April 1, 1958 M. J. NARDULLI 2,828,513

WINDOW STRUCTURE

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Fig. 1.

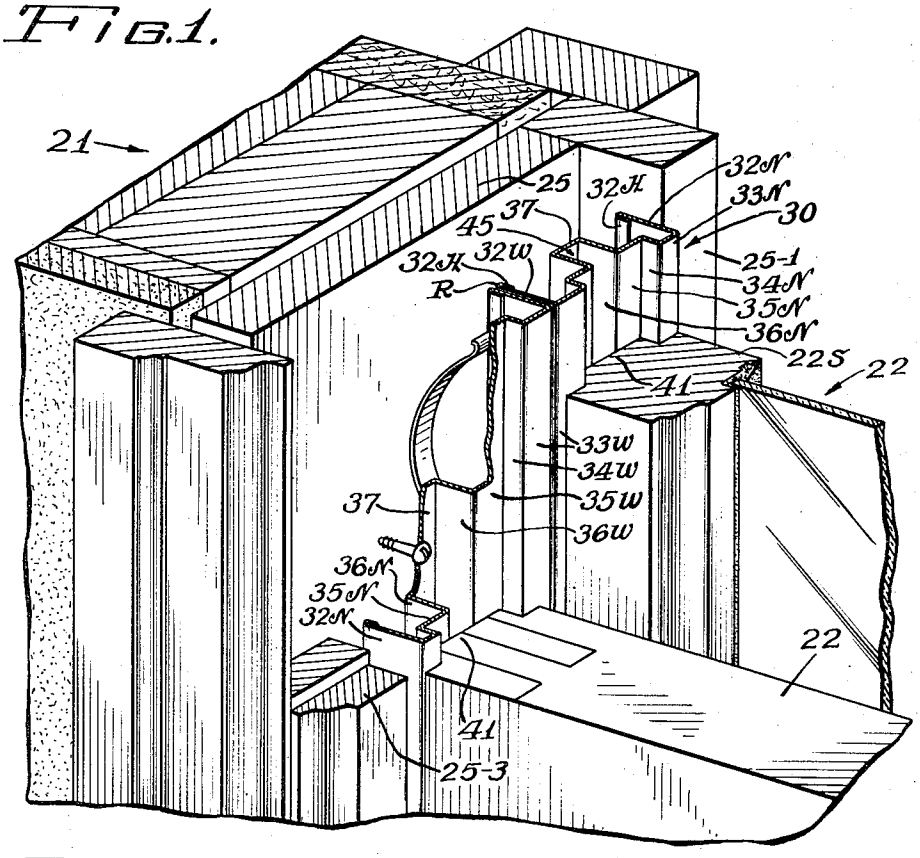
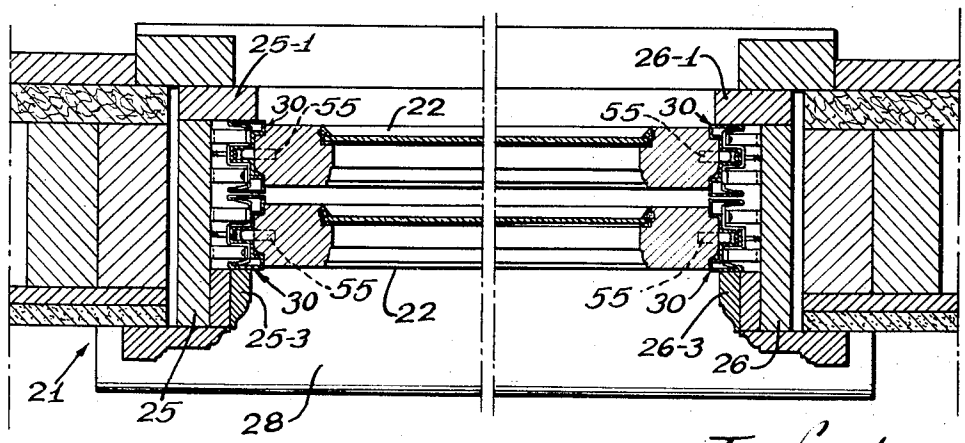


Fig. 2.



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FIG. 3.

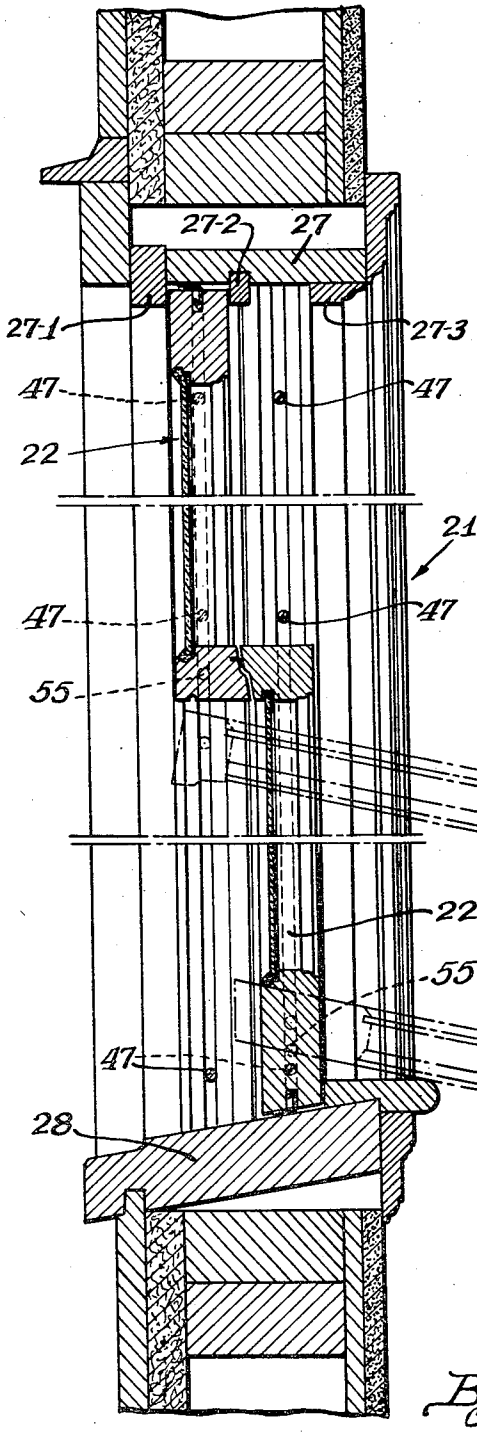


FIG. 4.

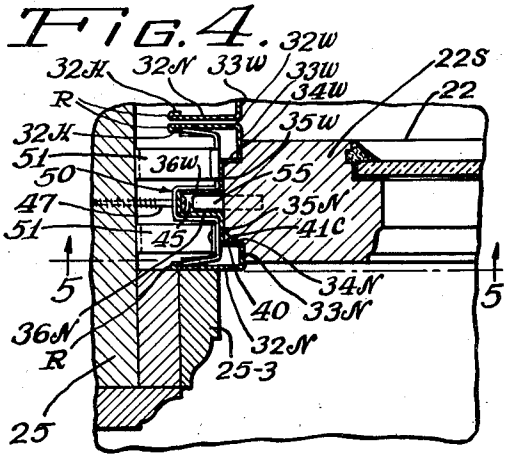
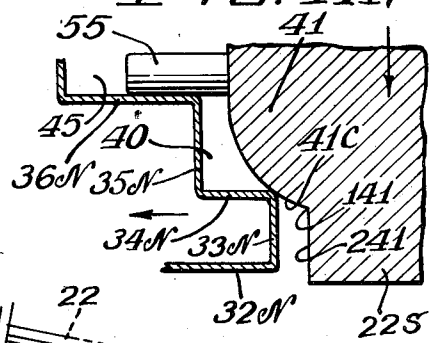


FIG. 4A.



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FIG. 5.

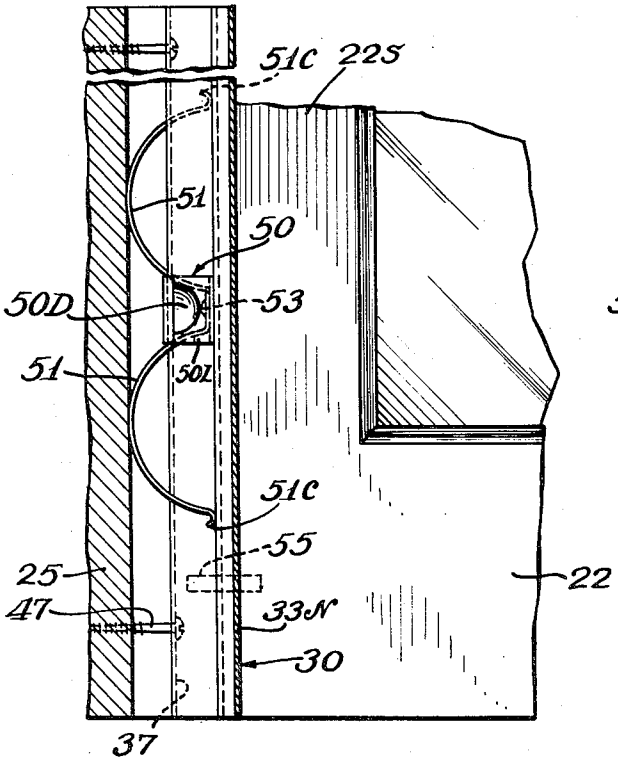


FIG. 6.

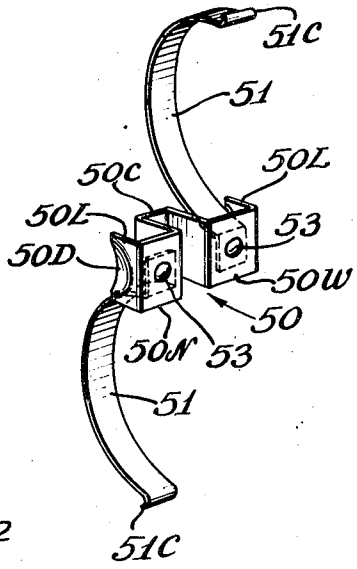


FIG. 7.

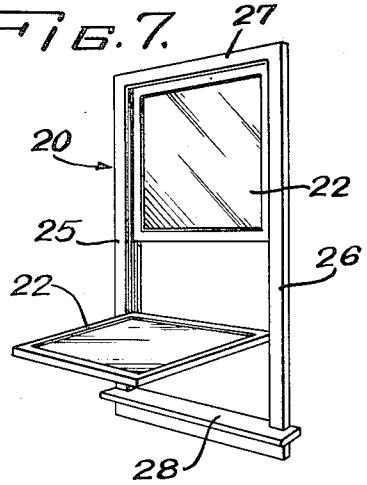
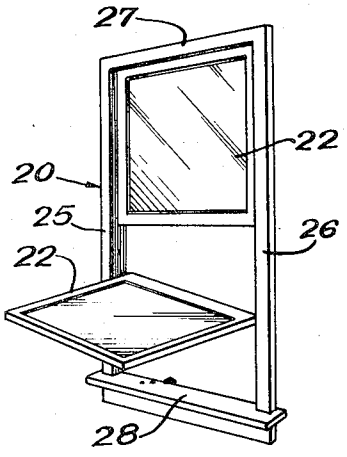


FIG. 8.



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WINDOW STRUCTURE

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Application July 11, 1955, Serial No. 521,185

7 Claims. (Cl. 20—52.2)

This invention relates to window structures, and particularly to such structures of the friction balanced double hung type.

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, and to improve the yielding guidways employed therein.

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, 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 afford 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.

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 rabbetting 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 35W 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 adopted 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. 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. 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 pins 55 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. 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 mounting operation is also facilitated and may be accomplished by first 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 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.

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 longitudinally extending grooves in the adjacent faces thereof, 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, means including retaining screws cooperating with said spacing means to holding said channels in position, a sash having tongues along its side edges extended into said channel grooves, pivot pins near the lower edge of said sash extended 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 pins.

3. 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.

4. In a window structure, a frame having side members mounting channels fixed in opposed relation on said side members and providing sash locating grooves facing toward each other, means securing said channels to said side members, such means on at least one of said side members providing for resilient movement of the channel toward such side member, a sash having side stiles with longitudinally extending laterally projecting tongues extended into said locating grooves to slidably guide the sash for movement along said channels, said tongues having sloping cam surfaces formed along the inner edges thereof whereby inward movement applied to the upper edge of said sash will apply channel-separating forces to said channels, and pivot means mounted on said tongues near the lower edges thereof adapted to remain in engagement with the grooves of said channels as the channels are separated to thereby provide for inward tilting movement of the sash.

5. In a window structure, a frame having side members mounting channels fixed in opposed relation on said side members and providing sash locating grooves facing toward each other, means including compressive springs securing said channels to said side members for yieldingly resisted lateral separating movement of the channels, a sash having side stiles with longitudinally projecting tongues extended into said locating grooves to slidably guide the sash for movement along said channels, said tongues having sloping cam surfaces formed along the inner edges thereof whereby inward forces and movement applied to the upper edge of said sash will apply channel-separating forces to said channels, and pivot members mounted on a common axis and projecting laterally from said tongues near the lower edges thereof adapted to remain in engagement with the grooves of said channels as the channels are separated to thereby provide for inward tilting movement of the sash about the axis of said pivot members.

6. A window sash adapted for tiltable mounting in resiliently separable opposed guide channels, said sash comprising top and bottom rails and side stiles, said side stiles being formed with longitudinally extending tongues for projection into the guiding grooves of such channels, said tongues having the inner edges thereof formed as sloping cam surfaces, and projecting pivot means mounted on said tongues in aligned relation near the lower ends thereof.

7. A window sash adapted for tiltable mounting in laterally yieldable guide channels, said sash comprising top and bottom rails and side stiles, said side stiles being formed with edge portions adapted for projection into the guiding grooves of such channels, said edge portions having the inner edges thereof formed as sloping cam surfaces, and projecting pivot means mounted on said edge portions in aligned relation near the lower ends thereof.

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