April 1, 1958 M. J. NARDULLI 2,828,514

WINDOW STRUCTURE

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FIG. 1.

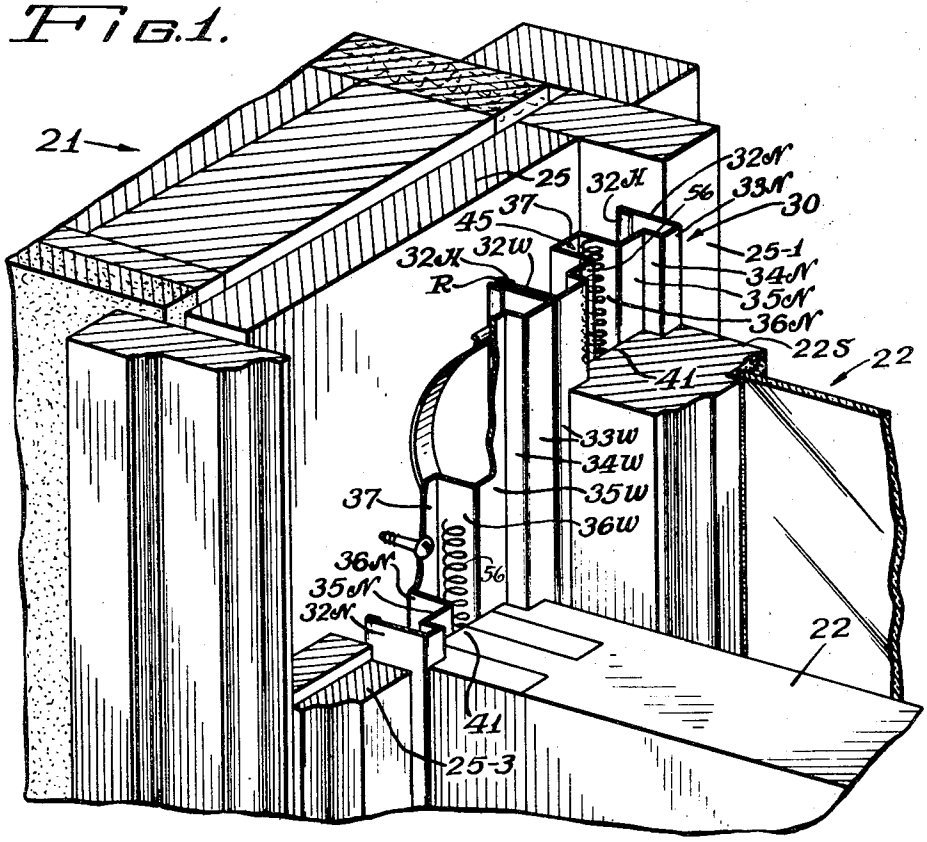
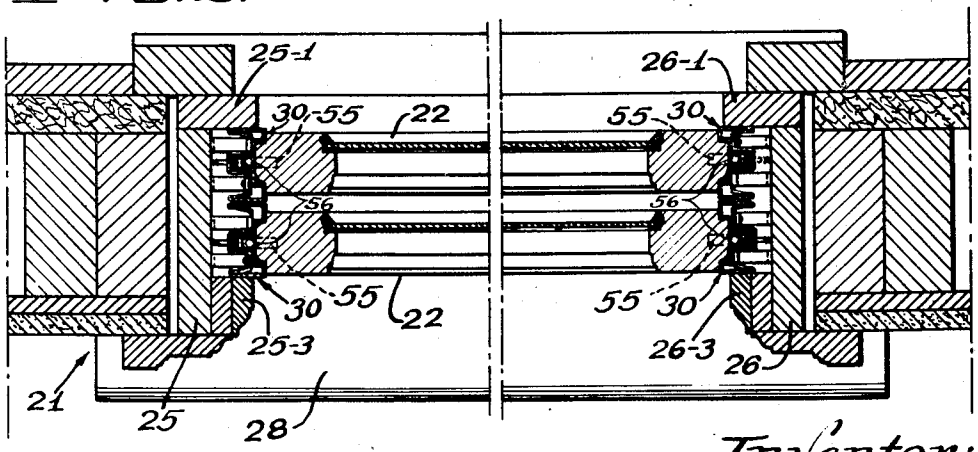


FIG. 2.



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FIG. 3.

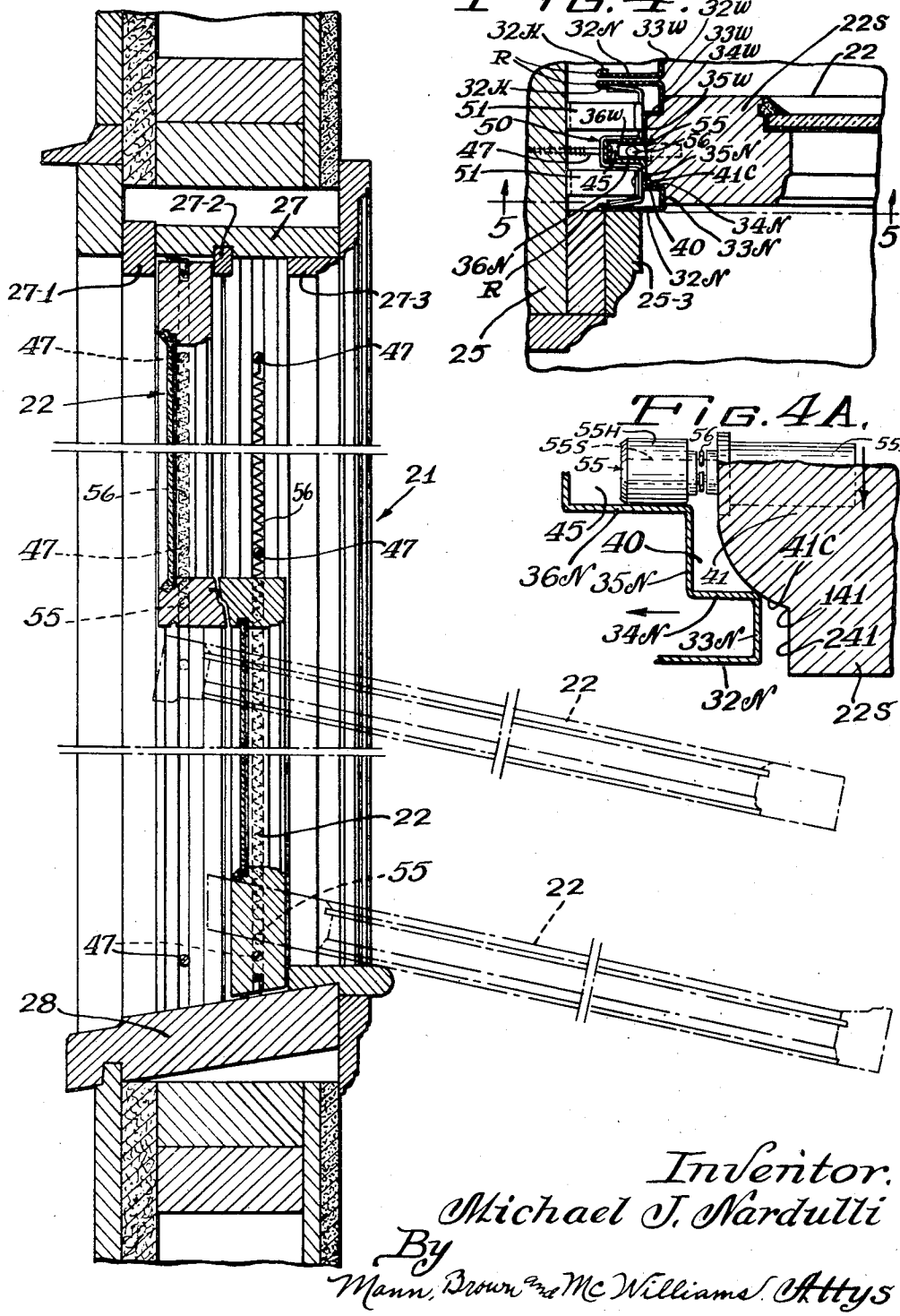


FIG. 4.

FIG. 4A.

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FIG. 5.

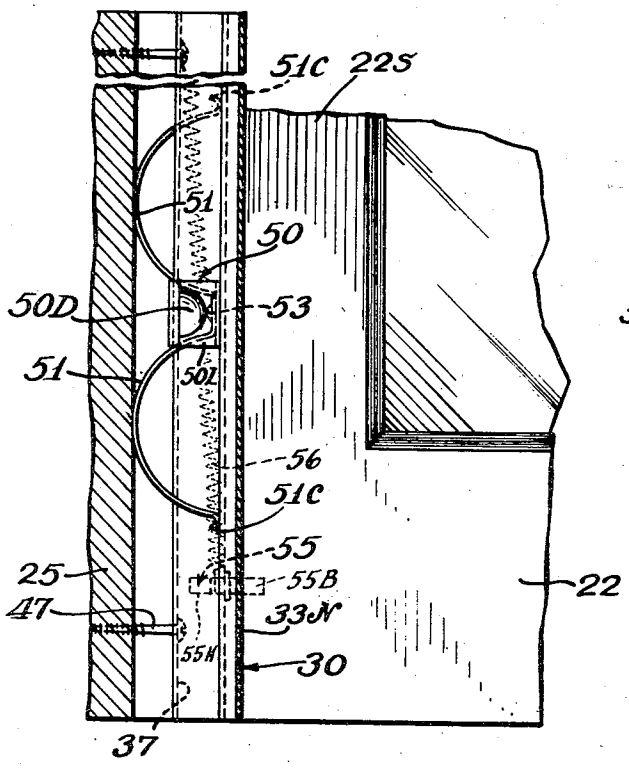


FIG. 6.

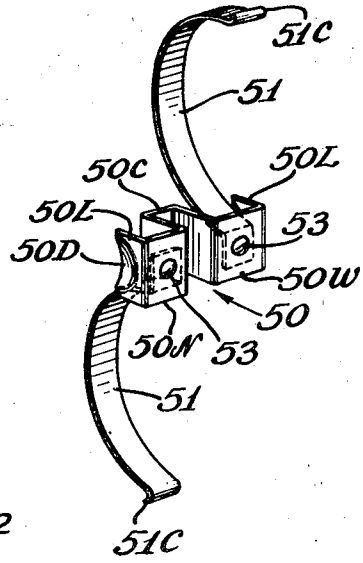


FIG. 7.

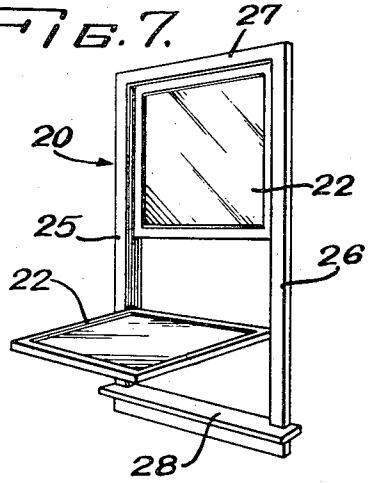
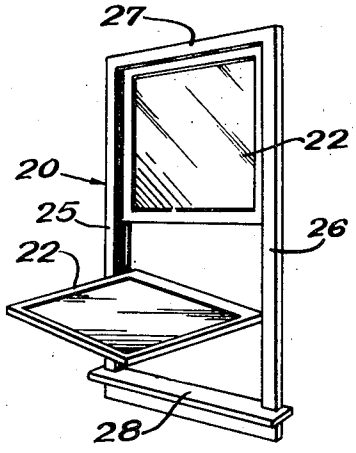


FIG. 8.



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2,828,514

WINDOW STRUCTURE

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Application May 24, 1956, Serial No. 587,120

3 Claims. (Cl. 20—52.2)

This application is a continuation-in-part of my co-pending application Serial No. 521,185, filed July 11, 1955.

This invention relates to window structures and particularly to double-hung windows of the removable type where friction is effective on the edges of the sash for imparting balancing forces to the sash.

Window structures of the aforesaid general type have been widely used in embodiments wherein the sash were capable of quick installation and removal, and in most prior structures of this general character the sash are balanced or held in place by lateral pressure applied by a laterally yieldable guideway along one edge of the sash, and when the sash are to be removed, the sash are moved or forced in one direction laterally against a yielding guideway so that the sash is released from the opposite sash guideway.

The characteristic of removability embodied in such prior windows has been intended to facilitate washing or cleaning of the windows, but as a matter of experience it has been found that when lateral pressures were employed sufficient to properly balance the sash, the forces required for removing the sash were so great as to cause the majority of housewives to avoid removal of the sash and to clean the windows in the normal manner. The quick mounting and removability are nevertheless recognized as having considerable value to the builder, and hence such window structures have continued to enjoy considerable popularity despite the aforesaid tendency of housewives to disregard and fail to make use of their removable characteristics.

In view of the aforegoing it is an important object of the present invention to simplify the removal of the sash of such windows; to simplify the installation of window structures of this type, to improve the yielding guideways employed therein, and to enable additional counterbalancing forces to be applied to the sash so as to thereby enable relatively slight lateral forces to be employed and also to enable sash mountings of this type to be used in relatively wide windows.

Another and equally important object of this invention is to enable removable sash in window structures of the aforesaid character to be tilted inwardly for cleaning purposes; and objects related to the foregoing are to provide such a tiltable sash structure that is sealed along its vertical edges in a simple and highly effective manner, to utilize the tiltable characteristic of such sash to simplify the mounting and removal operations in respect to such sash, to enable such tiltable window sash to be counterbalanced by coiled springs and to accomplish this in such a way that the springs are disposed in an out-of-the-way position and do not interfere with the tilting of the sash, and to accomplish the foregoing in a practical and economical manner.

Other and further objects of the present invention will be apparent from the following description and claims and are illustrated in the accompanying drawings which, by way of illustration, show a preferred embodiment of

the present invention and the principle thereof and what I now consider to be the best mode in which I have contemplated applying that principle. Other embodiments of the invention embodying the same or equivalent principle may be used and structural changes may be made as desired by those skilled in the art without departing from the present invention.

In the drawings:

Fig. 1 is a fragmentary perspective view taken in horizontal section through a window structure embodying the features of the invention;

Fig. 2 is a horizontal sectional view of the structure;

Fig. 3 is a vertical sectional view of the window structure;

Fig. 4 is an enlarged horizontal sectional view showing a portion of Fig. 2;

Fig. 4A is an enlarged portion of Fig. 4 with the parts in different positions;

Fig. 5 is a sectional view taken substantially along the line 5—5 of Fig. 4;

Fig. 6 is a perspective view of the spring-mounting clip; and

Figs. 7 and 8 are perspective views of the structure illustrating the sash tilting and sash removing features thereof.

For purposes of disclosure, the invention is herein illustrated as embodied in a window frame **21**, in which wood sash **22** are mounted in double-hung relation and in such a way that the sash may be tilted inwardly for cleaning, or may be readily removed and replaced when desired.

The wood window frame **21**, which is of a simplified form in that it does not have a parting stop, has a left-hand side frame member **25** and a right-hand side frame member **26** that are so formed as to provide outer stops **25–1** and **26–1**, and inner stops **25–3** and **26–3**, and these stops serve to provide a wide space in which vertical sash-mounting channels **30** are disposed as will be described. The frame **21** also has an upper transverse member **27** that has an outer stop **27–1**, a parting stop **27–2** and an inner stop **27–3**. The frame also has a lower or sill member **28**.

Under and in accordance with the present invention, the mounting channels **30** are so associated with the frame and the sash that these sash may be tilted inwardly for washing or may be readily removed or put in place when this is required, and such sash are counterbalanced by elongated coil spring means that are so related to the sash that the sash may readily be tilted.

In accomplishing the foregoing the present invention utilizes the separately formed sash mounting channels **30** that are shown in perspective in Fig. 1, and this channel **30** is utilized in identical form but reversed positioning in providing sash runways or mounting members on both sides of the frame **21**, and in accomplishing the removable and inwardly tiltable mounting of the sash, at least one of these channels is mounted for yielding movement laterally toward the frame of the sash guideway in which it is located.

The mounting channel **30** under the present invention is uniform in its cross sectional form throughout its length, and is thus adapted to be formed by continuous high speed forming processes, and in the present instance, the channel is illustrated as being formed by rolling from a thin metal sheet, such as an aluminum sheet. The channel **30** has an overall width of just slightly more than the thickness of a standard sash, this added thickness being equal to one-half the clearance space required between sash for the usual meeting rail structures, as will be described.

The mounting channel **30**, as shown in detail in Figs. 1, 2 and 4 of the drawings, is a rolled section made from

a thin sheet of a metal such as aluminum, and this channel has opposite edge walls 32N and 32W of equal height and in parallel relation, and at their rear edges R the edge walls 32N and 32W have inturned hems 32H. At their forward edges the walls 32N and 32W are turned or bent toward each other in a common plane to provide walls 33N and 33W which are of different widths as will be described. At the adjacent edges of the walls 33N and 33W the metal is bent rearwardly to form walls 34N and 34W that extend about one-half the distance toward the plane of the rear edges R. The metal is then bent inwardly from the rear edges of the two walls 33N and 33W to provide walls 35N and 35W that are located in a common plane parallel to the plane of the forward walls 33N and 33W. The walls 35N and 35W terminate short of each other, and the metal is bent rearwardly from the adjacent edges of the walls 35N and 35W to provide parallel spaced walls 36N and 36W which are parallel to the walls 32N and 32W, and are connected at their rear edges by a wall 37 located in the plane of the rear edges R.

The walls 34N and 34W thus constitute side walls of a main sash locating and retaining groove 40, the bottom of which is defined by the walls 35N and 35W, and this groove 40 is adapted to receive a projecting tongue 41 that is formed on the adjacent edge of the side stile 22S of the sash. The tongue 41 is formed by rabbeting the vertical corners of the side stile 22S. Thus the outside corner of the stile 22S is rabbeted to provide a side surface for the tongue 41, and a right angularly related surface that may bear flat against the surface of either the wall 33W or 33N. The rabbet at the other or inner vertical edge of the side stile 22S is of a special form that is important to the present invention as will hereinafter appear. Thus this special rabbet has one surface that may bear flat against the other of the two walls 33N, or 33W, while the other side surface thereof which defines the other side of the tongue 41 and which faces the inner side of the groove 40 is formed as a sloping or curved surface 41C which, as will hereinafter be explained, serves as a cam surface in enabling the sash 22 to be readily tilted or removed. The width of the tongue 41 at its base portion is such as to completely fill the width of the groove 40, and the juncture 141 of the cam surface 41C with the bearing surface 241 engages the outer corner formed by the walls of the groove 40. The tongue 41 terminates short of the rear walls 35W and 35N of the groove 40 so that the sash is positioned by its engagement with the forward walls 33W and 33N and with the side walls 34N and 34W of the groove 40.

The walls 36W and 36N and the wall 37 serve to define a clearance groove 45 that enables mounting of the channel 30 in a yielding relation to be readily accomplished. Thus holes 46 are provided near the top and bottom of wall 37 and at a point slightly above the normal meeting rail locations, as shown in Fig. 3, and securing screws 47 are extended through these openings so that the heads thereof are within the clearance groove 45. The screws 47 are screwed into the side frame elements and may thus hold the channels 30 in position against spring means that are interposed between the channels 30 and the frame elements 25 and 26. The adjacent channels 30 are positioned so that the walls 33W are side by side, as shown in Figs. 1 and 2, and these wider walls 33W thus provide a spacing between the sash 22 to accommodate the usual meeting rail structure.

As pointed out hereinbefore the characteristic of sash-removability may be attained by making only one of the channels 30 yieldable in character, but as herein shown the channels 30 on both sides of the frame are yieldably mounted, and this arrangement has been adapted because it imparts greater ease of operation in the sash-removing and sash-tilting operations as will be described.

The spring means employed are shown in detail in

Figs. 4, 5 and 6, and such spring means have been found to be unusually advantageous in installation as well as in use. Thus a spring mounting clip 50 is provided which has two bow-type springs 51 secured thereon and the clip 50 is so formed and arranged that it may be snapped into a locked position within the hollow spaces in the rear side of the channel 30. As shown in Figs. 4 and 6, the clip 50 is relatively narrow and is formed from resilient sheet steel to provide a U-shaped central portion 50C that is complemental to the surfaces defined by the walls 36N, 36W and 37. At the open end of the U-shaped portion 50C base members 50N and 50W are extended laterally, and the base members 50N and 50W are of different lengths, as will be evident in Figs. 4 and 6. The base member 50N is of such a length as to extend from the wall 36N to a point spaced somewhat from the wall 32N, and at its end a securing or latching wall 50L is formed so as to extend in the general direction of the side walls of the U-shaped portion, but so as to diverge slightly therefrom. The height of the latching wall 50L is such that when the clip 50 is firmly seated within the back of the channel 30, the end edge of the wall 50L will snap into position against the forward edge of the hem 32H. The other base wall 50W is somewhat longer than the wall 50N, so that a latching wall 50L at its end assumes a similar latching relation with respect to the hem 32H of the edge wall 32W. The latching action is improved by forming an inward depression 50D in the walls 50L, thus to make the corner portions of the ends of the walls serve as the active latching surfaces; and with this arrangement, the curved central portion of the rear end edge of the wall 50L is exposed adjacent the hem 32H, thus to facilitate the release of the clip 50 when this is desired.

The springs 51 are secured respectively to the base walls 50W and 50N by means such as rivets 53, and for best results the springs 51 are extended in opposite directions from the clip as will be evident in Figs. 5 and 6. This arrangement balances the clip 50 particularly during the insertion thereof into the channel 30; and it also balances the forces applied to the clip in use and thereby prevents unlatching of the clip. The ends of the springs 51 are preferably curled, as at 51C, to facilitate sliding of these ends along the walls 36N and 36W when the springs are compressed.

Under the present invention the pivoting of the sash 22 is accomplished by mounting aligned pivot pins 55 in the side stiles 22S thereof near the lower edges of the respective sash, and each side of each sash has an elongated coil spring 56 connected thereto so as to impart yielding upward forces to the sash. The coil springs 56 are of a diameter somewhat less than the width of the mounting groove 45, and at their upper ends the springs 56 are anchored by attachment of the upper end loop to the uppermost one of the mounting screws 47. At their lower ends the springs 56 have their lower anchoring loops connected to the respective pivots 55. Such pivots 55 are inserted with a drive fit into suitable sockets in the side stiles 22S, and their position laterally of the tongues 41 is such that when the sash is in normal position in the channels 30 the pins 55 will project into the clearance grooves 45. The length of pins 55 is such that they project into the clearance grooves 45 for a distance somewhat greater than the depth of the main groove 40. The pins 55 may, of course, extend substantially to the rear side 37 of the clearance groove 45, and with the screws 47 located as above described, the pins 55 may move freely in the groove 45 as the sash are raised and lowered in the normal manner. In the present instance the pivots 55 are formed in two pieces, the first of which comprises a base 55B that is set into the side of the sash frame and which may be made of a material such as steel. This base 55B has an axially projecting screw-threaded stem 55S of a reduced diameter extending outwardly therefrom, and on this stem 55S a head

55H is mounted by threading the same onto the stem 55S. With this arrangement the lower end loop of the spring 56 may be slipped over the stem 55S and the head 55H may then be threaded into position. The head 55H, of course, constitutes the part of the pivot that engages the groove 45, and to facilitate sliding of the pins 55 in the grooves 45, and enable the pins to be of maximum diameter so as to engage both walls of the groove, the heads 55H are preferably made from a rigid plastic material such as nylon.

When the user wishes to tilt a sash 22 inwardly for cleaning, the upper edge thereof is grasped and pulled inwardly, and when this is done the cam edges 41C come into play against the inner side of the grooves 40, thus to force the channels 30 laterally as indicated in Fig. 4A, and the inward tilting movement may then be continued until the sash reaches the position shown in dot-dash outline in Fig. 3, and in full lines in Fig. 7. With the arrangement that is thus provided the springs 56 do not interfere in any way with the pivoting action of the sash because the sash are pivoted about the axis to which the lower ends of the springs 56 are attached. The cleaning of the outside surface of the sash may then be readily performed, and the sash may be returned to its normal position by a return tilting movement, at the end of which the channels will snap into their proper positions wherein an effective weather seal is provided along the vertical edges of the sash.

If the user wishes to remove the sash, this may be accomplished with unusual ease by first tilting the sash to the position of Fig. 7, then raising one edge thereof as shown in Fig. 8. The lower end loops 56 of the springs may be disconnected from the pivots 55 after the sash is released from the guides. The mounting operation is also facilitated and may be accomplished by first attaching the lower end loops of the springs 56 to the pivots 55, then inserting the sash in the relation of Fig. 8, lowering the high edge so that the sash is positioned as in Fig. 7, and then tilting the sash upwardly to its normal mounted position. The pins 55, by engaging the clearance grooves 45, serve in this mounting operation to guide the sash as the necessary forces are applied thereto.

If desired the outer sash 22 may be made somewhat narrower than the inner sash 22, so that the outer channels 30 project outwardly from the frame members to a greater extent, and with this arrangement tilting of the upper outer sash is further facilitated since the necessity for actuation of the inner channels 30 is thus positively avoided. In other words, by such an arrangement the inward tilting action of both sash is made the same in all respects.

From the foregoing description it will be apparent that the present invention materially simplifies the mounting and removal of the sash, enables inward tilting of the sash to be easily accomplished, and provides a perfect seal for the sash when they are in their normal positions. It will also be evident that these results are attained by a simple, economical and sturdy structure that is neat and attractive in appearance.

Thus while I have illustrated and described a preferred embodiment of my invention, it will be understood that changes and modifications may be made therein without departing from the spirit and scope of the invention.

I claim:

1. In a window structure, a window frame having side members, metal channels disposed in opposed relation along said side members and having longitudinal sash locating grooves therein, said channels having depressed mounting grooves formed longitudinally along the bottoms of said locating grooves, spacing means interposed between the side members and opposed surfaces of said channels, the spacing means for at least one of said channels being provided by compressive spring means, retaining screws located in said mounting grooves to cooperate with said spacing means in holding said channels in position, a sash having tongues along its side edges extended into said locating grooves, pivot pins near the lower edge of said sash extended on a common axis into said mounting grooves, said tongues having cam surfaces thereon along their inner edges for applying channel-separating forces to said channels when the upper edge of said sash is pulled inwardly to thereby enable said sash to be pivoted inwardly about the axis of said pivot pins, and coiled tension springs mounted in said mounting grooves and anchored at their upper ends on selected ones of said retaining screws and removably anchored at their lower ends on said pivot pins.

2. In a window structure, a window frame having side members, metal sash mounting channels disposed in opposed relation along said side members and having longitudinal grooves therein, means including compressive springs mounting said channels on said side members for separating movement against the force of said compressive springs, a sash having tongues along its side edges extended into said grooves, pivot members near the lower edge of said sash projecting from said tongues on a common axis into said grooves, said tongues having cam surfaces thereon along their inner edges for applying channel-separating forces to said channels when the upper edge of said sash is pulled inwardly to thereby enable said sash to be pivoted inwardly about the axis of said pivot members, and coiled tension springs disposed along the edges of said sash and removably connected at their lower ends to said pivots and at their upper ends to said channels to impart counterbalancing forces to said sash.

3. In a window structure, a window frame having side members, metal channels disposed in opposed relation along said side members and having longitudinal sash locating grooves therein, said channels having depressed mounting grooves formed along the bottoms of said locating grooves, spacing means interposed between the side members and opposed surfaces of said channels, the spacing means for at least one of said channels being provided by compressive spring means, retaining means located in said mounting grooves to cooperate with said spacing means in holding said channels in position, a sash having tongues along its side edges extended into said locating grooves, pivot pins near the lower edge of said sash extended on a common axis into said mounting grooves, said tongues having cam surfaces thereon along their inner edges for applying channel-separating forces to said channels when the upper edge of said sash is pulled inwardly to thereby enable said sash to be pivoted inwardly about the axis of said pivot pins, and coiled tension springs mounted in said mounting grooves and anchored at their upper ends in said grooves and anchored removably at their lower ends on said pivot pins.

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