Jan. 16, 1934. W. T. SIMPSON ET AL 1,943,932

WINDOW

Filed June 22, 1931 4 Sheets-Sheet 1

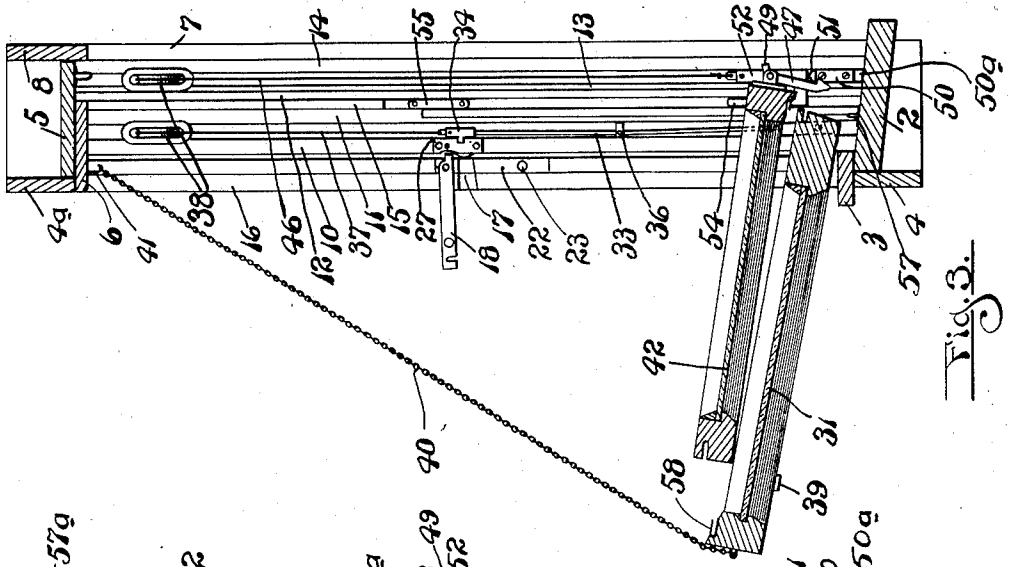


Fig. 3.

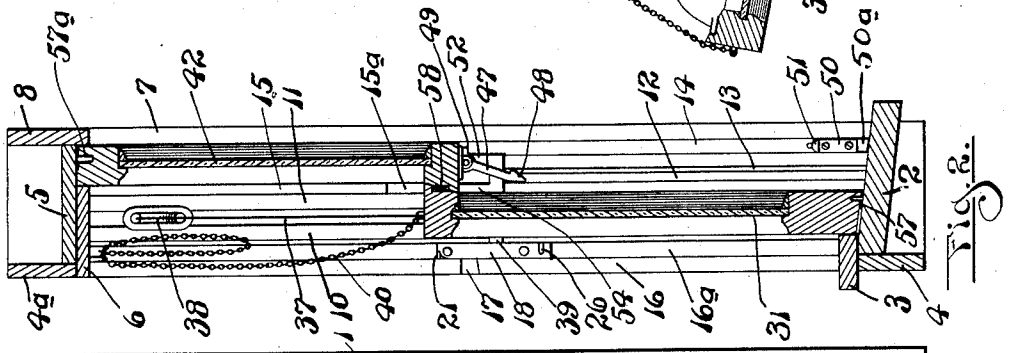


Fig. 2.

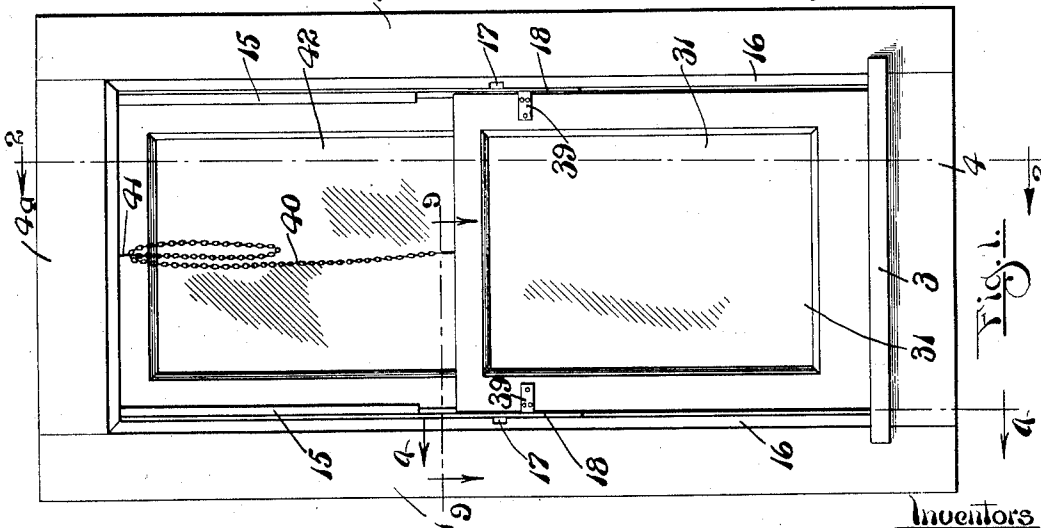


Fig. 1.

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WINDOW

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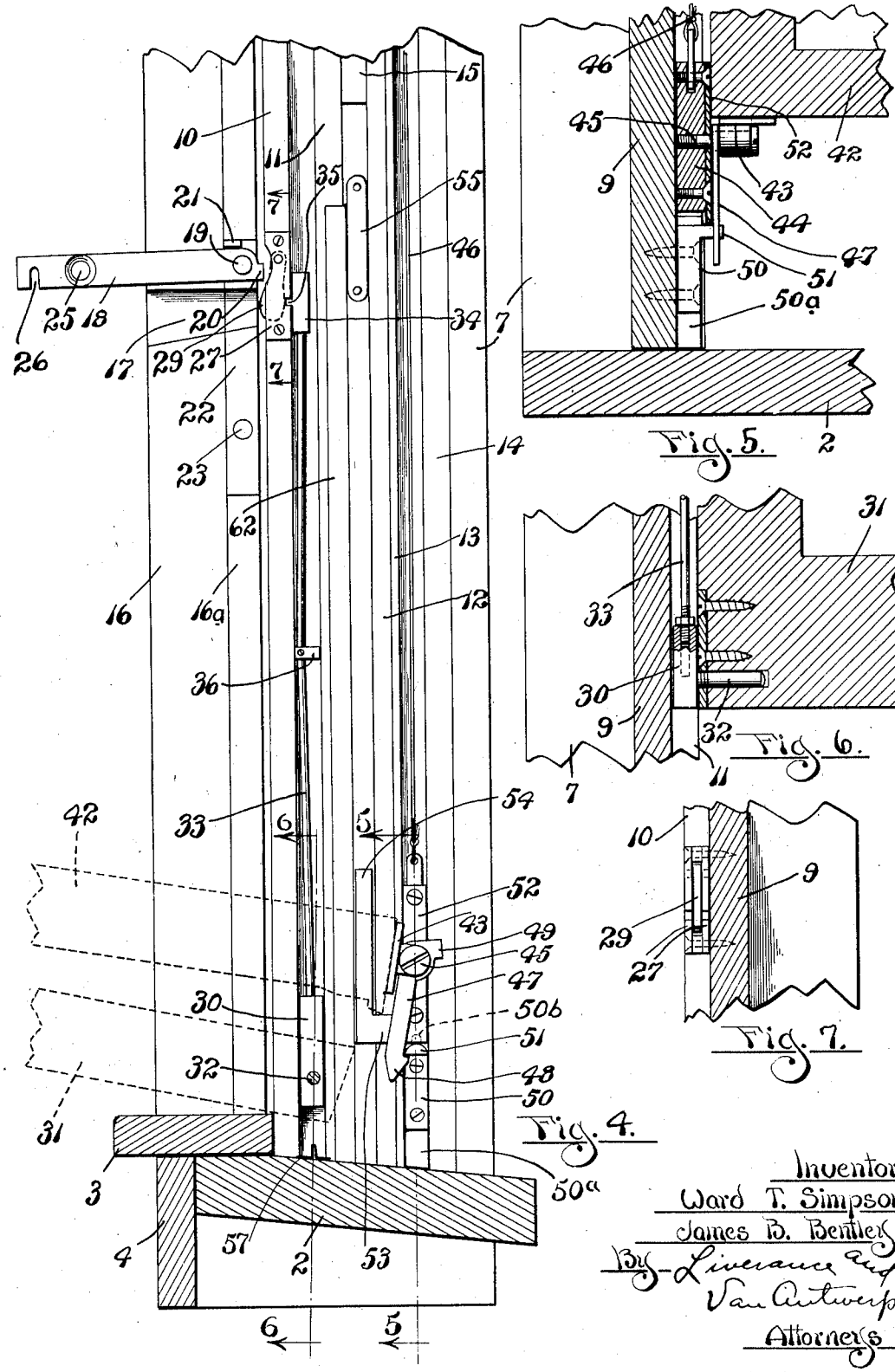


Fig. 4.

Fig. 5.

Fig. 6.

Fig. 7.

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WINDOW

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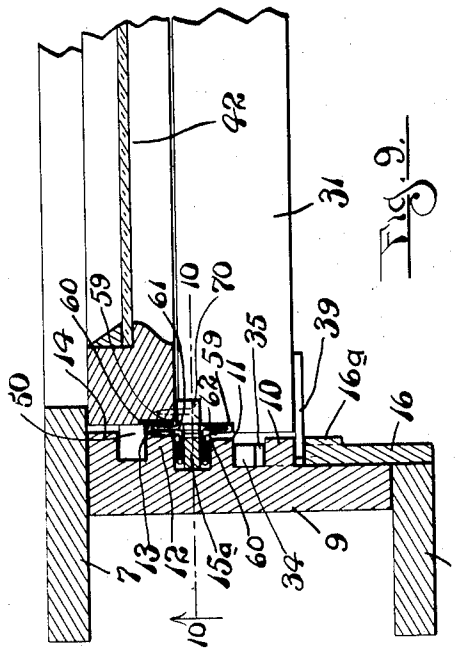


Fig. 9.

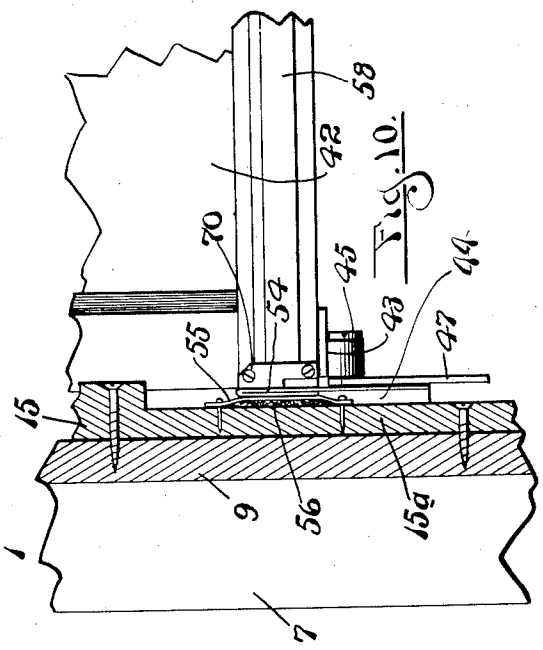


Fig. 10.

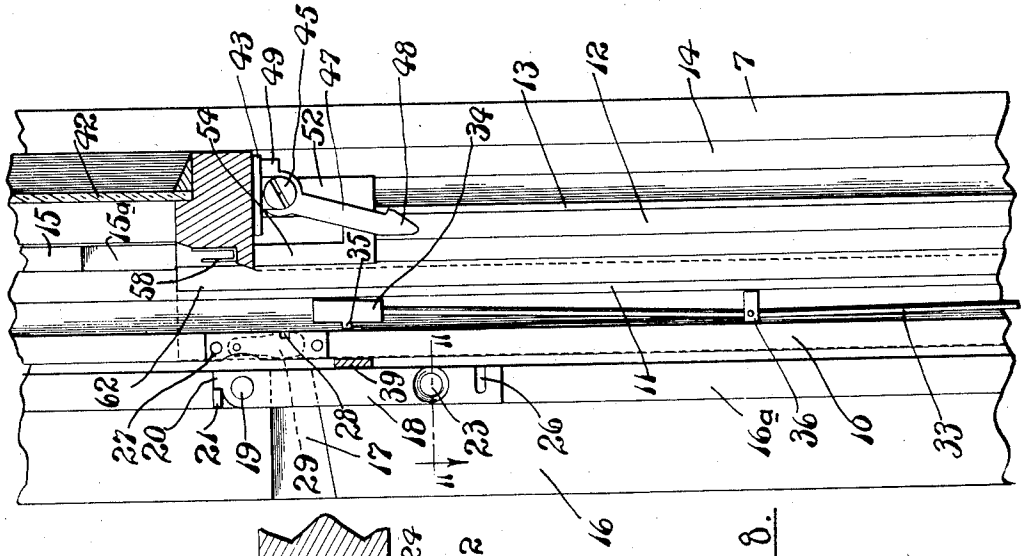


Fig. 8.

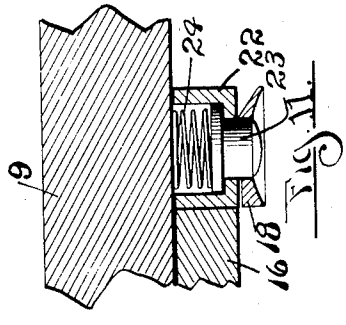


Fig. 11.

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WINDOW

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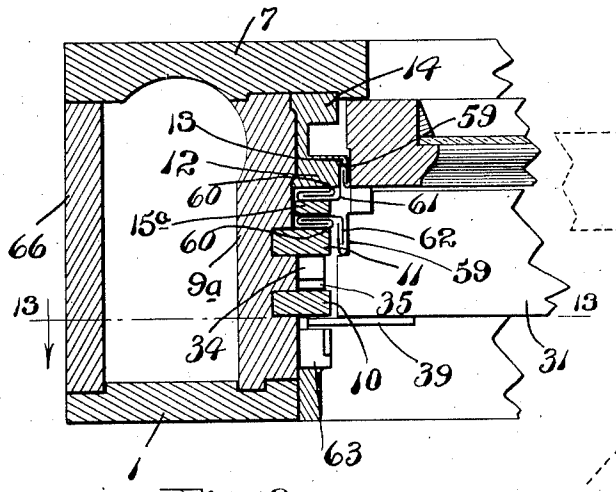


Fig. 12.

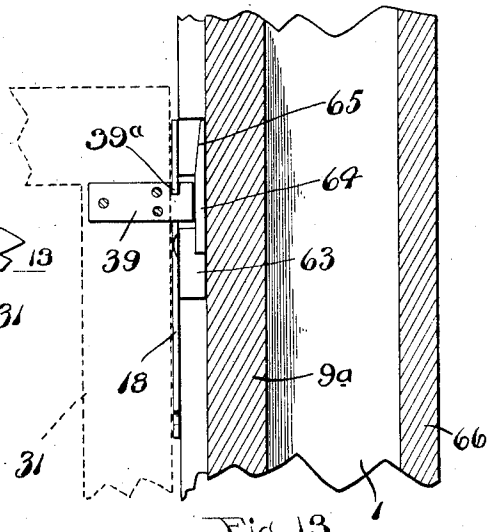


Fig. 13.

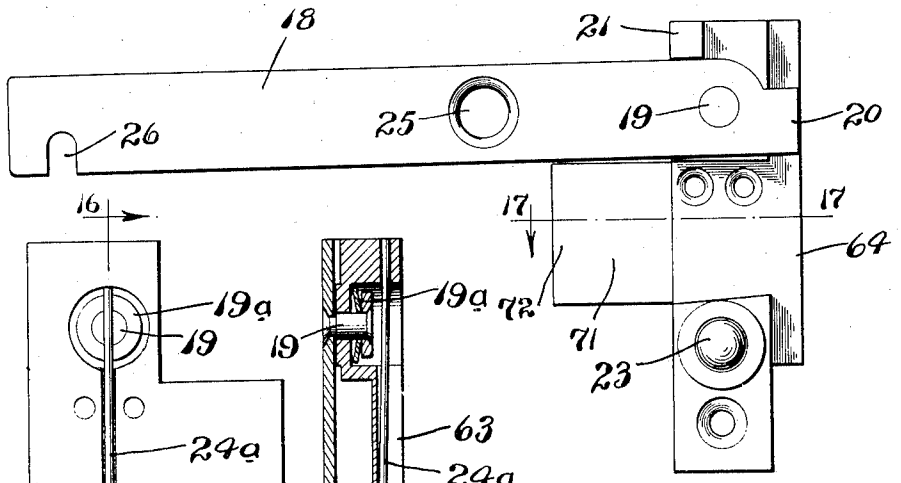


Fig. 14.

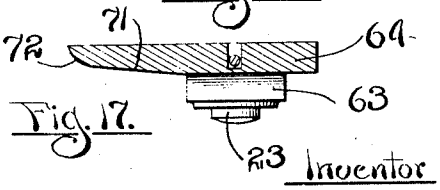


Fig. 17.

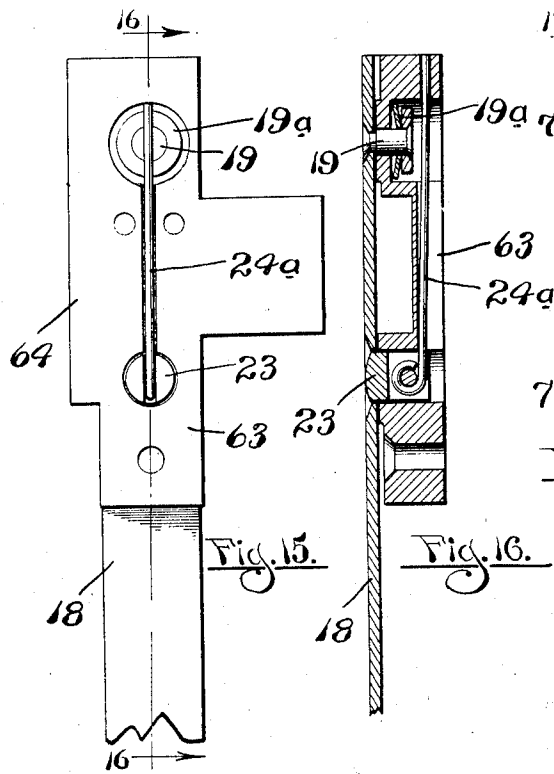


Fig. 15.

Fig. 16.

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1,943,932

UNITED STATES PATENT OFFICE

1,943,932

WINDOW

Ward T. Simpson and James B. Bentley, Grand Rapids, Mich., assignors to Henry Randel Dickinson, Grand Rapids, Mich.

Application June 22, 1931. Serial No. 545,879

33 Claims. (Cl. 20—43)

This invention relates to windows and is more particularly concerned with practical improvements in double hung windows, wherein two vertical slidable window sashes are mounted for movement past each other and in which it is designed that both sashes shall be tiltable inwardly into a room.

In windows of this character the window frame or casing is ordinarily of wood and is not only subject to swelling and shrinking in changes of weather conditions, but is also subject to inaccuracies in workmanship whereby the vertical sides of the frame are not always perfectly vertical and parallel to each other. This is also true of metal frames and the invention in the present instance is not restricted to either wood or metal frame constructions as its advantages are inherent with both. The variation in the opposed vertical sides of a window frame or casing at times equals one quarter to three-eighths of an inch.

Attempts have been made to provide double hung windows with weather stripping to prevent passage of wind, rain and dust, but such attempts have been more or less complete practical failures by reason of binding of the sliding sashes in their guideways and against the side jambs or against the weather strip members, sufficient leeway not having been possible for the necessary freedom of movement of the sashes to take care of the variations and changes in conditions due to shrinking and swelling and inaccuracies in workmanship and, at the same time, render the window weather proof.

The attempts to weather strip or weather proof the double hung, tilt-in windows have been of a mistaken character through trying to use weather strips which are designed merely for a double hung window and one which does not tilt inwardly. We have found that this cannot be done satisfactorily; and have found that the weather stripping or weather proofing means must be a part of the window itself and work in harmony therewith.

We have worked out a design which is capable of installation and operation, either with or without the weather proofing means, and in which the weather proofing means may be installed at a later time. Our invention accordingly relates to both the novel mechanism for providing a double hung tilt-in window and for weather proofing means associated therewith, and the invention is not restricted specifically to the weather proof means; as a very practical and salient part of our invention is concerned only with the novel construction of double hung tilt-in windows irrespective of whether the weather stripping and weather proofing means is used with it. One object and purpose of the present invention is to provide a window construction of the type stated wherein the window sashes or either of them may be readily moved up and down and turned on horizontal axes without binding or other detrimental results either with or without weather strips.

Another object is to provide means for completely weather stripping and weather proofing said window sashes and frame against the entrance of wind, dust, rain or the like and with a preservation of the desired easy freedom of movement of the sashes at any and all points of their travel, this being accomplished irrespective of the material from which the window frame and sashes are made.

A further object and purpose of the invention is to provide a double hung window in which both the sashes may be tilted inwardly into a room, permitting easy access thereto for cleaning and without the necessity of the person cleaning the window having to be on the outside of the building in which the window is installed, this being desirable for safety reasons especially on high buildings.

A further object is to provide a construction in which the lower sash may be tilted a short distance into a room for purposes of indirect ventilation.

A still further object of the invention is to provide a window construction with a very practical weather stripping and weather proofing means, the sashes being provided with said weather stripping at both vertical edges to engage with the window frame strips, also with weather strips at the lower edges of the lower sash and the frame sill, weather strips at the upper end of the upper sash and frame head, weather strips at the meeting rails of the sashes, and weather proofing means between the ends of the meeting rails and the window frame.

And yet a further object of the invention is to provide automatic safeguards for positively locking the pivot members of the window sashes against upward or downward movement when the sashes are tilted inwardly into a room through the employment of positive locking means for eliminating strain on the sashes and pivot members and also any slipping of one pivot higher than the other, which undesirable features always accompany pivot members held by friction means. The positive locking also assures

proper engagement of the weather strip members when the sashes are returned to vertical position.

Another object of the invention is to have a predetermined location of the pivot members when the sashes are turned on their pivotal axes to prevent damage to the sill and meeting rail weather stripping thereon and to other parts of the construction, for example, such as the lower sash engaging with the window stool thereby causing heavy strains in fulcruming thereagainst.

Many other objects and purposes than those stated with novel construction for attaining the same will be apparent upon understanding of the invention from the following description taken in connection with the accompanying drawings, in which,

Fig. 1 is an elevation of the window at the inner side thereof constructed in accordance with our invention.

Fig. 2 is a substantially central vertical section taken along the line 2—2 of Fig. 1, the sashes being in closed position.

Fig. 3 is a view like Fig. 2 with both sashes tilted inwardly.

Fig. 4 is a fragmentary enlarged vertical section and side elevation of the window frame at the lower portion thereof, illustrating the constructions used for mounting and locking the sashes when they are tilted, said sashes being indicated in inwardly tilted position in dotted lines. This view is taken along line 4—4 of Fig. 1.

Fig. 5 is a fragmentary vertical section of the lower outer portions of the window frame and the upper sash, with the sash in its lower locked position which it occupies when it is to be inwardly tilted, and further showing the manner in which the upper sash is pivotally mounted. This view is taken substantially along the plane of line 5—5 of Fig. 4.

Fig. 6 is a similar fragmentary section showing the manner in which the inner lower sash is mounted on its pivots. This view is taken substantially along the plane of line 6—6 of Fig. 4.

Fig. 7 is a fragmentary vertical section and elevation taken along the plane of line 7—7 of Fig. 4 and illustrative of the automatic control for the latching means associated with the lower sash.

Fig. 8 is a fragmentary vertical section and side elevation of the window frame construction similar to that shown in Fig. 4 with the parts in the positions they occupy when the window is closed.

Fig. 9 is a horizontal transverse section substantially on the plane of line 9—9 of Fig. 1 looking in a downward direction showing the tongues formed by cutting grooves in the jamb below the jamb surface. The irregular line formed by joining the free inner edges of tongues 10, 11, 12, 13 and 14 constitutes the jamb surface or face.

Fig. 10 is a fragmentary vertical section, substantially on the plane of line 10—10 of Fig. 9.

Fig. 11 is a fragmentary horizontal section substantially on the plane of line 11—11 of Fig. 8.

Fig. 12 is a fragmentary horizontal section similar to that shown in Fig. 9, illustrating a modified and preferred form of construction showing how a frame is built up of several pieces, thus avoiding the stresses and strains caused when making or machining a number of grooves in one side of a piece of wood. This built up frame in no way detracts from the statement that the jamb surface is the surface touching the sash. This drawing also shows a construction by means of which the lower window sash is automatically centrally positioned to properly tilt inwardly when moved to position for inward tilting.

Fig. 13 is a fragmentary vertical section on the plane of line 13—13 of Fig. 12.

Fig. 14 is a side elevation of a constructive detail of mechanism utilized for the purpose of properly positioning the lower window sash for inward tilting and for carrying bars to engage with and hold the lower window sash in partly inwardly tilted position and with the several parts in window locking position. This part has other functions also, viz: horizontal guideway, locates locking mechanism of lower sash, guides sash and prevents vertical movement until it is locked. In the closed position of the arm it forms a continuous groove and prevents tilting of window.

Fig. 15 is an elevation from the opposite side with the several parts in such a position as to allow the window to freely slide up and down and to prevent its tilting action. In this position it also holds the lower sash mechanism out of engagement.

Fig. 16 is a view in cross section taken along the plane of the line 16—16 of Fig. 15.

Fig. 17 is a cross sectional view taken along line 17—17 of Fig. 14.

Like reference characters refer to like parts in the different figures of the drawings.

The window frame is of rectangular shape having inner vertical casings 1, a lower sill 2 and a stool 3 below which is a depending apron 4. At the upper end is a head jamb 5, head trim 6, at the outer side a blind stop 7 across the upper ends of which is a horizontal stop 8, while at the inner side is a head casing 4*a*. The vertical side jambs 9 of the window frame between which the sashes are located are recessed vertically at spaced apart points defining and forming tongues 10, 11, 12 and 14, and the tongue 12 is cut away as shown in Fig. 9, forming a projecting rib 13, the edge of which is in the same vertical plane with the inner side of the tongue 14, and forms a support for the intermediate strip 61, against the engaging thrust when the upper sash is returned to vertical position after tilting.

The side jambs 9 (Fig. 9) are thicker adjacent their outer portions where the upper outer sash is located, and the free inner edges of the tongues 10 and 11 are in the same vertical plane, the recessed part of the tongue 12 extends a fraction of an inch ($\frac{3}{32}$'') farther in than tongues 10 and 11 and the tongues 13 and 14 extend a fraction of an inch farther in than the recessed part of tongue 12. In the vertical recess between the tongues 11 and 11 weather stripping members are adapted to be located associated with said tongues and a parting stop 15, which at its upper portion is widened for a predetermined part of the length of said parting stop, thus holding the upper sash against inward tilting movement until it has been moved to a predetermined lower position. It is held at all times from outward tilting movement by the blind stop 7. The lower and thinner section 15*a* of the parting stop is outside of the path of the upper sash when it is turned inwardly on its pivots. When said sash is passing under the thicker portion of 15, this keeps said sash 42 from an upward movement until

the latch 47 is engaged, likewise when the upper sash is being swung up into vertical position from an open position this prevents any upward motion until the latch 47 is disengaged and the sash has passed under the thicker portion of 15.

At the inner side and adjacent the inner edge of each side jamb 9 a vertical stop 16 is secured which is somewhat thicker at one portion, as indicated at 16a (see Fig. 9). The stops 16 are spaced from the tongues 10 by narrow vertical slots forming vertical guideways, as will later be described, to hold the lower sash against inward turning movement until determined or predetermined position. Tongue 10 prevents the lower sash from turning outwardly at all times. And the stops 16 have substantially horizontal grooves 17 cut therein at a point slightly below the upper rail of the lower sash when said sash is in closed position. These grooves 17 which extend through part 22 are wider at one end than at the other as shown.

Pivotally mounted adjacent to the vertical guideway between 16a and tongue 10 and horizontal guideway 17 is a flat metal bar 18 carried on a pivot 19 which extends into member 22 which is set in the thickened portion of the stop 16a substantially flush therewith, which contains spring tension means 19a for holding said bar 18 against member 22, thereby setting up friction which resists the turning of bar 18. The bar 18 adjacent said pivot 19 at one end is formed with a short projecting finger, 20.

It will be understood that when the bars 18 are unlatched and turned to horizontal position, having sufficient clearance to clear stop 16, the fingers 20 extend across the narrow slots between the stops 16a and the adjacent tongues 10, and form an obstruction in the vertical guideway blocking the upward movement of the lower sash beyond a predetermined point until the bars 18 are locked vertical as in Fig. 8, which closes the horizontal passage 17 and forms a continuous vertical guideway.

The bars 18 may be turned to horizontal position as in Fig. 4 or until they engage against the stops 21 which project inwardly from the upper end of member 22. A spring actuated automatic latch 23 normally pressed outwardly by spring 24, Fig. 11, projects through the member 22 and through an opening 25 in the bar 18 when the bar is in its vertical position as shown in Fig. 11, and farther out, adjacent its free end, as shown in Figs. 4 and 8, is a transverse notch or slot 26 which opens downwardly when the bar 18 is turned to horizontal position as in Fig. 4.

Directly in line with each of the grooves 17 and inset flush in the tongues 10 are spaced apart plates 27. Each plate 27 at its edge opposite the end of the groove 17 has a substantially square notch 28 cut therein (Fig. 8). A flat metal member 29 is pivotally mounted between the plates 27 (Fig. 7) at its upper end so as to normally hang freely in the position shown in dotted lines in Fig. 8, but which may be swung about its pivot to occupy a different position as shown in Fig. 4. With the bars 18 positioned vertically as in Fig. 8 and with the swinging member 29 in the dotted line position as there shown each narrow slot between a stop 16a and a tongue 10 is free and unobstructed.

It is to be understood that in describing one side of the window frame with its bar 18, groove 17, plates 27 and member 29, the same description holds good for the opposite side of the window frame as the two sides thereof are made as opposites but function as duplicates of each other in all respects.

The vertical groove between the tongues 10 and 11 at the inner side of each of the vertical side jambs 9 forms a guideway for the lower sash mounting blocks 30 between which the lower sash 31 is located and to which it is pivotally mounted by means of horizontal pins 32 projecting from the blocks as shown in Fig. 6, the pivot pins 32 extending through a metal plate into the lower rail of the sash. Each block 30 has a rod 33 attached at its upper end which extends nearly vertical at an angle of a few degrees away from the sash 31 to insure non-interference of the rod and parts attached thereto with the sash. A block or head 34 is attached at the upper end of each rod 33 on one face of which is a projection 35 shaped and of a size that it may be received in the notches 28 of the metal plates 27. The rods 33 are bowed or bent substantially midway between their ends and each carries a member 36 (Fig. 4) which at its free end slides against the side of the adjacent tongue 11, thereby bending and springing each rod 33 and causing the projections 35 on heads 34 to bear with a yielding pressure against the adjacent side of the guide tongue 10, whereby when free to do so, the tongues 35 automatically enter the notches 28 upon reaching the same.

To adjust the lower sash pivot members 32 so that the sash 31 may turn freely, each block 30 is internally screw threaded at its upper end to receive the threaded portion of the rod 33, as indicated in Fig. 6, and locked with a lock nut. To adjust the pivot members the block 34 is pulled out of its guideway far enough to screw the rod 33 in or out of the block 30, care being taken that the rod 33 is not unduly sprung. We have found in practice that the adjustment can be done by permanently attaching the block or head 34 to the rod and using a fine threaded screw for attaching the pivot blocks 30 to the rods.

A cable 37 is secured at the upper end of each block or head 34 (Fig. 3) extending upwardly therefrom and over the usual sash pulley 38 mounted in the side jamb 9, and the cables are equipped with sash weights at their opposite ends in the usual manner to help balance the weight of the sash.

A flat member or finger 39 of metal is secured at each side of the lower sash 31, having a free end portion which extends into the adjacent narrow slot between stop 16 and the adjacent tongue 10 for guiding the lower sash in its vertical movements and normally holding it from inward tilting, and always holding it from outward tilting, such inward tilting being possible only when the members 39 are moved so that their projecting free end portions come directly in line with the grooves 17 in the stops 16 and 16a and in the metal bar members 22. And it will be noted that the grooves 17, which serve as passages and guides for the projecting ends of the members 39, are cut through the stops 16 at a point slightly below the upper rail of the lower sash when the sash is in closed position, so that it is necessary to raise the sash a short distance above its lower closed position in order that the ends of the members 39 may be brought to the grooves 17; and in thus raising the sash to such position the projections 35 on the head blocks 34 at the same time are brought to the notches 28 in plate 27.

Then by turning the bars 18 outwardly and

upwardly to the position shown in Fig. 4 the lower sash may be tilted inwardly by passing the projecting ends of the members 39 through the grooves 17. The grooves 17, adjacent the vertical guideway between the tongue 10 and the stop 16*a*, has a smaller clearance for the passage of the projecting ends of members 39 than the notch 28 in plate 27 has for the entrance of projection 35 on block 34, thus insuring the registering and the free entrance of projection 35 whereupon the projections 35 act in said notches 28 on plates 27 and move the pivotal plate 29 to the position shown in Fig. 4. When the lower sash is returned to its vertical position the ends of the fingers 39 bear against the adjacent edges of the member 29 and automatically force the projections 35 out of said notches 28 and release the lower sash for sliding movement, it having been locked against sliding movement by reason of the latch engagement of projections 35 in notches 28 during the time that the lower sash is at inwardly tilted position.

The lower inner sash has one end of a chain 40 attached thereto which is connected at its opposite end to a hook 41 depending from the head trim 6 in the window frame construction, whereby, when the sash is tilted to its lowermost position, as in Fig. 3, the chain limits the distance that the sash may be lowered. Of course by connecting any intermediate part of the chain with the hook 41, as in Fig. 2, the chain may not only be pulled up out of the way when the window is closed, but becomes useful to limit the inward tilting movement of the lower sash for ventilation. This also protects the lower sash from inadvertently falling inward. The hook 41 is relatively high and generally out of the reach of all except window cleaners and if an intermediate length of the chain is engaged therewith there is little likelihood of it being disconnected. Then should the lower inner sash be raised a short distance such that the fingers 39 were in conjunction with the grooves 17 and the bars 18 be left in their horizontal position, on blowing in of the sash from gusts of wind or for any other reason too far inward movement of the sash is guarded against by hooking the chain with the hook 41 in the manner shown in Fig. 2. This insures against damage to the sash or any injury to an occupant of the room.

The lower sash may also be held at an inner position for ventilation by engaging the notches 26 in the arms 18 with notches 39*a* in the projecting ends of fingers 39, this being many times desirable as is evident.

The upper outer sash 42 has a bushing member 43 (Fig. 5) secured at its lower edge adjacent each side. A block 44 is located between the tongues 12 and 14 on each side jamb 9 of the window frame. Pivot bolts or rods 45 pass through the bushings 43 and connect to the blocks 44. Cables 46, connected to the upper ends of the blocks 44, extend upwardly over other sash pulleys 38, which cables are likewise equipped with sash weights to balance the weight of the sash. The upper and outer sash 42 slides between the blind stops 7 and the parting stops 15, but on moving the sash 42 to its lowermost position, the upper rail of said sash is brought even with or slightly below the thicker portions of the parting stops 15 whereupon the upper sash is permitted to tilt inwardly into the room.

A latching bar 47, equipped with a latching hook or head 48 at its free lower end, is pivotally suspended from each of the rods or bolts 45 and at its upper end, is provided with a horizontal projection 49 lying under the lower rail of the sash, whereby, normally, when the sash 42 is in vertical position, the latching bars are held out of latching engagement (Fig. 8) with latch pins carried on each side or near the lower ends of the side jambs 9.

The latch pins 51 project horizontally from vertical metal bars 50, as shown in Fig. 5. Bars 50 serve as lower limit stops for the blocks 44, carrying the sash 42, and determine the lowermost position to which said sash can be lowered. Bars 50 are supported vertically by blocks 50*a* and are fastened to jamb 9; and in practice, in order that the upper sash may turn freely on its pivots and have a free path of movement in installation, suitable shims may be inserted between the bars 50 and the blocks 50*a* to adjust for this purpose. As shown in Fig. 4, the pivot stop 50 is provided with a male member at its upper end to engage with a female member in 44, indicated in dotted outline at 50*b* (Fig. 4), thereby properly centralizing and bringing the latches into proper vertical relation with the latch pins 51. This is necessary for the low cost and quick installation as well as an assurance for proper mechanical functioning.

The clearance between the top rail of sash 42 and the thicker portion of parting stop 15 being less than the clearance between locking head 48 on latching bar 47 and projecting latch pins 51 always insures the horizontal registering and free engagement of locking head 48 and latch pins 51.

When the upper sash is turned inwardly it releases the fingers 49, and the latch heads 48 which have passed by the pins 51 automatically turn to engage thereunder; but when the sash 42 is returned to vertical position it acts upon the projections or fingers 49 to automatically turn the latch bars 47 and disconnect the latching heads 48 from the pins 51.

At the inner side of each block 44 a U-shaped member of flat metal is secured, having vertical legs 52 permanently connected to the inner side of its member 44, a horizontal inwardly extending lower connecting section 53, and a second vertical leg 54 which is located in the groove between the tongues 11 and 12. The upper end of leg 54 is return bent upon itself to increase the thickness as shown in Fig. 10. Secured to the inner side of the reduced sections 15*a* of the parting strips 15 and out of the path of the upper sash are flat metal plates 55, the intermediate portions of which are raised and spaced from the parting strips to which they are attached. The spaces between the same are filled with any suitable cushioning material, indicated at 56, which is of a compressible nature whereby, when the upper sash is in its uppermost position the upper ends of the legs 54 are between the members 55 and the blocks 70 attached to the upper sash at the ends of the meeting rails, providing a snug fit therewith which holds the upper sash against any sidewise movement which might be productive of undesired noises, as rattling and the like, and discrepancies in dimensions either due to shrinking or swelling, are compensated by the compressible padding 56 which will compress when necessary or expand so as to always maintain the plates 55 in snug engagement with the upper ends of the legs 54 and the blocks 70.

These blocks 70 are set flush to the upper sash weatherstrip 59, and when the window is in

a closed position fill the space at the ends of the lower sash meeting rail, caused by cutting away the ends of said meeting rail to provide clearance when sliding the sash 31 vertically past the upper thicker portion of the stop 15. The lower outer corner of block 70 adjacent to member 54 is recessed as shown in Fig. 10, to allow clearance for latch member 47 when sash 42 is in full tilt position, and the upper inner corner of block 70 is cut out on an angle for the purpose of using the camming action of said angle with the end of the lower sash meeting rail weatherstrip 58 in centralizing said meeting rail and attached weatherstrip 58 when moving the sashes to closed vertical position. Parts 54, 55, 56 and 70 work in conjunction in the manner described above an centralize the meeting rails between the jambs when the sashes are in closed position, and are very important in obviating the entrance of wind, dust and the like.

Weather stripping the window is readily accomplished. The lower rail of the lower sash 31 is grooved to fit over suitable weather strips 57 (Fig. 2) carried on the sill 2. The meeting rails of the two sashes are readily weather stripped by U-shaped engaging weather strips 58 which are separable on a vertical movement of the sashes. The upper rail of the upper sash 42 is grooved so as to fit over suitable weather strip 57*a* carried by the head jamb 5. The vertical sides of the sashes have U-shaped weatherstrips attached, the lower sash strip 59 engaging with intermediate weatherstrip member 62 provides for a free engaging and dis-engaging movement of the weather strips 59 and 62 when the sash 31 turns on its axis. The intermediate strip 62 engages with a jamb weatherstrip member 60 in a manner that provides for a free limited movement of strip 62 and sash 31 to and from each jamb 9. The strip 62 is backed up and supported by member 15*a* when the sash 31 is turning on its axis to vertical position from tilting position. The upper sash 42, having strip 59 attached and engaging with intermediate strip 61, which engages with jamb strip 60, works in a manner similar to strips 59, 60 and 62 for the lower sash, with the exception that strip 61 is backed up and supported by projection 13 on tongue 12 of the jamb 9.

Such weather stripping permits all of the necessary leeway required for the minor variations in dimensions or from the effect of shrinking or swelling or any minor discrepancies in parallelism in the side jambs 9 and the adjacent vertical sides of the sashes which is quite liable to be present particularly when wood is the material used, though use of metal does not prevent discrepancies in workmanship. The weather stripping also permits freedom of movement of the sashes for tilting purposes under all such varying conditions and at the same time completely obviates the entrance or passage of wind, rain, or dust when the sashes are in closed position.

When the window is in closed position, as in Fig. 1, the lower sash is held vertical by the fingers 39 extending into the narrow guideways between stops 16 and tongues 10 and the upper sash is held vertical and against tilting by the blind stops 7 and the wider upper portions of the parting stops 15. In such position all weather strips are in fully engaged relation to each other. In order to tilt the lower sash inwardly it must be elevated a short distance or until the ends of the fingers 39 are brought properly to the grooves 17. Such elevation disengages the weather stripping at the lower edge of the lower rail of the lower sash and the horizontal vertical-engaging weather-stripping between the upper rail of the lower sash and the lower rail of the upper sash and there can be no damage to the weather stripping at such places by reason of inward tilting movement of the sash which must be raised to disengage from the sill before the sash can turn inwardly on the horizontal pivotal axes provided for it. The upper sash is held vertical and against inward tilting movement at all times except when it has been lowered to its lowermost position in which it is brought below the upper wider portions of the parting strips 15 and in position to be latched to the pins 51 which are properly located so that when the sash is free to turn and tilt inwardly the previously inwardly tilted lower sash will not interfere therewith.

To tilt the lower sash inwardly, bars 18 must be unlatched and turned to horizontal position as shown in Fig. 4. The lower sash must be raised a short distance to bring the fingers 39 in conjunction with the horizontal grooves 17, thus freeing the weather stripping of the lower sash of the lower sill and of the meeting rails of the two sashes from each other. The sash, when tilted inwardly, passes the fingers 39 through the horizontal grooves or guideways 17. The initiation of the movement of the fingers 39 on the inward tilting of the lower sash takes them away from the pivoted members 29, whereupon the projections 35, which are in direct conjunction with the notches 28, enter the same and move the plates to the position shown in Fig. 4 and automatically latch the lower sash against any upward or downward movement. As soon, however, as the lower sash is returned to vertical position the fingers 39 press against the plates 29, force the same to the dotted line position shown in Fig. 3 and thereupon automatically force the projections 35 from the notches 28 and free the pivot blocks 30 of the lower sash so that the sash may have vertical sliding movements.

It will be noted that the vertical weather stripping is such that not only is there permitted free vertical movement of the two sashes through the sliding engagement of the weather stripping on the sashes with the intermediate stripping which in turn allows free limited horizontal movement with the weatherstripping on the side jambs 9, but each sash may be readily tilted inwardly and back again. The weather stripping 59 on the vertical sides of sashes separates or disengages on inward tilting movement from the intermediate weather stripping 61 and 62 on the jambs and is reengaged by jack-knife action on the sashes returning to vertical position. By making the said stripping 59 of lighter material than the members 61 and 62 and with which they engage, there is thereby insured free working strips, although the hook members of strips 59 may have been bent almost closed. This sometimes happens when the sashes are tilted into the room, at which time they have no protection, and if struck against in any manner may be bent and if not made out of lighter material would damage the members 61 and 62 as the sashes were returned to closed position.

The construction described is very practical and serviceable. The common and conventional sliding window of two sashes designed to slide by each other, known as double-hung, is freed of imperfections which it has had previously

such as binding or sticking and rattling by reason of looseness of the sashes in the window frame. When gusts of wind or rain strike thereagainst, there is not only a complete weather stripping of the window to exclude the same but this is accomplished with no sacrifice of complete freedom and ease of movement of the sashes irrespective of the material from which they and the surrounding window frame are made, which material may shrink or swell or not be in proper vertical parallelism and alinement, which characteristics and features of windows of this type heretofore made have laid them open to objection. One very valuable characteristic and feature of the invention is the ability to secure all of the results above stated and at the same time have the sashes both capable of tilting inwardly into a room, facilitating cleaning the glass on both sides which is very easily accomplished without the need for outside window washers. This is of importance particularly in high buildings, dispensing as it does with the need of cleaning windows at the outside of said buildings with the attendant danger to the one doing it as well as eliminating the expense of installing the necessary "safety belt" hooks and providing for their periodic inspection.

As previously stated the lower sash may be tilted inwardly only a short distance for indirect ventilation purposes, utilizing the notches 26 in the bars 18 engaging over and in corresponding notches 39*a* in guide 39 to keep bar 18 from slipping off the end of guide 39 for thereby firmly holding the lower sash in partly open ventilating position. One very valuable and, from a practical standpoint, vitally necessary feature of the construction and operation is that the sashes, when they are tilted inwardly, have their pivotal support instantly automatically latched against any upward movement. This is necessary as otherwise the sash weights used would lift the lower ends of the sashes when the sashes are tilted inwardly because part of the weight would be carried by the operator. The same is true at all times while the sashes are turning on their axes. Therefore the pivot members are firmly latched at both sides and held latched so that the sashes turn freely on fixed horizontal axes and one side of a sash cannot be lifted higher than the other and bear against the window frame and weather stripping, with binding occurring and with the possibility of injury to the weather stripping.

The automatic freeing of the pivots from said latching means when the sashes are returned to vertical positions is a further valuable feature and characteristic of the invention. Also the positive requirement that the lower sash must be elevated a short distance before it can be tilted inwardly insures against damage to the weather stripping between the sash meeting rails and also between that of the lower sash and sill.

As a result of this construction which has been devised there is low initial cost of material and parts coupled with low installation costs, great operating efficiency and increased practicability. The grooves in the vertical side jambs 9, providing space for the carrying members for the sashes, automatic locks and the like, result in the economy of space with no diminution in glass size or in the size of the side rails of the lower sash and with but a fraction of an inch reduction in the size of the side rails of the upper sash. Any inward tilting movement of either sash automatically latches it to prevent any elevation thereof until it is returned to vertical position and, therefore, when the lower sash is in its partly open ventilating position it is latched against elevation. The positive prevention of vertical movement of the pivot members when the sashes are in tilted position or are being moved to tilted position, their automatic release when the sashes are returned to vertical position, the insurance against damage to the weather stripping, the fully equipped compound freely moving weatherstrips that compensate for swelling, shrinking and misalinement of sashes and frame for a double hung tilt-in window, the means providing for indirect ventilation, the means for preventing the sashes from falling in accidentally, and the means for adjusting the pivotal axes so that the sashes must turn in a free path, all combine to make the invention one of great practical merit.

In Figs. 12 to 16, inclusive, are shown some modifications in structure which have been perfected in conjunction with the window and, particularly, for properly positioning the lower window sash 31 and centralizing it so that when the projecting ends of the members 39 come to the grooves 17 they will freely pass through the same without catching on any parts or be obstructed from freely moving in any manner. To this end metal member 22, previously described, is replaced by a similar member 63 on which the arm 18 is mounted on a pivot 19, in a similar manner and, as shown in Fig. 16, the pivot is subjected to a spring friction of the disk 19*a* so that the arm 18 will stay in any position to which turned. A modification in the construction appears in that the catch 23 is carried on a spring rod 24*a*, rather than actuated by a coiled spring 24, as shown in Fig. 11.

One major addition or modification however, consists in extending the member 63 into and across the groove in which the projecting end of the member 39 rides in the form of a flat plate 64, the end portion of which has a downwardly inclined side 65, best shown in Fig. 13. With one of these projecting plates 64 extending into the guide groove for each of the members 39 and properly located with respect to the groove 17, said fingers 39 ride against the inner sides of the plate 64 and are centrally located with respect to said grooves and properly positioned so that when the ends of the members 39 come to the ends of said grooves 17, they will move freely as the sash is tilted inwardly and will not engage against any projections on the stop 16*a* or on the member 63, due to the sash being moved over to one side more than the other. The inclines at 65 automatically guide the projecting ends of the members 39 into proper position.

The other major addition or modification consists in extending the member 63 into and across the horizontal passage 17 in the stop 16, through which the member 39 passes, in the form of a flat plate 71, the end portion of which has a downwardly inclined side 72, best shown in Fig. 17. On returning the sash to vertical position from a tilted position said members 39 will move freely and will not engage against any projections on the stop 16, or the member 63, due to the sash being moved over to one side more than the other. The inclines at 72 automatically guide the projecting ends of the members 39 into proper position centrally

located between the side jambs. These are very desirable even though minor features of the invention and ones which add to its practical operativeness.

In Fig. 12 the parts of the sides of the window frame are shown as they are practically made, that is, as several parts which may be readily fabricated on machines and then substantially fastened, glued or leaded and nailed together.

The side jamb members may be made of a vertical side jamb member 9*a*, to which the blind stop 7 and the vertical casing 1 is fastened as by being leaded and nailed, a box-like casing being provided and completed by an outer member 66 as shown. The tongues 10 and 11 are separate members inserted and leaded and nailed in the vertical side jamb member 9*a*, while the tongues 12 and 14 with the projecting rib 13 on the tongue 12 are formed in one integral piece grooved lengthwise as shown and leaded and nailed to the vertical side jamb member 9*a*. The parts are machined so as to be properly located with respect to each other and when the parts are all leaded and nailed together a very practical and economical construction is produced.

While a specific description of a very practical and perfected form of the invention has been made it is to be understood that this invention is not limited in any respect to the particular and exact forms of construction thus illustrated and described. Also while the invention is especially useful in conjunction with window frames and sashes made of wood, many features of the invention are attainable with the use of metal or other material than wood; and the invention is not to be restricted in any sense to the so-called wood type of window. There are many variations in structural detail which may be resorted to without departing from the invention. The invention is defined in the appended claims and all forms of structure coming within their scope are to be considered comprehended by the invention.

We claim:

1. In a construction of the class described, a window frame having vertical guides at the vertical sides of said frame for two window sashes, members slidably mounted in said guides for sliding movement therein, one pair thereof for each window sash, window sashes pivotally mounted between said pair of members adjacent the lower ends of said sashes, releasable means for holding the sashes in vertical position, said means operating at the predetermined lower position of the sashes.

2. In a window construction, a window frame having vertical sides, vertical guides therein, one located inwardly from the other, a parting strip between said guides on each side member of the frame extending from the upper end of the frame downwardly substantially to mid-way between the upper and lower ends of the frame, means slidably mounted in the guides to which an inner and lower sash is pivotally mounted adjacent its lower end, an upper and outer sash similarly mounted on similar means slidable in the outer guides and outside of the parting strip, and means for maintaining the lower sash in vertical position except at one point at which it may be tilted inwardly, said parting strips providing means for maintaining the upper sash from tilting inwardly until the same is moved downwardly below the lower ends of the parting strips whereupon it may be tilted inwardly.

3. In a window construction, a window frame having vertical sides, two sashes slidably mounted between the sides of the frame in different vertical planes whereby they may pass each other, means for pivotally mounting the sashes adjacent their lower edges to turn inwardly about horizontal axes, means attached to the frame and the sash allowing full vertical movement in the vertical plane of the sash but automatically limiting the tilting movement to a few degrees off vertical.

4. In a window construction, a window frame having vertical sides, two sashes slidably mounted between the sides of the frame in different vertical planes whereby they may pass each other, means for pivotally mounting the sashes adjacent their lower edges to turn inwardly about horizontal axes, means for supporting the free end of lower sash at inner tilted position by a flexible member attached to the frame and the free end of the lower sash, the upper outer sash lying over the inner lower sash when it is tilted inwardly.

5. In a window construction, a window frame having vertical sides, two sashes slidably mounted between the sides of the frame in different vertical planes whereby they may pass each other, means for pivotally mounting the sashes adjacent their lower edges to turn inwardly about horizontal axes, means for maintaining the sashes in vertical position and against tilting movement except at the lowest position of movement of the upper sash and a short distance above the lowest position of movement of the lower sash, and means for limiting said lowermost position of movement of the upper sash to prevent it from prying action with the lower sash bottom rail as a fulcrum when both sashes are at full tilt position.

6. In a window construction, a window frame having vertical sides, two sashes slidably mounted between the sides of the frame in different vertical planes whereby they may pass each other, means for pivotally mounting the sashes adjacent their lower edges to turn inwardly about horizontal axes, a weatherstrip fastened to the frame, a second weatherstrip having a portion telescopingly engaging the first mentioned weatherstrip thereby permitting sufficient horizontal movement of the sashes for free working at all times to and from each jamb, and a third weatherstrip fastened to each window sash adapted to engage with the second weatherstrip when the window sashes are in vertical position.

7. In a window construction, a window frame having vertical sides, two sashes slidably mounted between the sides of the frame in different vertical planes whereby they may pass each other, means for pivotally mounting the sashes adjacent their lower edges to turn inwardly about horizontal axes, the combination of weatherstripping therefor comprising, a U-shaped weatherstrip fastened to the frame, a second weatherstrip having a portion received into the U part of the first mentioned weatherstrip whereby permitting sufficient horizontal movement of the sashes for free working at all times to and from each jamb, and means on the sashes adapted to snugly engage with the second weatherstrip when the sashes are in vertical position thereby tending to seal any openings between the sashes and its frame.

8. In a window construction, a window frame having vertical sides, two sashes slidably mounted between the sides of the frame in different vertical planes whereby they may pass each other, means for pivotally mounting the sashes adjacent their lower edges to turn inwardly about horizontal axes, the combination of weatherstripping therefor comprising, a U-shaped weatherstrip with one side of the U elongated and turned at right angles across the U opening with clearance allowed, said elongated portion fastened to the frame, a second U-shaped weatherstrip with one side of the U elongated and turned at right angles across the U opening with clearance allowed, the second U-shaped strip reversibly telescopingly engaged with the first U-shaped strip so that the limit of movement in the plane of engagement in one direction is made by the hitting of the free legs of the U-shaped strips on the inside bottoms of the U of the reversed engaged U-strip, and in the other direction by the hitting of the outside bottoms of the U-shaped strips against the elongated leg of the opposite strip which is at right angles to the plane of engagement, said limits allowing sufficient horizontal movement of the sashes for free working at all times to and from each jamb, said elongated portion of the second strip at right angles across the U-opening adapted to directly telescopingly engage with a third strip fastened to the sash, when the sashes are in vertical position.

9. In a window construction, a window frame having sides, a sash slidable therein, means for pivotally mounting the sash adjacent its lower edge to turn inwardly about a horizontal axis, a weatherstrip fastened to the frame, a second weatherstrip having a portion telescopingly engaging the first mentioned weatherstrip thereby permitting sufficient horizontal movement of the sash for free working at all times to and from each jamb, and a third weatherstrip fastened to the window sash adapted to engage with the second weatherstrip when the window sash is in vertical position.

10. A window construction as set forth in claim 9 in which the second mentioned weatherstrip telescopingly engages with the other weatherstrips for the purpose described.

11. In a tilting window construction of the class described, a first weatherstrip fastened to the frame of the window, said first weatherstrip having a portion slightly spaced from the sides of the tilting window and extending in parallelism to its movement, and a second weatherstrip connected to the sides of the sash, said second weatherstrip being adapted to overlap the first weatherstrip and being of relatively light construction for the purpose described.

12. A window construction as per claim 11 in which the second weatherstrip is of V-shape construction whereby the first weatherstrip is received therein between its flanges.

13. In a construction of the class described, a window frame having vertical guides at the vertical sides of said frame for two window sashes, members slidably mounted in said guides for sliding movement therein, one pair thereof for each window sash, window sashes pivotally mounted between said pair of members adjacent the lower ends of said sashes, releasable means for holding the sashes in vertical position, said means operating at the predetermined lower position of the sashes.

14. In a window construction, a window frame having vertical sides, vertical guides therein, blocks mounted for sliding movements in said guides, an inner sash pivotally mounted adjacent its lower end on said blocks, also members secured to said sash extending horizontally therefrom at each edge adjacent the top rail of said sash, and slidable in grooves at the inner side of the window frame, said frame at each side thereof having passages therein extending from said grooves to the inner edge of the window frame through which said members may pass when the sash is at a predetermined lower position a short distance above its lowermost position whereby said sash may be tilted inwardly and bars pivotally mounted on the window frame at each side thereof adjacent said passage and adapted to occupy a vertical position wherein it closes said horizontal passage and furnishes a part of the side of the slot in which the adjacent member on the sash moves.

15. In a window construction, a window frame having vertical sides, vertical guides therein, blocks mounted for sliding movements in said guides, an inner sash pivotally mounted adjacent its lower end on said blocks, also members secured to said sash extending horizontally therefrom at each edge adjacent the top rail of said sash, and slidable in grooves at the inner side of the window frame, said frame at each side thereof having passages therein extending from said grooves to the inner edge of the window frame through which said members may pass when the sash is at a predetermined lower position a short distance above its lowermost position whereby said sash may be tilted inwardly, and bars pivotally mounted on the window frame at each side thereof adjacent said passages and adapted to occupy a substantially horizontal position where they extend inwardly from the window frame, said bars being provided with means to hold the lower sash in partly tilting position.

16. In a window construction, a window frame having vertical sides, vertical guides therein, blocks mounted for sliding movements in said guides, an inner sash pivotally mounted adjacent its lower end on said blocks, also members secured to said sash extending horizontally therefrom at each edge adjacent the top rail of said sash, and slidable in grooves at the inner side of the window frame, said frame at each side thereof having passages therein extending from said grooves to the inner edge of the window frame through which said members may pass when the sash is at a predetermined lower position a short distance above its lowermost position whereby said sash may be tilted inwardly, and means for limiting the vertical movement of the lower sash until said horizontal passages are closed.

17. A construction of the class described comprising a window frame having vertical guides, window sashes located between the sides of the frame, members to which said sashes are pivotally connected mounted for sliding movement in said guides, and means for weather stripping said sashes and window frame entirely therearound to exclude air, dust and the like when the sashes are in closed position, said weather stripping permitting inward swinging movement of the sashes about their pivots.

18. In a window construction, a window frame having vertical sides, vertical guides therein, blocks mounted for sliding movements

in said guides, an inner sash pivotally mounted adjacent its lower end on said blocks, also members secured to said sash extending horizontally therefrom at each edge adjacent the top rail of said sash, and slidable in grooves at the inner side of the window frame, said frame at each side thereof having passages therein extending from said grooves to the inner edge of the window frame through which said members may pass when the sash is at a predetermined lower position the shortest possible distance above its lowermost position whereby said sash may be tilted inwardly 90° without prying over the sill.

19. In a window construction, a window frame having vertical sides, two sashes slidably mounted between the sides of the frame in different vertical planes whereby they may pass each other, means for pivotally mounting the sashes adjacent their lower edges to turn inwardly about horizontal axes, means for positive registration before the sashes can be turned inwardly about their axes of the means for locking said pivot means against vertical movement when the sashes are turned inwardly.

20. A construction containing the elements in combination defined in claim 19, combined with means for automatically locking the pivot means against vertical movement when the sashes are turned inwardly, and automatically releasing the pivot means and sashes for vertical movement when the sashes are returned to vertical position.

21. In a window construction, a window frame having vertical sides, two sashes slidably mounted between the sides of the frame in different vertical planes whereby they may pass each other, means for pivotally mounting the sashes adjacent their lower edges to turn inwardly about horizontal axes, means for weatherproofing the usual void between the parting stop and the ends of the meeting-rails, when the sashes are in closed vertical position, said means consisting of yieldable abutments attached to frame outside of the path of the pivoting sashes adjacent to the meeting-rail ends and means carried by and fastened to the upper sash pivot members for contacting with said abutments and filling the space between said abutments and the meeting-rail ends.

22. In a window construction, a window frame having vertical sides, two sashes slidably mounted between the sides of the frame in different vertical planes whereby they may pass each other, means for pivotally mounting the sashes adjacent their lower edges to turn inwardly about horizontal axes, horizontal vertical-engaging weatherstripping between the lower edge of the lower sash and the frame and between the upper portion of the lower sash and the lower portion of the upper sash engaged together when the window is in closed vertical position, means for disengaging the weatherstrip before the lower sash can turn on its axis.

23. In a window construction, a window frame having vertical sides, two sashes slidably mounted between the sides of the frame in different vertical planes whereby they may pass each other, means for pivotally mounting the sashes adjacent their lower edges to turn inwardly about horizontal axes, weatherstripping associated with said frame sides and sash, said weatherstripping permitting inward swinging movement of the sashes about their pivots, said sashes riding against said stationary frame sides when said sashes are in vertical motion.

24. In a window construction, a window frame having vertical sides, two sashes slidably mounted between the sides of the frame in different vertical planes whereby they may pass each other, means for pivotally mounting the sashes adjacent their lower edges to turn inwardly about horizontal axes, weatherstripping associated with said sashes and frame sides, said weatherstripping automatically permitting inward swinging movement of the sashes about their pivots, lower sash of greater width than upper sash, frame sides constructed to compensate for the difference in width.

25. In a window construction, a window frame having vertical sides, two sashes slidably mounted between the sides of the frame in different vertical planes whereby they may pass each other, means for pivotally mounting the sashes adjacent their lower edges to turn inwardly about horizontal axes, means for adjusting said pivot members so sashes will turn about horizontal axes in a free unobstructed path.

26. In a window construction, a window frame having vertical sides, two sashes slidably mounted between the sides of the frame in different vertical planes whereby they may pass each other, means for pivotally mounting the sashes adjacent their lower edges to turn inwardly about horizontal axes, means for automatically holding the carrying members of the sashes out of the path of the sashes turning about their horizontal axes, said means allowing free horizontal movement of the sash and its pivot members in the vertical plane of the sash at all times.

27. In a window construction, a window frame having vertical sides, two sashes slidably mounted between the sides of the frame in different planes whereby they may pass each other, means for pivotally mounting the sashes adjacent their lower edges to turn inwardly about horizontal axes, means on the inner lower sash slidably engaging with the sides of the window frame normally holding said sash in vertical position, said frame being provided with means operable to render said last means ineffective at a predetermined position of travel where said sash may be tilted inwardly.

28. In a construction of the class described, a window frame having vertical sides, two sashes slidably mounted between the sides of the frame in different vertical planes whereby they may pass each other, means for pivotally mounting the sashes adjacent their lower edges to turn inwardly about horizontal axes, means on the lower sash adjacent its upper end and engageable with the frame to hold the sash against pivotal movement except at one position, combined with means mounted on the window frame movable to an inner and to an outer position, said means when at said inner position operating to hold the sash from inward tilting movement at the one position thereof in which it can be tilted inwardly.

29. In a construction of the class described, a window frame having vertical sides, two sashes slidably mounted between the sides of the frame in different vertical planes whereby they may pass each other, means for pivotally mounting the sashes adjacent their lower edges to turn inwardly about horizontal axes, means on the lower sash adjacent its upper end engageable

with the frame to hold the sash against pivotable movements, said frame having means thereon whereby said sash may be turned inwardly about its pivotal connection when located in a predetermined position, a latch on said window frame, and means connected to the lower sash to engage with said latch when said sash is turned inwardly preventing vertical movement of said pivot means.

30. In a window construction, a window frame having vertical sides provided with vertical guides therein, blocks slidably mounted in said guides, a sash pivotally mounted adjacent its lower edges on said blocks and between said guides, means connected to the sash slidably engageable with adjacent guides in the window frame for holding the sash against pivotal movement except at one position, said frame being cut away at one point to permit said means to pass therethrough whereupon the sash may be tilted inwardly, a rod connected to each block extending vertically in the frame, a locking dog carried by said rod and means on the window frame with which said dog is engageable to latch the sash against upward movement when the sash is at its one position where it may be tilted inwardly, said latching being in effect so long as the sash is positioned vertically and becoming effective when the sash is tilted inwardly.

31. In a construction of the class described, a window frame having vertical sides, a sash pivotally and slidably mounted thereon, means for holding the sash to sliding movements except at one position in which it may be tilted inwardly, a second sash pivotally and slidably mounted on the frame, a latch carried by the second sash and held in inoperative position when the sash is in vertical position, said latch being freed upon inward tilting of the sash, a keeper carried by the window frame for the latch to engage therewith, and means for holding the second sash against tilting movement until it reaches a predetermined position in which said latch will engage with the keeper when the sash is tilted, as specified.

32. In a window construction, a window frame having vertical side jambs, two sashes slidably mounted between the side jambs, said side jambs for ease of manufacture and low cost constructed of several parts consisting of main jamb member with several members substantially attached, said parts forming pivot guideways, and a channel for attaching weatherstrip members integral with the parting stop, inner free faces of said parts substantially attached to said main side jamb member form a new jamb face against which the sashes ride, means for pivotally mounting sashes adjacent their lower edges to turn inwardly about horizontal axes.

33. In a window construction, a window frame having vertical sides, two sashes slidably mounted between the sides of the frame in different vertical planes whereby they may pass each other, means for pivotally mounting the sashes adjacent their lower edges to turn inwardly about horizontal axes, means for centralizing the meeting-rail of the upper sash when said sash is in its vertical closed position.

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