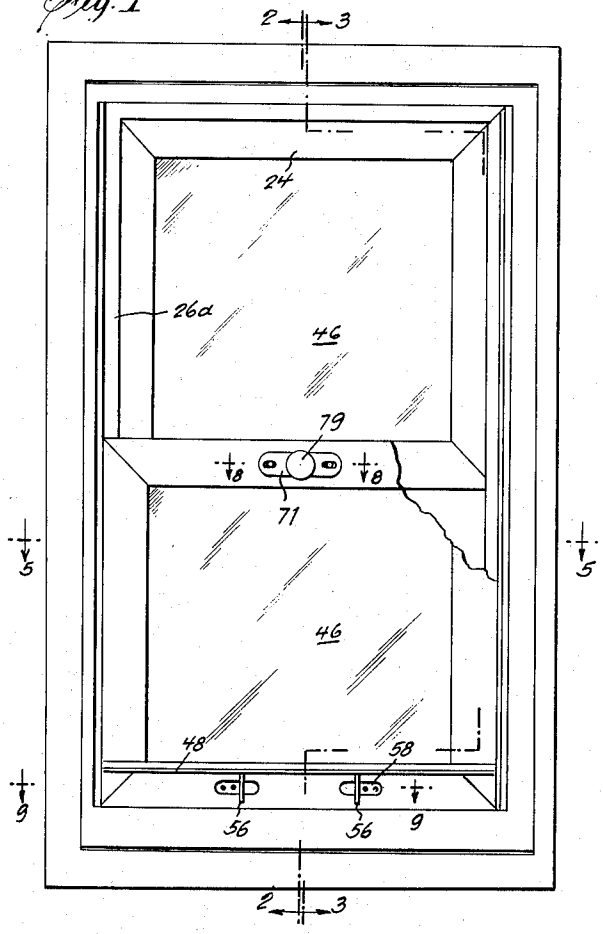


Fig. 10

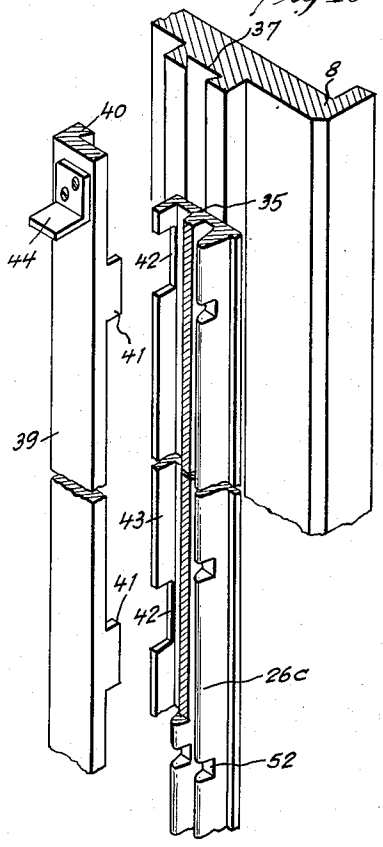


Fig. 8

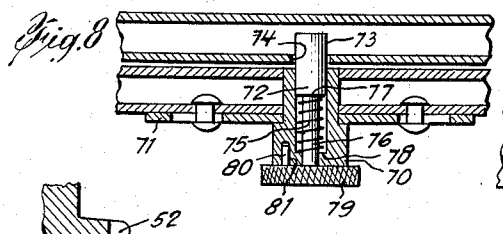
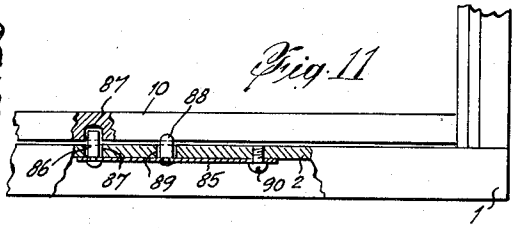


Fig. 11



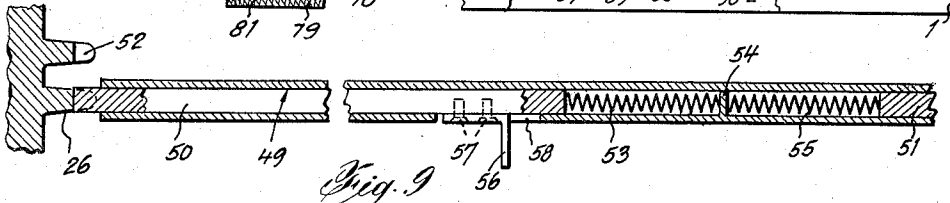


Fig. 9

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Fig. 2

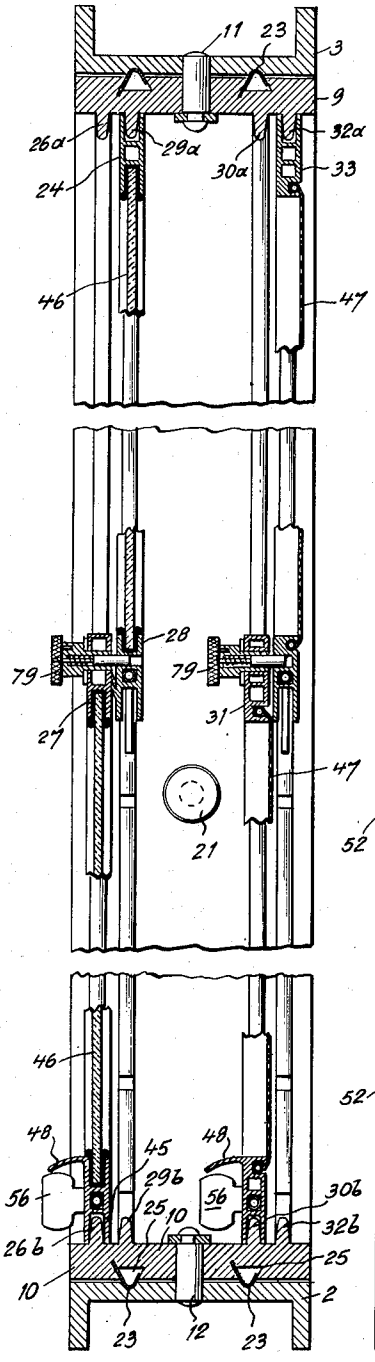


Fig. 3

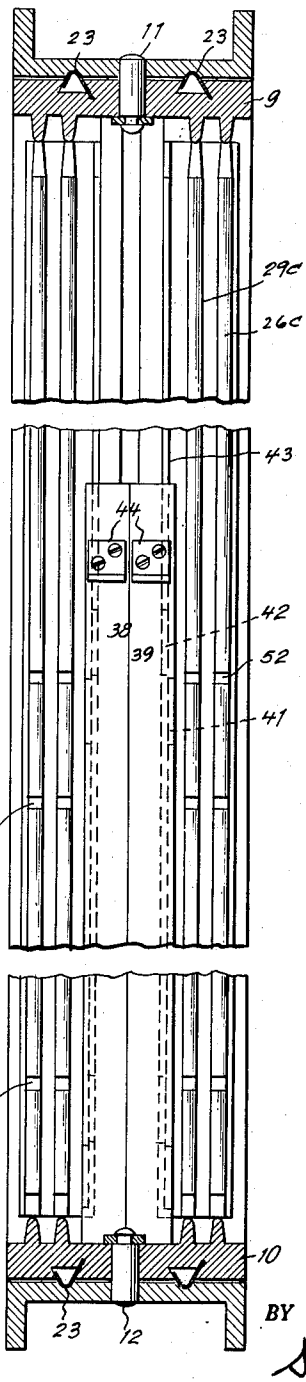
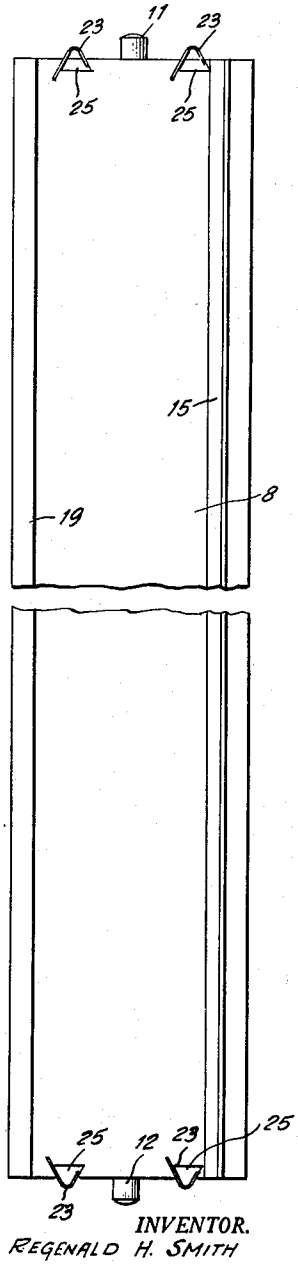


Fig. 4



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Fig. 5

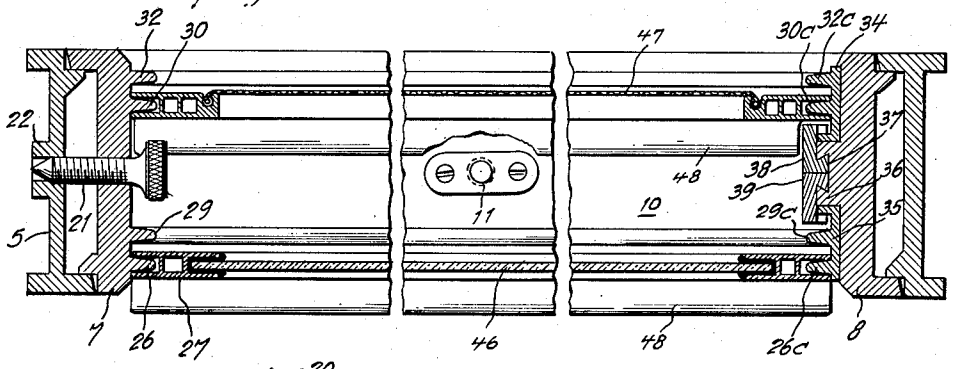


Fig. 6

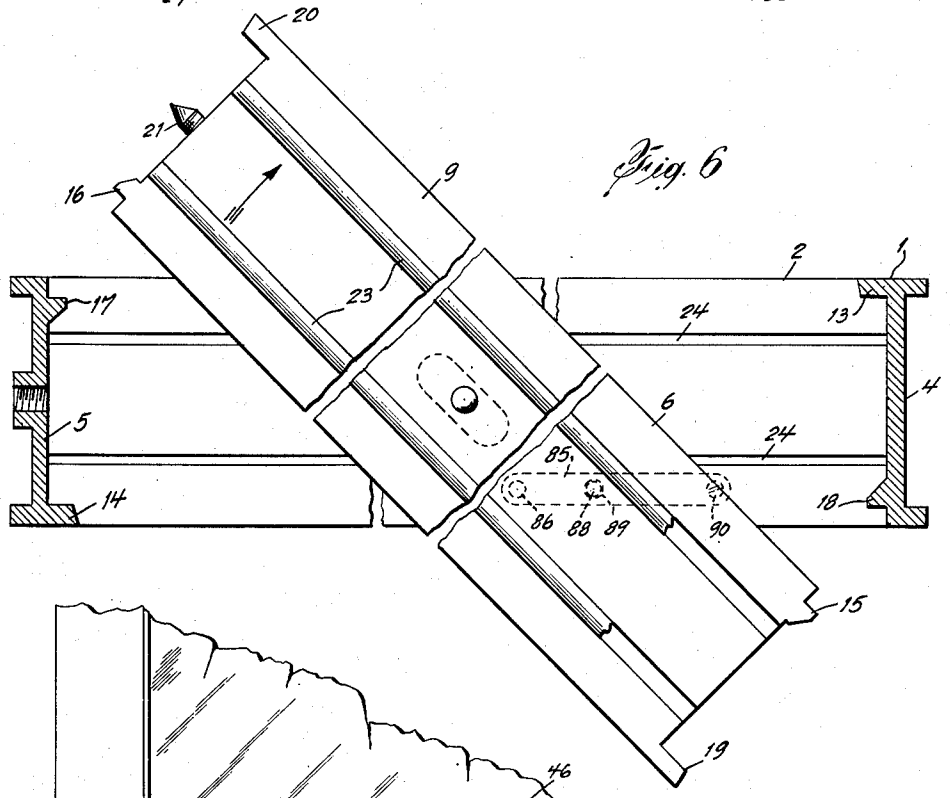
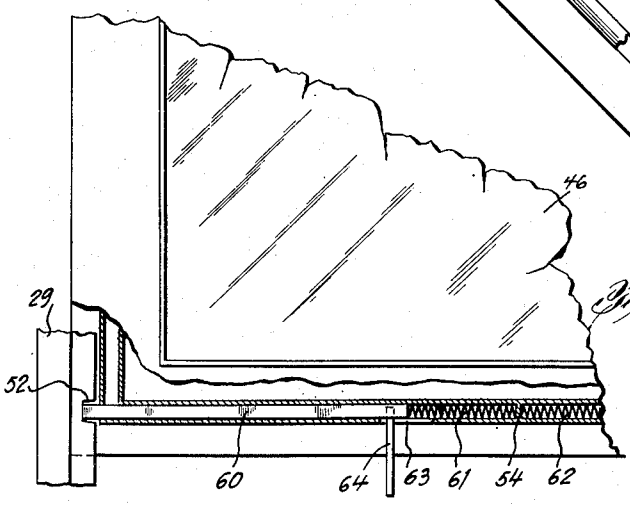


Fig. 7



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UNITED STATES PATENT OFFICE

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SLIDING WINDOW STRUCTURE

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Application December 16, 1948, Serial No. 65,650

4 Claims. (Cl. 20—52.3)

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This invention relates to window structures, and more particularly to the type of window disclosed in my co-pending application Serial No. 700,394, filed October 1, 1946, and which is now Patent No. 2,560,196, patented July 10, 1951.

In the above-entitled application is disclosed a window provided with a sash-supporting frame of two-part construction and wherein an inner frame within which the sashes are carried, is rotatively mounted on a vertical axis within an outer frame having a part or half-section that is hinged at one edge to the stationary frame which defines the window opening. Such a structure contemplates the provision of means by which the entire window may be readily removed from the window opening or stationary frame, as a unit, as well as permitting a pivotal or rotative movement of the sash-supporting frame to bring either side of the sashes within the room to facilitate cleaning of the windows, the replacement of a broken pane or the introduction of storm sashes or screens at the required times.

The present invention provides for a means having all of the advantages found in the structure of the above-entitled application, and in addition numerous other advantages are offered, including a simplification of construction, a decrease in weight, a reduction of the number of parts employed, greater economy in manufacture and greater efficiency in use.

More particularly, the invention contemplates the provision of a structure in which a single sash-holding frame is pivotal upon a vertical axis in a stationary window frame, with means which permits a pivotal or swinging movement of said sash-holding frame through an arc of approximately 170 degrees; of locking means which locates and maintains said sash-holding frame in its nested position within the stationary frame. The invention also includes novel mounting means for the sashes, including the elimination of sash weights, spring balances and other elements likely to cause inoperativeness after some time of usage.

Still another object of the invention is to provide a novel form of weatherstripping and mounting therefor, with such weatherstripping located between the pivoted frame and the stationary frame and which assures tightness of fit between the two frames while allowing ready pivotal movement of the pivoted frame.

Another object of the invention is to provide a novel means for maintaining the sash-tracks within the pivoted frame and by means of which portions of said tracks are readily removable at any time to permit the removal of the sashes.

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These and other objects are attained by the invention, a more particular description of which will be hereinafter set forth and pointed out in the claims appended hereto.

In the accompanying drawings, wherein an illustrative embodiment of the invention is disclosed,

Fig. 1 is a front elevation of the improved window construction, looking at the same from the inside of a room;

Fig. 2 is a sectional view taken on the line 2—2 of Fig. 1, looking in the direction of the arrows;

Fig. 3 is a sectional view taken on the line 3—3 of Fig. 1, looking in the direction of the arrows;

Fig. 4 is a side elevation of the pivotally-mounted sash-holding frame;

Fig. 5 is a sectional view, taken on the line 5—5 of Fig. 1, looking in the direction of the arrows;

Fig. 6 is a top plan view of the sash-holding frame with parts of the stationary frame shown in section, the sash-holding frame being shown in a partly open or pivoted position;

Fig. 7 is a detail view, showing a portion of one of the upper sashes and the locking means by which the same is supported in any selected open position;

Fig. 8 is a sectional view showing the window lock, the section being taken on the line 8—8 of Fig. 1, looking in the direction of the arrows;

Fig. 9 is a sectional view taken on the line 9—9 of Fig. 1, looking in the direction of the arrows;

Fig. 10 is an exploded view, with parts in section, of a portion of the sash-holding frame, a part of one of the sash-guides and a part of one of the slidable locking plates therefor, and

Fig. 11 is a detail view of portions of the stationary and movable frames showing the means for locking the movable frame in its open position.

Referring to the drawings, 1 indicates generally the fixed or stationary frame of the window, the same being mounted in an opening in the wall or other part of the building in any of the well-known ways. The frame is preferably composed of extruded metal and made in the channel shape shown for rigidity and strength and ease of manufacture. Said stationary frame 1 includes a bottom member 2 and a similar top member 3, these two members being connected at their ends by the vertical side pieces 4 and 5. Mounted for pivotal or rotative movement within the stationary frame 1 is the sash-holding frame designated generally at 6. Said frame includes

the vertical side pieces 7 and 8 rigidly connected in any suitable manner at the top and bottom respectively by the top piece 9 and bottom piece 10. The rectangular frame thus formed fits closely within the stationary frame 1 and is rotatable therein to a limited extent on vertically disposed pivots. One of these pivots consists of the upper pintle 11 mounted in the top piece 9 of the sash-holding frame and rotative in the top member 3 of the stationary frame 1. The lower pivot consists of the pintle 12 mounted in the lower piece 10 of the sash-holding frame and rotatively mounted in the lower member 2 of the stationary frame 1. Through this pivotal arrangement of the inner or sash-holding frame within the outer or stationary frame it will be apparent that the frame 6 will be pivotally mounted within the frame 1 as shown in Fig. 6.

It will be noted that the vertical side member 4 of the stationary frame 1 is provided at its forward end with a flange 13, while a similarly-shaped flange, indicated at 14 is provided at the rear of the vertical member 5 of the stationary frame. The inner sides of these two flanges form shoulders which serve as abutments or stops for ribs indicated respectively at 15 and 16 and located on the opposite edges of the sash-holding frame 6, to not only limit the rotative movement of the frame 6 within the frame 1, but also provide a weather-tight joint between the two frames at these points. Provided at the forward end of the frame side member 5 is an angular flange 17, while a similarly-shaped flange, indicated at 18 is provided at the rear end of the member 4 of the frame 1. These flanges 17 and 18 form shoulders which serve as stops for the projecting ribs 19 and 20 provided at the edges of the frame 6 as clearly seen in Figs. 5 and 6. The arrangement above described is such that when the frame 6 is in its nested position within the stationary frame 1, the rib 20 will be in abutment with the flange 17; the rib 15 will abut against the inner side of the flange 13; the rib 16 will abut against the flange 14 and the rib 19 will be in abutment with the flange 18. The arrangement and shapes of the several ribs and the flanges against which the same abut are such that a rotative movement of the frame 6 in one direction is permitted through an arc of approximately 170 degrees, or until the rib 20 comes into contact with the outer surface of the flange 13. When the sash-holding frame 6 is in its nested position, or that in which it is surrounded by the stationary frame 1, it is locked in that position by means of the threaded locking pin 21 which extends through the frame member 7 and is received in the internally-threaded boss 22 provided in the vertical side member 5 of the stationary frame 1. When the sash-holding frame is located in the above position, a seal between its lower member 10 and the lower member 2 of the stationary frame 1 will be effected by means of springy weather-strips 23 entering grooves 24 provided in the upper face of the lower frame member 2. Each of said weather-strips 23 consists of an elongated section of substantially V-shaped spring metal which has one longitudinal edge fixed in a recess 25 in the lower face of the frame member 10, and its other edge free to permit expansion or flattening of the strip within said recess. When the frame 6 is moved to its nested position, these resilient strips 23 will enter with a snap engagement into the recesses or grooves 24 and act as a seal between the lower frame elements 10 and 2. The weather-strip construction just described is duplicated at the top of the two frames 6 and 1 and similar reference characters have been applied to similar parts of said structure at the top of the window.

In the embodiment of the invention shown, the resilient weather strips 23 are indicated as being located in the grooves 25 carried by the sash-holding frame, and the grooves 24 for the reception of these strips are provided in the stationary frame. This arrangement, may if desired, be reversed. That is to say, the strips 23 can be mounted in the stationary frame 1 and the grooves 24 for the reception of such strips can be provided in the movable or sash-holding frame 6. It will also be noted that while these weather-strips are shown as being provided only at the top and bottom of the frames, they may be arranged at the sides also, or in fact, arranged to extend completely around the frames.

Formed on the inner face of the vertical side member 7 of the sash-holding frame 6 is a pair of guide ribs or sash tracks, that indicated at 26 constituting the guiding track for the inner lower sash 27, while that indicated at 29 constitutes the guiding means for the inner upper sash 28. The top piece 9 of the sash-holding frame 6 is provided with ribs or tracks corresponding to those shown at 26 and 29, these top ribs being respectively indicated at 26*a* and 29*a*. Similarly, the bottom member 10 of the frame 6 is formed with the ribs or tracks 26*b* and 29*b*. For the reception of screens or storm sashes, the vertical frame member 7 is formed with the guiding rib or track 33, receiving the lower screen or storm sash 31. A similar rib or track 32 guides the upper screen or storm sash 33. Corresponding ribs 30*a* and 32*a* are formed on the top member 9 of the sash-holding frame 6, while the bottom member 10 is formed with the ribs 30*b* and 32*b*. The above-described structure will be clearly noted in Fig. 2.

The guiding ribs or tracks provided for the sashes on the vertical side member 8 of the pivoted-sash-holding frame 6 are removable, thereby permitting ready removal of the several sashes or screens. The guiding means for the inner sashes 27 and 28 consists of an elongated strip or track plate 35 formed with the ribs 26*c* and 29*c*. A similar strip or track plate 34 receives the outer screens or storm sashes 31 and 33, said strip or plate being formed with the guiding ribs or tracks 30*c* and 32*c*, as seen in Fig. 5. These two plates 34 and 35 are separated by a parting strip 36 formed on or attached to the vertical frame side member 8, and said parting strip 36 is formed with a dovetail or undercut groove 37. Locking plates, indicated respectively at 38 and 39, are mounted for slidable movement in the groove 37. The construction of these locking plates and associated parts will be noted in Fig. 10.

Each of the locking plates 38 and 39 is formed along one edge with a half-dovetail flange 40 fitting in the groove 37, and at its opposite edge, the plate is formed with a plurality of spaced lugs 41. When it is desired to remove the guide strips 34 and 35, and thus permit of the removal of the several sashes out of the frame 6, these lugs may be registered with notches or cut-outs 42 provided in a flange 43 on each of the guide or track plates 34 and 35. To facilitate vertical sliding movement of the locking members 38 and 39 in the groove 37, finger-pieces in the form of projections or angle members 44 are provided on said locking members.

In the normal position of the parts just described, the lugs 41 are engaged behind the flange 43 at points between the notches or cut-outs 42 in said flange. Such engagement tends to hold the guide strips 34 and 35 against the face of the vertical frame member 8 so that said guide strips are then, for all intents and purposes, maintained as a part of the frame member 8. When it is desired to remove the sashes from the frame 6, the projections or angle members 44 are forced upwardly to thereby cause the locking plates 38 and 39 to be raised to an extent required to align the lugs 41 thereon with the notches 42 in the guide strips 34 and 35. This will then permit the guide strips 34 and 35 to be moved laterally or out of the frame 6 and the sashes thereupon removed. The re-installation of the sashes, or their initial placement in the frame 6, is done by reversing the steps just described.

While I have herein stated that the locking plates 38 and 39 are required to be raised or elevated to align the lugs 41 thereon with the notches 42, it will be apparent that the parts may be arranged so that a lowering movement, instead of a raising movement, is required to align the lugs and notches and permit removal of the guide strips or tracks.

The several sashes employed in the window are generally of similar construction as far as their frames are concerned, each of the sashes having its frame composed of light weight extruded metal and having its edge provided with a channel 45 closely, but slidably, fitting the ribs or tracks 26, 29, 30 and 32 which it embraces. The inner sashes 24 and 27 are provided with the panes 46, while the outer sashes 31 and 33 may be provided with the screening 47 or with glass panes if the outer sashes are used as storm sashes. Each of the lower sashes 27 and 31 is provided on its lower rail with the inwardly extending flange 48 constituting a lifting means for aid in raising the sashes. Said lower rail of each of these sashes is hollow to provide a tubular passage 49 in which a pair of slidable bolt members 50 and 51 are located. The bolt member 50 normally has one of its ends projecting out of the end of the lower rail of the sash for engagement with any selected one of a number of notches 52 provided in the rib 26. Similarly, the bolt member 51 has its end projecting out of the opposite end of the lower rail of the sash for engagement with like notches 52 formed in the rib 26c. The bolt member 50 is spring-pressed into its projected position by means of the coil spring 53 contained within the passage 49 and having one end bearing against the inner end of the bolt member 50 and its opposite end bearing against a wall or partition 54 extending across the passage 49 on the inside of the lower rail of the sash. The bolt member 51 is similarly spring-pressed by means of a coil spring 55, similar to that shown at 53, and having one end bearing against the inner end of the bolt member 51 and its opposite end bearing against the wall or partition member 54. Each of the bolts 50 and 51 is provided with a finger-piece 56, attached to the bolt by the screws 57 and projecting through a slot 58 in the lower rail of the sash. It will be clear that by moving the two finger-pieces 56 toward one another, the two bolt members 50 and 51 will be drawn inwardly or toward one another and thus freed from engagement with the notches 52 with which they may have been engaged at the time, and while

the bolts are thus held in their retracted positions, the sash can be raised or lowered and then set in any position desired, by release of the bolts 50 and 51, to permit the same to engage the notches 52 located at the point of stoppage of movement of the sash.

The upper sashes 24 and 33 are operated in a somewhat similar manner. That is to say, the lower rail of each of these sashes contains two spring-pressed bolts, one of which is shown at 60 in Fig. 7. These bolts are pressed outwardly by the springs 61, 62, to the extent permitted by the slots 63. The bolts, when outwardly projected, can engage with any of the notches 52 formed in the ribs 29 and 30 in the manner explained with respect to the lower sashes. The finger pieces 64, employed for the manipulation of the bolts 60 in the upper sashes, are in the form of rods which extend downwardly from the bottom of the lower rails of these sashes and thus do not project in a way to interfere with the movement of the lower sashes.

The lock for holding the two sashes 24 and 27 or 33 and 31 in closed position is shown in detail in Fig. 8. It will be therein noted that the lower sash of each of these pairs is provided with a sleeve 70, attached to the lower sash by the plate 71, which sleeve extends through the lower sash, and thus becomes a fixed part of the same. Mounted for slidable, axial movement through the sleeve 70 is the bolt or locking pin 72, which normally has its end 73 protruding out of the end of the sleeve 70 for entry into an aperture 74 provided in the lower rail of the upper sash. Thus when the sashes are in their closed position, as in Figs. 1 and 2, the end portion 73 of the bolt or locking pin 72 will enter the aperture 74 and prevent relative movement of the sashes.

The locking pin 72 is held in its protruded position by means of a coil spring 75 which fits around the reduced-diameter portion 76 of the pin 72 and has one end bearing against a shoulder 77 on the pin 72 and its other end bearing against the end wall 78 of the sleeve 70

Secured on the end of the reduced-diameter part 76 of the pin 72 is a knob 79 which is adapted for manual engagement to retract the locking pin or bolt or to permit of rotation of the bolt to cause the same to be held in a retracted position. Provided on the knob 79 is a pin 80 which, when the bolt is in its protruding or locking position as shown in Fig. 8, fits within a recess 81 formed in the sleeve 70 and extending substantially parallel to the bore of the sleeve 70.

When the bolt or pin 72 is in its locking position, the pin 80 fits within the recess 81. When it is desired to place the lock in its open or unlocked position and retain it in that position, the knob 79 is grasped and pulled outwardly. This will retract the locking pin or bolt 72 and draw it out of the aperture 74 in the upper sash. When the bolt is thus drawn out, the pin 80 will be drawn out of the recess 81 so that the knob can be then rotated. Rotative movement of the knob will then disalign pin 80 from the recess 81 and when the parts 80 and 81 are thus disaligned and the knob 79 is released, the end of the pin will abut against the end of the sleeve 70. This will prevent the pin or bolt 72 from protruding out of the lower sash, so that the upper and lower sashes can be moved freely past one another. A slight rotative movement applied to the knob 79 will align the pin 80 with recess 81 and permit the pin to enter the recess

and permit the bolt to be advanced by spring 75 to its protruding or locking position.

From the foregoing, the structure and operation of the improved window will be readily understood. The normal or closed position of the window is shown in Figs. 1, 2, 3 and 5. At this time it will be noted that the inner or pivotal sash-holding frame 6 is fully nested within the fixed or outer frame and the two frames 1 and 6 are held against relative movement by the locking pin 21 threadably engaging the boss 22. A weathertight joint between the two frames at the vertical sides is assured by the abutting relation of the several flanges 13 to 20 inclusive. At the top and bottom of the pivoted frame a tight connection is assured by the engagement of the resilient weather strips 23 in the grooves 24. While the parts are in this position, the several sashes may be readily opened or closed by pressure imposed on the bolt finger-pieces 56 and 64 to retract the bolt members 50, 51 and 60 out of their respective notches 52 to allow of sliding movement of the selected sashes to the desired position, when a release of pressure on the bolt finger-pieces will result in the sashes being held in such position by projection of the several bolt members into the notches located adjacent to such points of sash stoppage.

When it is desired to clean the windows or replace a pane thereof, the frame 6 can be readily pivoted to bring the outer sashes within the room by partially unthreading the locking pin 21 to free it from engagement with the boss 22, whereupon a push on the right end of the frame 6, as viewed in Figs. 5 and 6, will result in the frame 6 and sashes carried thereby swinging outwardly in the direction of the arrow in Fig. 6, through an arc of approximately 170 degrees until such swinging movement is halted by the contact of the rib 20 with the outer face of the flange 13 on the fixed frame 1.

When the sash-holding frame is in its outwardly pivoted or open position as above described, it is desirable that the same be retained in such position as long as needed while the window is being cleaned or worked upon. A locking means for holding the pivoted frame in such open position is shown in detail in Fig. 11. A leaf spring is shown at 85, attached near one of its ends to the under side of the bottom member 2 of the stationary frame by a screw 90. Adjacent to the free end of the spring 85 is provided an upwardly-extending stud 86 which projects through an aperture 87 formed in the bottom member 2 of the stationary frame. The end of the stud 86 rises above the upper surface of the frame member 2 and is normally held in position for snap engagement with a recess 87 formed in the under side of the bottom member 10 of the movable or sash-holding frame 6. Said recess 87 is so located that it will only engage the stud 86 when the movable sash is swung to its fully open position and when it so engages the sash, the sash cannot be swung until the stud 86 is freed from its engagement with the recess 87. This is done by manual pressure imposed on a button or pin 88 attached to the top of the spring 85 and extending upwardly through an opening 89 provided in the lower member 2 of the stationary frame 1. It will be clear that when the frames 1 and 6 are in their nested position, the bottom member of the movable frame will depress the stud 86 and button or pin 88, the resiliency of the spring 85 permitting its deflection when the lower member 10 rides over the top of the stud 86 and button 88. However, when the frame 6 is swung to its fully open position and the recess 87 is thus so moved as to bring it above the stud 86, it is apparent that the stud will be moved upwardly by the spring 85 to enter the recess 87 and hold the movable frame 6 in its open position. When the frame 6 is in such open position the button or pin 88 is rendered accessible since the frame 6 does not extend over and cover it at this time. Hence; when it is desired to move the frame 6 to its nested position within the stationary frame 1, the button or pin 88 can be easily reached and depressed by the finger to cause the stud 86 to be moved down and out of the recess 86.

The removal of any of the sashes is also readily done by sliding one or the other of the locking plates 38 or 39 upwardly to an extent necessary to bring its lugs 41 into registry with the notches 42 in the guide or track strip to be removed, whereupon the guide strip is movable laterally and out of the frame and the sash thereon readily taken out. Openings in the lower corners of the pivoted frame slanting down from the space between the inner and outer sashes to the outside, allow trapped water to drain out.

The structure of the various parts embodied is such that the same may, if desired, be made of readily extruded light-weight metal, and the window is easily assembled, will operate smoothly and may be very readily cleaned and repaired when necessary.

While I have described one embodiment of the invention, it is obvious that the same is not to be restricted thereto, but is broad enough to cover all structures coming within the scope of the annexed claims.

I claim:

1. In a window construction, a frame in which a sash is slidably mounted, a track fitting the edge of said sash, said track being detachable from the frame, the frame having a groove, a locking bar slidably held in said groove, said bar having spaced lugs, the track having a flange behind which the lugs project when the bar is in its locking position relative to the track, and the flange having notches with which the lugs may be aligned and through which the lugs can be passed to thereby disengage the track from its engagement by the lugs when the bar is moved to its unlocking position by sliding movement in the groove.

2. In a window construction, a frame in which a sash is slidably mounted, a track located in said frame and fitting the edge of the sash, said track being detachable from the frame, said track including a notched flange, a locking bar slidably mounted on the frame and having lugs overlying the notched flange, said locking bar being adapted to maintain the track within the frame while said notches are disaligned from the lugs, and permitting the removal of the track from within the frame when the lugs on the locking bar are aligned with the notches in the flange.

3. In a window construction, a frame, tracks carried on the inside of the frame, sashes carried and longitudinally slidable on said tracks, portions of said tracks being removable from within the frame, locking plates slidably mounted in the frame and normally overlying portions of the removable tracks to retain said portions in fixed relation to said frame, notches in the removable portions of the tracks, and means on the locking plates adapted to be aligned with the notches to permit of disengagement of the re-

movable portions of the tracks from the locking plates.

4. In a window construction, a frame composed of side members, a top member and a bottom member, sash-tracks provided on said members of the frame, the tracks disposed along one of the side members being removable and consisting of inner and outer sections, the said side member being formed with an undercut groove between said track sections, a pair of locking plates having undercut flanges located in said groove and permitting independent sliding movement of the locking plates in said groove, each of the locking plates having spaced lugs along one of its edges, each of the track sections having a notched edge behind which the lugs on one of the plates extends, the notches in the edges of the track sections permitting passage of the lugs through them when the locking plates are moved

relatively to the track sections so that said lugs are opposite said notches.

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