May 12, 1953 W. C. WATKINS 2,638,189

STEEL WINDOW STRUCTURE

Filed Sept. 24, 1951 3 Sheets-Sheet 1

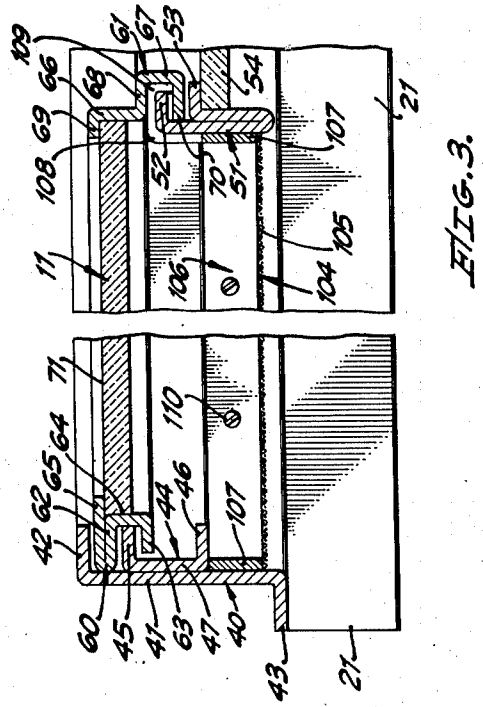


FIG. 3.

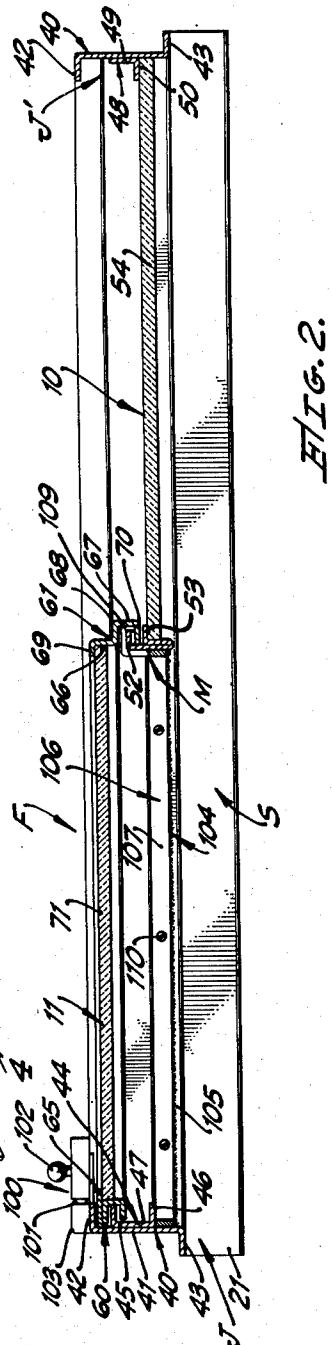


FIG. 2.

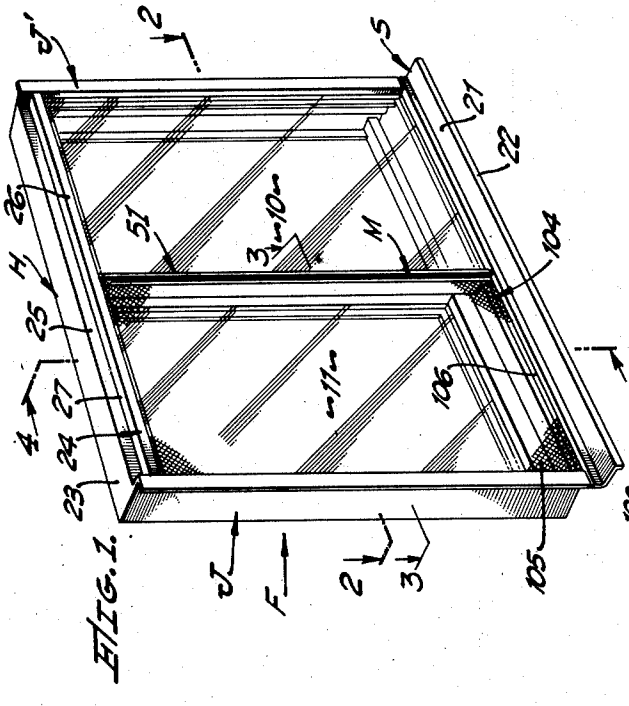


FIG. 1.

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STEEL WINDOW STRUCTURE

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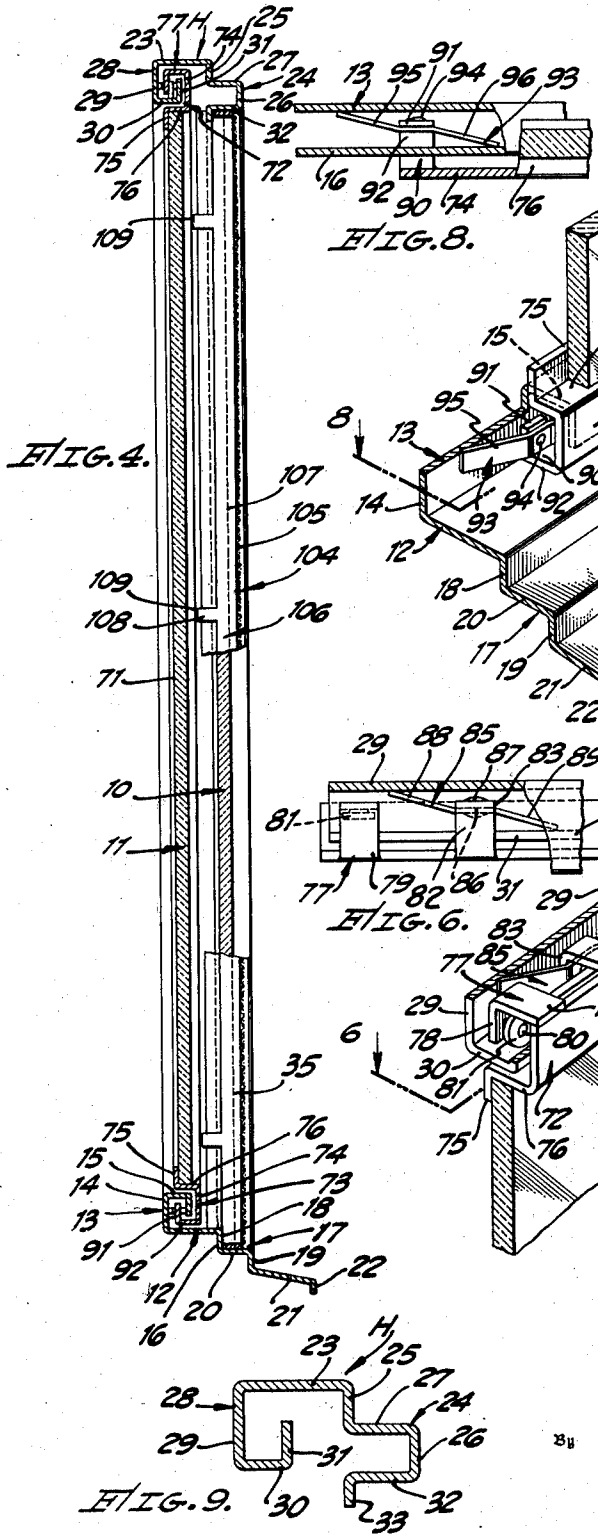


FIG. 4.

FIG. 8.

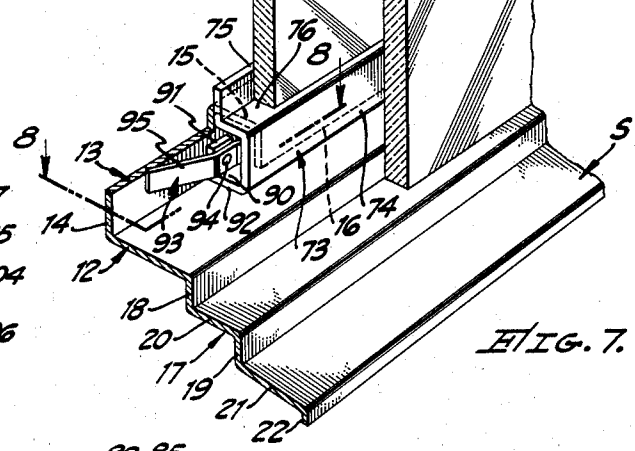


FIG. 7.

FIG. 6.

FIG. 5.

FIG. 9.

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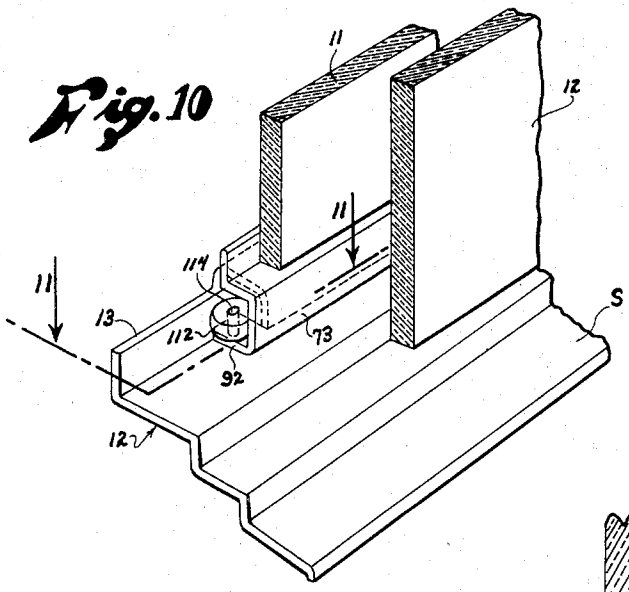
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May 12, 1953 W. C. WATKINS 2,638,189

STEEL WINDOW STRUCTURE

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Fig. 10



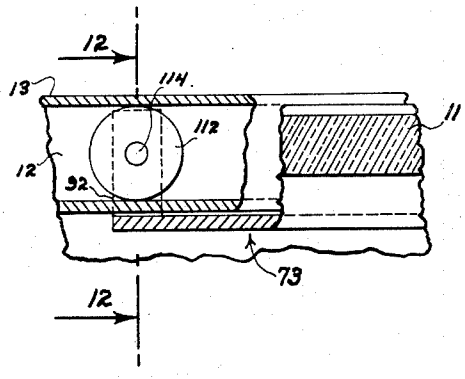


Fig. 11

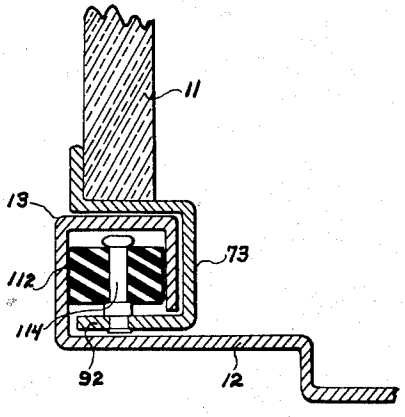


Fig. 12

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UNITED STATES PATENT OFFICE

2,638,189

STEEL WINDOW STRUCTURE

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Application September 24, 1951, Serial No. 247,914

7 Claims. (Cl. 189—64)

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My invention relates to window construction, with particular reference to a steel window or sash adapted for use in both dwellings and industrial installation, and is a continuation-in-part of my copending application, Serial No. 732,946 entitled Steel Window Structure, filed March 7, 1947 which has been abandoned. Although there are available on the market at the present time, a number of steel framed windows of various designs, none of these windows appear to be adapted to the modern trend in architecture in which the use of low sweeping lines is emphasized. It will readily be apparent that to achieve such a sweeping effect in the appearance of a building, the windows used in its construction must be capable of being furnished in elongated lengths, rather than in the stock sizes now available. In addition, the present windows are equipped with a complicated actuating mechanism for moving a portion of the window inwardly or outwardly for ventilation, and with the result that repairs to the actuating mechanism are usually beyond the ability of the average person. A further disadvantage of the presently available type of steel window is the danger of it being inadvertently left in the open position during a storm or strong wind, and the extending portion being broken from its supporting pins or hinges.

To eliminate these detrimental features there have been heretofore proposed windows incorporating an integrated frame and sill within which is mounted one or more horizontally movable window sections. Such windows, however, have proved to have other disadvantages. Many of them, for example, have not been sufficiently weather-tight to restrain the entrance of winds, moisture and dirt. Others, if made sufficiently weather-tight, have proved to be either difficult to open and close (the movable sections tending to bind within the frame and sill), or else have proved to be subject to disagreeable rattling (the movable section being free to move laterally within the frame and sill). Hence, it is a major object of my invention to provide a window of this type having novel construction whereby although it is completely weather-tight, it is also easy to operate and is not subject to rattling.

To this end the horizontally movable section of my window is supported at its upper portion by a plurality of rollers mounted upon this portion and adapted to rotate upon a horizontal guide member carried by the upper portion of the frame. The lower portion of the movable section mounts means engageable with a lower guide member carried by the sill, which means is adapted to restrain lateral movement of the section within the frame and sill without restraining horizontal movement of the movable section therewithin. My window additionally includes an integrated frame and sill which may be coated with a rust-proof primer prior to being delivered to the construction job site. My window is adapted for fabrication in a variety of munten and mullion designs particularly adapted to the style of architecture of the building in which it will be installed.

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It is another object of my invention to furnish a steel window or sash that will be unrestricted as to design, possess a maximum light area, have a streamlined munten and mullion design and need outside screening only over that portion of the window that is slidably opened for ventilation.

Another object of my invention is to reduce the maintenance cost on steel windows by eliminating the need for counterbalances and sash weights, the use of hinges, gears and crank mechanisms and the necessity of stocking a large amount of repair parts.

A further object of my invention is to furnish a window having an extremely simple mechanical structure, and one adapted for being used by the amateur builder who has only an elementary knowledge of carpentry.

A still further object of my invention is to provide a window having a horizontally movable section, which window will effectively restrain the entrance of wind, moisture and dirt.

These and other objects and advantages of my invention will appear from the following description of a preferred form thereof and from the accompanying drawings wherein:

Figure 1 is a perspective view of my completely integrated steel window frame;

Figure 2 is a horizontal cross section of the device taken on the line 2—2 of Figure 1;

Figure 3 is an enlarged fragmentary horizontal cross section illustrating in detail the construction of the side jamb, the vertical interlocking meeting rail or mullion, and the movable section engaging both members taken on line 3—3 of Figure 1;

Figure 4 is a vertical cross section of the window taken on line 4—4 of Figure 1;

Figure 5 is an enlarged fragmentary perspective view in detail of the combined horizontal window head and track channel, and one of the slidable section roller supports;

Figure 6 is an enlarged fragmentary horizontal cross section of the upper head member and one of the springs utilized to prevent rattling of the

movable section taken on the line 6—6 of Figure 5;

Figure 7 is an enlarged fragmentary perspective view of the horizontal sill and lower cross piece of the movable section;

Figure 8 is an enlarged fragmentary horizontal cross section of the lower cross piece of the movable section showing one of the springs used in preventing rattling of the movable section taken on line 8—8 of Figure 7;

Figure 9 is an enlarged vertical cross-sectional view of the window head member shown in Figure 5;

Figure 10 is an enlarged fragmentary perspective view of the horizontal sill and lower cross piece of the movable section similar to Figure 7 and showing another means which may be used to prevent rattling of the movable section;

Figure 11 is an enlarged fragmentary horizontal cross section taken on line 11—11; and

Figure 12 is an enlarged fragmentary vertical cross section taken on line 12—12 of Figure 11.

Referring now to the drawings, and particularly to Figure 1 thereof for the general arrangement of my invention, it will be seen that a rectangular frame F is formed by a horizontal sill member S, a pair of vertical side jambs J and J' disposed at each end thereof, and a horizontally positioned head member H rigidly affixed to and supported between the pair of side jambs J and J'. A vertical interlocking dividing bar or mullion M extends between the sill S and the head member H to divide the window into two sections; the section 10 situated on the right of the mullion M as shown in Figure 1 being stationary and adapted for view purposes, while the section 11 is slidably adjustable and may be used for ventilation of the room or building.

Although for convenience of illustration, I have shown sections 10 and 11 to be of substantially the same length, this relationship may be altered at the time of manufacture to suit the desire of the purchaser. It will be apparent that several variations in the arrangement of the slidable section 11 are possible, such as: repeating the section 11 at both ends of the window with each section sliding inwardly; or having two sliding sections at the center of the window, each of which moves outwardly from one another to engage a mullion that may be spaced some distance in from the side jamb. The latter arrangement is particularly effective where it is desired to protect drapes situated at the end portions of the window from dust or dirt brought in through the open sections. Under most circumstances, as long a section 10 as possible will be found to be desirable for view purposes, although this will be determined by the overall length of the window and the portion of that length which must be allotted to the movable section 11 to insure proper ventilation under the most adverse climatic conditions that will be encountered.

The sill S may be fabricated in a number of different ways but I have found it preferable to form the sill as an integral unit from a rectangular sheet of metal of an appropriate gauge that is pressed into a cross section such as is shown in Figures 4 and 7. It will be noted that the sill S includes a horizontally positioned rectangular sill member 12 that turns upwardly on its rearwardly disposed edge into an angular inverted J-shaped member 13, the function of which will hereinafter be discussed in detail. Member 13 includes a vertical upwardly extending flange 14, a horizontal forwardly projecting web 15, and a flange 16 extending downwardly a somewhat less distance than the height of the flange 14.

A downward step 17 situated on the forward edge of the member 12 is formed from a pair of laterally spaced risers 18 and 19 with a horizontal step member 20 extending therebetween as best seen in Figure 4. Sloping downwardly and away from the lower edge of the riser 19 is a rectangular sill cap 21 with a short vertical flange 22 disposed on its forward edge.

It will be seen from Figure 4 that with my window installed in a wall, any water or moisture collecting on the sill S will flow forwardly along the upper face of the cap 21, and pass downwardly over the flange 22 to the exterior of the window supporting wall. The flange 22 prevents inward seepage of water toward the interior of the wall section, and any attendant damage that may result from such a condition.

Head member H has a cross section such as is shown in Figure 9 and is formed as an integral unit from sheet metal on a press break or Yoder mill, although in the large scale production of my window a rolled shape having the desired cross section may be advantageously used. The head member H is formed from a rectangular member 23 that is provided on its forward edge with a downward step 24 consisting of a pair of laterally spaced risers 25 and 26 and a horizontal connecting step member 27 as best seen in Figures 5 and 9. Both the member 23 and step 24 are identical to and in vertical alignment with the sill member 12 and step 17. An angular J-shaped track channel 28, used in movably supporting the slidable section 11, extends downwardly from the rearwardly disposed edge of member 12 and includes a supporting flange 29, a forwardly extending horizontal track web 30 and an upwardly projecting guide rail 31 that is somewhat shorter in height than the flange 29. Proceeding rearwardly from the lower edge of the riser 26 is a horizontal member 32 that terminates in a relatively short downturned vertical flange 33 on its rearward edge. The forward face of the flange 33 and the riser 18 are in vertical alignment and serve as glazing supports for a stationary glass pane as will hereinafter be explained.

Each of the vertically disposed side jambs J and J' includes a member 40 having a Z-shaped cross section, and comprising a web member 41 with a flange 42 extending inwardly from its rearward edge and a similar flange 43 projecting outwardly from its forward edge. Both of the flanges 42 and 43 are parallel to one another and normal to the faces of the web member 41. It will be noted in Figures 2 and 3 that the side jamb J terminates on its forward and rearward face by the flanges 42 and 43 being flush with the exterior faces of the flange 14 and riser 18 respectively.

Although each of the side jambs J and J' includes the vertical member 40, the interior arrangement of each jamb is different. The inner face of the side jamb J which the slidable section 11 contacts when in the closed position is provided with a vertically positioned member 44 having a channel shaped cross section, that includes a pair of laterally spaced inwardly projecting arms 45 and 46 with a web 47 extending therebetween. For convenience in the construction of my window the outer face of the web 47 is preferably affixed to the interior face of the web 41 by spot welding. The channel 44 is so situated on the web 41 that a substantial space is left between the rearward face of the channel flange 45 and the forward face of the jamb flange 42 as may best be seen in Figure 3. The space between the flanges 42 and 45 is occupied by a portion of the

movable section 11 when it is in the closed position.

In the construction of the opposite side jamb J' a vertical member 48 having an L-shaped cross section and composed of a pair of legs 49 and 50 which are disposed normal one to the other, is affixed in a vertical position on the interior face of web 40 by being spot welded thereto as may be seen in Figure 2.

The interlocking dividing bar or mullion M is preferably formed from a rectangular sheet of metal of such thickness that it may be pressed to form an F-shaped member composed of a web 51 of partial double thickness and two parallel laterally spaced flanges 52 and 53 projecting outwardly toward the jamb J' as illustrated in Figures 2 and 3. Flange 53 is arranged with its forward face in vertical alignment with the forwardly disposed faces of jamb flange 50, the sill riser 18 and the header flange 33. Thus it will be seen that with the forward faces of these members in alignment a support is provided to prevent the rearward movement of a rectangular pane of glass 54 that fits into the stationary section 10 of the window, with its lower edge resting on the upper face of the sill step 20, its upper edge against the inner face of the header member 32, and its vertical edges abutting the mullion arm 51 and web 41 of the side jamb J' respectively. The pane 54 is held in place against the above members by putty being applied in the conventional manner.

Movable section 11 includes a pair of vertical, laterally spaced end pieces 60 and 61, with each end piece being fabricated with a different cross section. The end piece 60 which engages the side jamb J when section 11 is in closed position is pressed from sheet metal and has a substantially square U-shaped cross section that includes a pair of laterally spaced, parallel, flanges 62 and 63 with a connecting web 64. The flange 62 is longer than the flange 63, and is bent back upon itself to form a lip 65 that extends inwardly toward the mullion M above the inner face of the web 64 as best seen in Figure 3. The vertical end piece 61 is preferably formed from a rectangular strip of sheet material by pressing same to have a Z-shaped cross section that includes a pair of parallel arms 66 and 67 with a connecting web 68. By bending the outer portion of each of the flanges 66 and 67, a pair of parallel ribs 69 and 70 are provided that extend inwardly toward the mullion M. It will be noted in Figure 2 that the forwardly disposed faces of the lip 65 and rib 69 are in alignment and serve as vertical supports to prevent the rearward movement of a rectangular pane of glass or other transparent material 71 that extends therebetween. The rib 70, with the section 11 in the closed position, engages the opening between the mullion flanges 52 and 53 to form an interlocking wind-proof joint. A horizontally positioned top and bottom cross piece 72 and 73 respectively, each having a Z-shaped cross section, extends between the end pieces 60 and 61. Each of the cross pieces 72 and 73 includes a pair of parallel flanges 74 and 75 that extend outwardly in opposite directions and in unequal distances from a connecting web 76 as may best be seen in Figure 4. Flange 74, which is of somewhat greater depth than flange 75, projects outwardly from section 11 and has its rearward face disposed a slight distance in from the sill flange 16 and header flange 31. The flanges 75 extend inwardly toward one another, and have their forwardly disposed faces in vertical alignment with

the forward face of the lip 65 and rib 69 to serve as supports to prevent the rearward movement of the pane 71.

For movably supporting the section 11 a down-turned L-shaped member 77 that includes a vertical and horizontal arm 78 and 79 respectively, is affixed by welding to the upper edge of cross piece flange 74 at each end thereof. Rotatably supported from the arm 78 by a horizontal shaft 80 that engages both members is a roller 81 which travels along the upper face of the channel web 30 as best seen in Figures 4 and 5. To prevent the movable section 11 from rattling or vibrating, a second down-turned L-shaped member 82, having a vertical and horizontal arm 83 and 84 respectively, is disposed inwardly from each of the L-shaped members 77 and secured to the upper edge of the flange 74 by welding. A horizontally positioned elongated rectangular spring 85, preferably of Phosphor bronze, and having a central portion 86 that fits against the forwardly disposed face of the arm 83, is affixed thereto by a rivet 87 that engages both members. An outwardly disposed portion 88 of the spring is bent to contact the forward face of the header flange 29 and the inwardly disposed spring portion 89 is likewise bent to contact the rearward face of the flange 31.

Supported at each end of the movable section 11 from the lower edge of flange 74, as may best be seen in Figures 7 and 8, is a rearwardly extending upturned L-shaped member 90 having a vertical and horizontal arm 91 and 92 respectively. A substantially horizontal elongated rectangular Phosphor bronze spring 93 is affixed to the forward face of the arm 92 by a rivet 94 and with one end portion 95 of the spring bent rearwardly to contact the forward face of the flange 14 and the opposite end portion 96 likewise is bent to contact the rearward face of flange 16. Thus it will be seen that by the use of the springs 85 and 93 any rattling or vibration of the movable section 11 is eliminated.

It should be understood that other means may be utilized to restrain any rattling or vibration of the movable section 11 in place of the springs 85 and 93. Thus, in Figures 10, 11 and 12 there is shown a roller element 112 rotatably mounted by a vertical pin 114, which pin is secured at its lower end to the forward face of the arm 92 of the cross piece 73. This roller element 112 will preferably be formed of natural or synthetic rubber and will have a diameter equal to or only slightly smaller than the horizontal distance separating the forward and rearward faces of the flange 16, as shown in Figure 12. Hence, at all times the periphery of the roller element 112 will be in engagement with one of these faces whereby a plurality of these roller elements may be substituted for the plurality of springs 85 and 93 as rattling preventing means. It should also be noted that these roller elements 112 are shown mounted only on the lower cross piece 73 and not on the upper cross piece 72, inasmuch as it has been found possible to eliminate rattling of the movable section by employing roller elements or springs on the lower cross piece alone.

In order that the slidable section 11 may not be opened from the outside by thieves or would-be trespassers, a conventional lock 100 is affixed in a convenient location on the end piece 60 as best seen in Figure 2, a bolt 101 that may be actuated by a handle 102 slidably engages a cylindrical receptacle 103 that is rigidly affixed in a horizontal position to the vertical jamb flange 42. Such a locking mechanism permits the slidable

section 11 to be placed in the open position only from the interior of the room or building in which my window is located.

As the section 11 is the only portion of my window adapted for being moved, a rectangular screen 104 may be inserted in vertical alignment with the pane 54 between the interior faces of the side jamb J and mullion M. The screen is provided with the usual wire mesh body 105 in a rectangular frame 106 that on three sides is preferably formed from flat metal strip 107 and on the fourth side with an inwardly extending flange 108. On the rearwardly extending edge of flange 108 are several hooks 109 that may be formed from either wire or strap and are used to engage the mullion flange 52 as best seen in Figure 2. The screen 104 is put in place by having the hooks 109 engage the flange 52 with the screen flange 108 situated adjacent to the mullion web 51. The three sides of the frame 106 are disposed against the interior faces of sill step 23, side jamb J, and header arm 32, and held thereon by a number of machine screws 110 that engage both the screen frame and window members. It will be noted that such screening has the advantages of ease of installation and removal, being relatively small in size and light in weight, and requiring a minimum of storage space.

In the installation of my window, an opening sufficiently large to receive the frame F is left in the studding of the wall with suitable cross framing for the window's support. Blocking is inserted between the studs and the exterior face of the side jambs J and J' and the window secured thereto by driving nails through openings (not shown) provided in each of the side jambs. With the window frame F in place the sheet weather-proofing material used in the construction of the building is brought downwardly to the horizontal line formed at the junction of the header riser 25 and step 27, where it may be easily cut by the use of a sharp instrument. The balance of the exterior portion of the wall section is now constructed, with the outer surface of the finished wall being forwardly disposed from the exterior face of the riser 26. It will be apparent that inward seepage of water from the outer surface of the wall is impossible due to the upwardly extending riser 25 and the sheet weather-proofing material used in the wall construction lapping over it. Along the side jambs J and J' the flanges 43 overlap the blocking material as does the sheet weather-proofing material and an exceptionally weather-tight construction is thus secured. The downwardly extending sill flange 22 insures that any water or moisture accumulating on the sill S will flow to the exterior surface of the window supporting wall structure, rather than under the sill cap 21. As the sill S is made integral with the frame F, a more economical as well as weather-proof window construction is assured by the use of my window.

The operation of my window when installed is extremely simple, as its only moving part is the section 11. It will be seen in Figure 3 that with section 11 in the closed position a wind and weather-proof joint is secured not only at the mullion M, by the end piece rib 70 interlocking between the mullion flanges 52 and 53, but that the same result is achieved at the side jamb J as the flange 64 engages the opening between the section 11 and flanges 62 and 63.

Movement of the section 11 requires little manual effort due to the section being rotatably supported on each end by a roller 31 that travels along the upper surface of header web 30, as best seen in Figure 5. The junction of the movable section 11 with the inner portion of the head member H is substantially wind-proof due to the overlapping of the section 11, flange 74 with the header flange 31. Although for the purpose of clarity a substantial distance is shown in Figure 4 between the forward face of the flange 31 and the rearward face of the flange 74, in actual practice this is a very snug fit.

As the section 11 is moved back and forth, the springs 85 and 93, shown in Figures 5 through 8 will be at all times in slidable contact with the vertical faces of the cross pieces 72 and 73 so as to restrain any rattling thereof within these cross pieces. With this arrangement, there is absolutely no binding tendency between the movable section and these cross pieces. The same results may also be accomplished by use of the roller elements 112 shown in Figures 10, 11 and 12. With respect to these roller elements, it will be realized that their supporting shafts 114 need not have their axes on a common vertical plane extending parallel to the cross piece 73, but rather these shafts may be mutually offset from such plane whereby a certain roller or rollers will be engageable with only one of the interior vertical faces of the cross piece while the other roller or rollers will be engageable with the opposite vertical face. It will also be apparent that the lateral positioning of the shafts 114 may determine whether the external surface of the vertical flange 16 will slidably engage the interior vertical surface of the cross piece 73 adjacent thereto.

Although I have shown the preferred form of my invention as particularly adapted for window construction, it will readily be apparent that by replacing the transparent panes 54 and 71 with an opaque material, a slidable door may be obtained. It will also be apparent that due to the unique construction of the head member H it may be used separately from the window as a support for hanging slidable doors or windows.

While the apparatus herein shown and described is fully capable of attaining the objects and providing the advantages hereinbefore mentioned, it is to be understood that it is merely illustrative of the presently preferred form of my invention, and that I do not mean to limit myself to the details of construction or design herein shown, other than as defined in the appended claims.

This application is a continuation-in-part of patent application Serial No. 732,946 filed by me March 7, 1947 and bearing the same title as this application which has been abandoned.

I claim:

1. A window structure which includes: a substantially rectangular frame provided with a head member and a sill member; a horizontally extending upper guide member of substantially J-shaped cross section formed on said head member; a longitudinally extending lower guide member of inverted J-shaped cross section formed on said sill member; a substantially rectangular section situated within the confines of said frame; a plurality of downturned L-shaped members affixed to the upper portion of said section, with each of said members having an arm that projects downwardly into said upper guide member; a plurality of rollers, with each of said rollers situated within the confines of said upper

guide member and rotatably supported from one of said arms, said rollers movably connecting said section to said upper guide member whereby said section may be moved horizontally in said frame; a plurality of upturned L-shaped members affixed to the lower portion of said section, with each of said members having an arm that extends upwardly into said lower guide member; and a plurality of transversely extending springs, with each of said springs supported by one of said arms, and slidably engaging the interior vertical surfaces of said lower guide member to restrain lateral movement of said section.

2. A window structure which includes: a substantially rectangular frame provided with a head member and a sill member; a horizontally extending upper guide member of substantially J-shaped cross section formed on said head member; a longitudinally extending lower guide member of inverted J-shaped cross section formed on said sill member; a substantially rectangular section situated within the confines of said frame, with said section having upper and lower horizontal members of angular cross section complementary to said upper and lower guide members to form substantially overlapping joints with said guide members so as to wind-proof the joints; a plurality of longitudinally spaced downturned L-shaped members affixed to the upper portion of said frame, with each of said members having an arm that projects downwardly into said upper guide member; a plurality of rollers, with each of said rollers situated within the confines of said upper guide member and rotatably supported from one of said arms, with said rollers movably connecting said section to said guide member; a plurality of upturned L-shaped members affixed to the lower portion of said section, with each of said members having an arm that extends upwardly into each lower guide member; and a plurality of transversely extending springs, with each one of said springs being supported by one of said arms, and slidably engaging the two interior vertical surfaces of said lower guide member to restrain lateral movement of said section.

3. A window structure which includes: a substantially rectangular frame provided with a head member and a sill member; a horizontally extending upper guide member of substantially J-shaped cross section formed on said head member; a longitudinally extending lower guide member of inverted J-shaped cross section formed on said sill member; a substantially rectangular section situated within the confines of said frame, with said section having upper and lower horizontal members of angular cross section that form substantially overlapping joints with said guide members so as to wind-proof the joints; a plurality of longitudinally spaced down-turned L-shaped members affixed to the upper portion of said section, with each of said members having a roller rotatably mounted thereon, said rollers movably connecting said section to said upper guide member for horizontal movement in said frame; a plurality of upturned L-shaped members affixed to the lower portion of said section with each of said members having an arm that extends upwardly into said lower guide members; and spring means affixed to a portion of said L-shaped members affixed to the upper portion of said section and on all of said L-shaped members affixed to the lower portion of said section, with said spring means engaging the interior vertical surfaces of said guide members to restrain lateral movement of said section.

4. A window structure which includes: a substantially rectangular frame formed with a head member, a sill member and two end members that have a mullion intermediately positioned therebetween with said frame having an upper horizontally extending guide member of J-shaped cross section formed on said head member and a lower guide member of inverted J-shaped cross section formed on said sill member; a rectangular section situated within the confines of said frame, with said section having upper and lower members of angular cross section complementary to said upper and lower guide members to form substantially overlapping joints with said guide members so as to wind-proof the joints, said upper and lower members being connected by vertical end pieces; roller means affixed to the upper portion of said section and engaging said upper guide member to movably support said section therefrom; a plurality of longitudinally extending springs affixed to both the top and bottom of said section, with each one of said springs being situated within the confines of one or the other of said guide members and slidably engaging the vertical walls thereof to restrain rattling and lateral movement of said section; and sealing means formed on said vertical end pieces of said section which are adapted to engage one of said end pieces of said frame and said mullion when said section is in the closed position to form a substantially wind-proof joint.

5. A window structure which includes: a substantially rectangular frame provided with a head member and a sill member; a horizontally extending upper guide member of substantially J-shaped cross section formed on said head member; a longitudinally extending lower guide member of inverted J-shaped cross section formed on said sill member; a substantially rectangular section situated within the confines of said frame; a plurality of down-turned L-shaped members affixed to the upper portion of said section, with each of said members having an arm that projects downwardly into said upper guide member; a plurality of rollers, with each of said rollers situated within the confines of said upper guide member and rotatably supported from one of said arms, said rollers movably connecting said section to said upper guide member whereby said section may be moved horizontally in said frame; a horizontally extending arm formed on the lower portion of said section, said arm extending below said guide member; and a resilient roller element mounted upon said arm for rotation about a vertical axis, the periphery of said roller element being engageable at all times with at least one of the vertical interior surfaces of said lower guide member so as to restrain lateral movement of said section.

6. A window structure which includes: a substantially rectangular frame provided with a head member and a sill member; a horizontally extending upper guide member of substantially J-shaped cross section formed on said head member; a longitudinally extending lower guide member of inverted J-shaped cross section formed on said sill member; a substantially rectangular section situated within the confines of said frame, with said section having upper and lower horizontal members of angular cross section complementary to said upper and lower guide members to form substantially overlapping joints with said guide members so as to wind-proof the

joints; a plurality of longitudinally spaced downturned L-shaped members affixed to the upper portion of said frame, with each of said members having an arm that projects downwardly into said upper guide member; a plurality of rollers, with each of said rollers situated within the confines of said upper guide member and rotatably supported from one of said arms, with said rollers movably supporting said section from said guide member; a horizontally extending arm formed on the lower portion of said section, said arm extending below said guide member; and a resilient roller element mounted upon said arm to rotate about a vertical axis, the periphery of said roller element being engageable at all times with at least one of the vertical interior surfaces of said lower guide member so as to restrain lateral movement of said section.

7. A window structure which includes: a substantially rectangular frame provided with a head member and a sill member; a horizontally extending upper guide member of substantially J-shaped cross section formed on said head member; a longitudinally extending lower guide member of inverted J-shaped cross section formed on said sill member; a substantially rectangular section situated within the confines of said frame; a plurality of downturned L-shaped members affixed to the upper portion of said section, with

each of said members having an arm that projects downwardly into said upper guide member; a plurality of rollers, with each of said rollers situated within the confines of said upper guide member and rotatably supported from one of said arms, said rollers movably connecting said section to said upper guide member whereby said section may be moved horizontally in said frame; a horizontally extending arm formed on the lower portion of said section, said arm extending below said lower guide member; and a transversely extending guiding element supported by said arm and being engageable at all times with at least one of the vertical interior surfaces of said lower guide member so as to restrain lateral movement of said section.

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