Dec. 19, 1950 J. KIRSCHSTEIN ET AL 2,534,355

WINDOW

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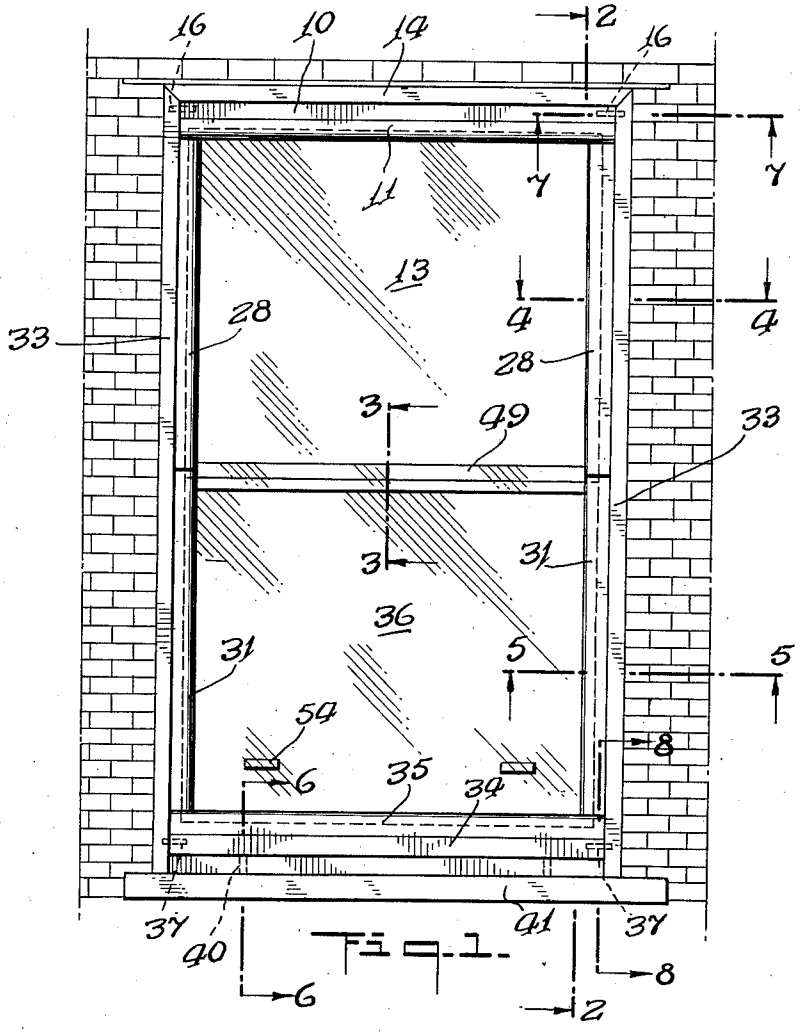


Fig. 1.

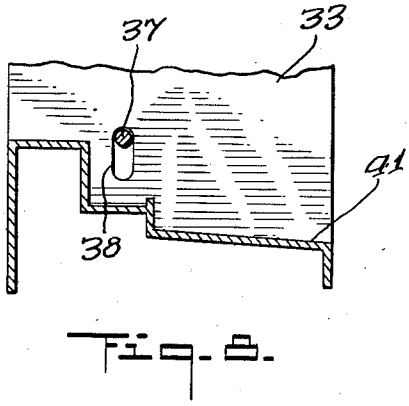


Fig. 4.

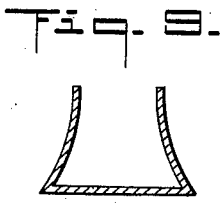


Fig. 3.

INVENTOR.
JULIUS KIRSCHSTEIN
BY CARMINE C. J. MAFFEI
ATTORNEY

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Fig. 2.

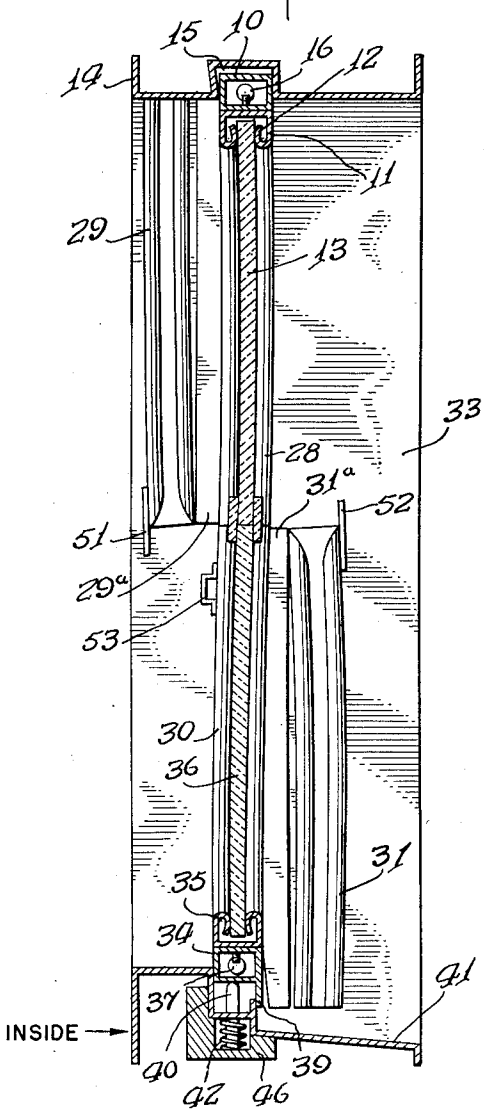


Fig. 2A.

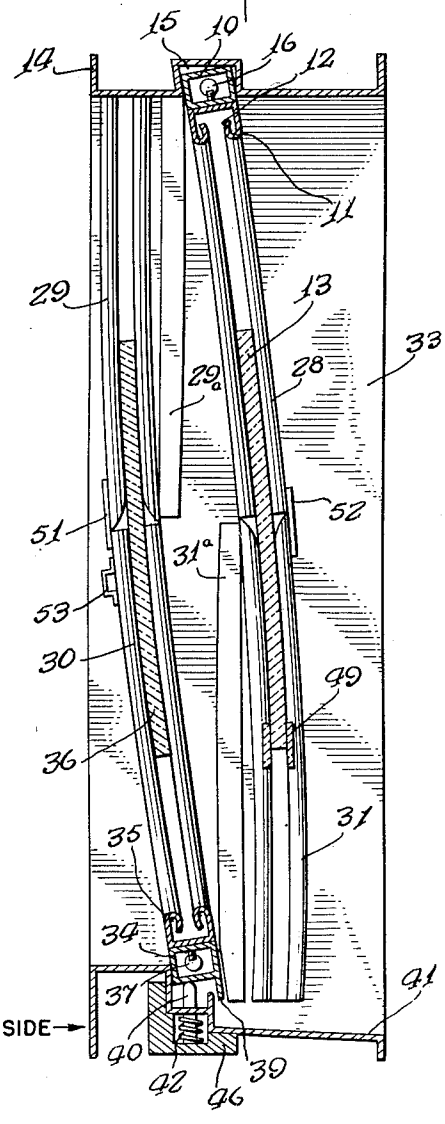
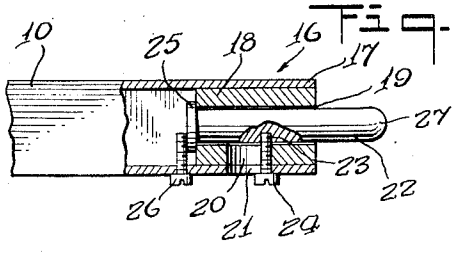


Fig. 7.



INVENTOR.
JULIUS KIRSCHSTEIN
BY CARMINE C. J. MAFFEI
Julius Kirschstein
ATTORNEY

Dec. 19, 1950 J. KIRSCHSTEIN ET AL 2,534,355

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Fig. 2.B.

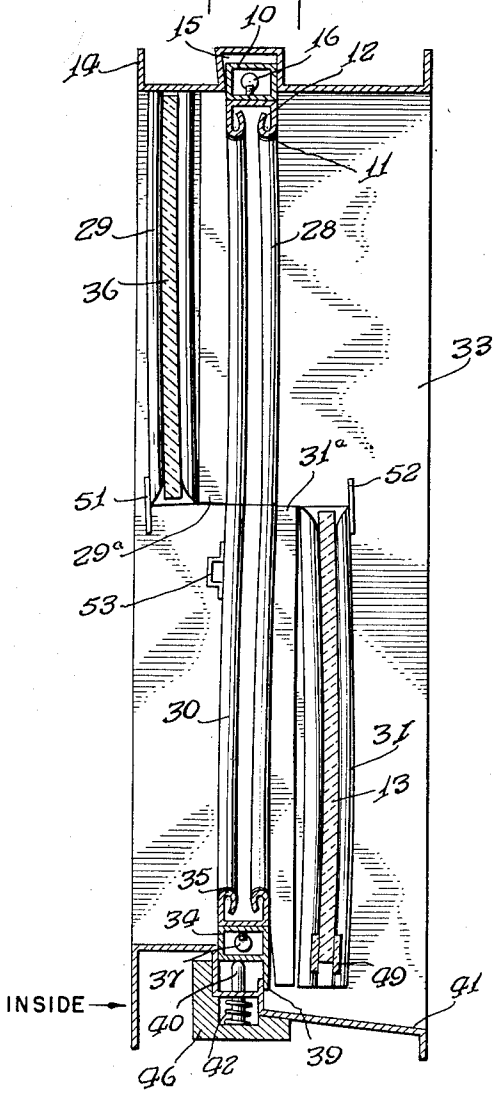


Fig. 4.

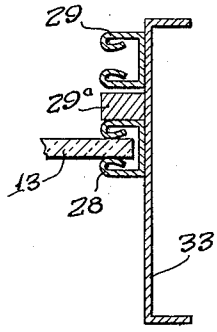


Fig. 5.

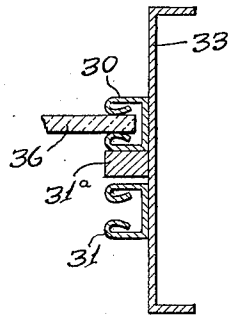


Fig. 3.

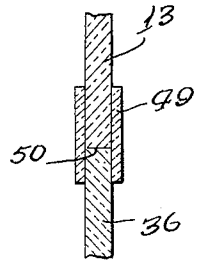
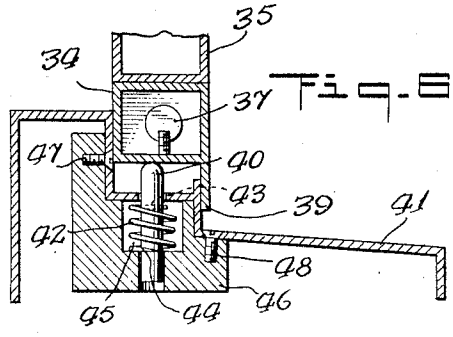


Fig. 6.



INVENTOR.

JULIUS KIRSCHSTEIN

BY CARMINE C. J. MAFFEI

ATTORNEY

Patented Dec. 19, 1950 2,534,355

UNITED STATES PATENT OFFICE

2,534,355

WINDOW

Julius Kirschstein and Carmine C. J. Maffei, Brooklyn, N. Y., assignors to Windalume Corporation, West New York, N. J., a corporation of New Jersey

Application January 10, 1946, Serial No. 640,191

7 Claims. (Cl. 20—45)

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This invention relates to windows. The window most generally employed is of the "double hung" type having upper and lower sashes, sliding vertically in guides formed by strips known as the "parting beads" and the jambs, maintained in position by some form of balancer such as sash weights, coiled springs, etc.

The main object of this invention is to provide a vertically sliding window which does not require any form of balancer. This is accomplished by placing the vertical elements of the sash frames on the jambs, forming these elements in such a manner that they will exert resilient pressure on the inserted panes which will be adapted to slide vertically in these elements as guides, and finally imparting to said elements a curvature along their length for aiding to maintain the panes in a set position.

Another object of this invention is to provide a window from which the panes are readily removed for any reason such as cleaning or replacement.

A still further object of this invention is to provide a window the lower sash of which can be used as a ventilator.

Another object of this invention is to provide a window of neat appearance, having large light transmitting areas, and which is economically manufactured and simple to assemble.

With these and other objects in view, the invention consists in certain novel features of construction and combination and arrangement of parts which will more fully be hereinafter described and pointed out in the claims.

In the accompanying drawings,

Fig. 1 is a front elevation of a window embodying our invention as seen from the outside;

Fig. 2 is a section taken substantially along the line 2—2 in Fig. 1;

Fig. 2*a* is a section similar to Fig. 2 but showing the window partially open at the top and bottom;

Fig. 2*b* is a section similar to Fig. 2 but showing the lower pane raised to the top of the window and the upper pane lowered to the bottom of the window;

Fig. 3 is a section taken substantially along the line 3—3 in Fig. 1;

Fig. 4 is a section taken substantially along the line 4—4 in Fig. 1;

Fig. 5 is a section taken substantially along the line 5—5 in Fig. 1;

Fig. 6 is an enlarged section taken substantially along the line 6—6 in Fig. 1;

Fig. 7 is an enlarged section taken substantially along the line 7—7 in Fig. 1;

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Fig. 8 is an enlarged section taken substantially along the line 8—8 in Fig. 1; and

Fig. 9 is a transverse section of a modified form of channel.

Referring now specifically to the drawings, 10 is a hollow elongated metal beam substantially of rectangular cross-section to which is attached along the lower face a U-shaped channel 11 formed with retroverted marginal edges 12 to exert resilient pressure on a pane 13. The members 10 and 11 may be formed as a single extrusion of a suitable material such as aluminum alloy, steel or extruded individually and then joined in any suitable manner such as spot welding along their juxtaposed faces. The assembly comprising the members 10 and 11 is joined to a head plate 14 formed with a horizontal recess 15 substantially of a trapezoidal cross-section into which the hollow beam 10 loosely fits so that the assembly may swing freely from a pair of pivoting means 16 extending from each end 17 of beam 10. The pivoting means 16 comprise blocks 18 centrally bored as at 19 and force fitted into the ends of hollow beam 10. A groove 20 is provided along the front of the bore 19 in registration with a slot 21 extending the width of the front wall of the hollow beam 10. Within the bore 19 is a round rod 22 having a tapped hole 23 for receiving a positioning screw 24 inserted through the slot 21 sliding in the groove 20 until it falls into the tapped hole 23 when it can be screwed into place for securing the rod 22. The latter is formed with a head 25 adjacent its interior end. A safety screw 26 extending through the wall of beam 10 is provided adjacent the said head 25 to prevent the rod 22 from sliding inwardly when the screw 24 is loosened. The round rods 22 project a short distance beyond beam 10, thus forming a pair of pivot hinges 27 from which the assembly is hingedly suspended when it becomes the horizontal head element of the frame for the pane 13.

The vertical frame elements for the window sashes comprise the U-shaped vertical channel members 28, 29, 30, 31 formed similar to member 11 with retroverted marginal edges to exert resilient pressure on the panes slid therein and with a slight curvature as at 32 along their length to maintain the panes in any position to which they may be set. The channels 28, 29, 30, 31 are placed on the vertical jamb plate 33. It is to be noted that there are two vertical jamb plates for each side of the window and on each of these jamb plates are the channels 28, 29, 30, 31. The upper ends of the vertical plates 33 are

joined with the head plate 14 at each end in any suitable manner such as a welded mitre joint. Registered holes are drilled in the jamb plates 33 at the upper ends to receive the pivot hinges 27.

The pair of channel members 28 are pivotally mounted on the plates 33 at the upper ends thereof and extend vertically downward approximately to the center of the plate. Thus, the pair of channels 28 with the horizontal member 11 form the vertical and horizontal elements of the sash frame for the pane 13. The pair of channels 29 are fixedly secured to the plates 33, parallel to channels 28 and separated therefrom by "parting beads" 29a.

The pair of channel members 30 are also pivotally mounted on the plates 33, at their lower ends, extending vertically upward to approximately the center of said plates and in alignment with the channel members 28. The pair of channel members 31 are fixedly attached to plates 33 parallel to channel members 30 but on the opposite sides in relation to members 29 and are separated from the said channels 30 by the "parting beads" 31a. Thus, the pair of channel members 30 provide the vertical elements for the lower sash frame.

A hollow beam 34 similar to beam 10 has attached thereto on its upper face a U-shaped channel 35 having retroverted marginal edges to exert resilient pressure on a pane 36. The hollow beam 34 has pivoting means 37 similar in construction to the pivoting means 16 providing a pair of pivot hinges which extend into registered oval slots 38 cut in plates 33 at the lower ends thereof. The outside face of the hollow beam 34 extends downwardly as at 39 abutting the vertical portion of the window sill for weathering.

The hollow beam 34 rests on a plurality of vertical pins 40 extending upwardly through the sill 41. The pins 40 are urged upwardly by spiral compression springs 42, the upper ends 43 of which are attached to said pins, while the lower ends 44 are secured to the base of a groove 45 cut in the spring block 46. The latter is fastened to the sill in any suitable manner as by screws 47, 48. It is clear now that the channel 35 provides the horizontal sill element for the lower sash frame.

The horizontal "meeting lines" for the upper and lower sashes comprises a pair of transparent strips 49, of a material similar to the material employed for the panes. The pair of strips 49 are secured to the pane 13 on the outer and inner face in any suitable manner adjacent the lower edge 50 thereof. The strips 49 extend above and below the edge 50, the downwardly extending portions forming the upper horizontal element of the sash frame for the pane 36. The panes 13 and 36 as well as the strips 49 are of a transparent material, glass, or preferably a clear plastic formed from a resin which has the desired physical and optical properties as, for example, a methyl methacrylate resin. The panes 13, 36 and the strips 49 are formed with a slight surface curvature exaggeratedly illustrated in Figs. 2, 2a and 2b to conform to the curvature 32 imparted to the vertical channel members 28, 29, 30, 31. When the latter are assembled on the jamb plates 33 they are arranged so that the members 28, 30 are oppositely curved as in Fig. 2, forming a concave-convex outline. Members 29 are arranged to curve parallel to members 30, and members 31 parallel to members 28.

Stops 51, 52 secured to members 29, 31 respectively, are provided to limit the swing of channels 28 and 30; a pair of handle means 53 are attached to channel members 30 to facilitate the swinging of the lower sash; and a pair of rectangular pieces 54 are secured to the lower pane 36 adjacent the lower corners thereof for raising the said pane.

The method of raising or lowering the window will now be described. Assume the window in a closed position. The upper and lower panes make edge contact and are in vertical alignment as shown in Fig. 2. The hands are placed on the handle means 53 which are pressed down until the lower pane 36 clears the strips 49. Now the lower sash is swung on the hinges 37 until the channel members 30 strike the stop 51. The pane 36 then is raised to any desired position as, for example, the position shown in Fig. 2a by means of the rectangular pieces 54. The upper sash pane 13 is lowered by swinging the upper sash on the hinges 27 using the strips 49 as handle means until it strikes the stops 52. The lower pane 13 may now be slid down to any desired position as, for example, the position shown in Fig. 2a, using the strips 49 as handle means. In Fig. 2b the pane 36 first has been raised all the way to the top and then the pane 13 lowered all the way to the bottom.

To close the window as, for example, from the position shown in Fig. 2a, the pane 13 is returned to the channels 28 and the upper sash swung to its original position. The pane 36 is now slid down into the channels 30. The lower sash is pressed down, using handle means 53 until the strips 49 are cleared, swung forward and released to make edge contact with the upper pane. To remove the panes, the lower pane is raised to the top, freeing the upper pane for removal after which the lower pane may be slid out.

To restore the removed panes, the channel members 28 and 30 are placed in vertical alignment as in their closed position. Pane 13 is now slid into channels 31 and pane 36 into channels 29, as in Fig. 2b. Channel members 28 are swung to stops 52, pane 13 slid up into said channel members 28 and the latter returned to the original vertical position. Now channel members 30 are swung to stops 51, pane 36 slid down into said members 30 and handle means 53 pressed down to clear strips 49, and the lower sash returned to vertical position and released to make edge contact with the pane 13.

Although we show channel members with retroverted marginal edges for producing resilient pressure on the panes, we do not confine ourselves to this particular design. Other means for obtaining resilient pressure may be employed as, for example, the modified channel shown in transverse cross-section in Fig. 9, or a channel member of rectangular cross-section with separate spring strips disposed along the inner walls.

Furthermore, we do not necessarily limit ourselves to a channel member curved along its length. The present type of "double hung" window may be modified so that the upper and lower sashes are curved, the "parting beads" correspondingly curved forming curved guides for the vertically sliding sashes which will maintain a set position without the use of balancer means.

Having thus described our invention we claim as new and desire to secure by Letters Patent:

1. In combination in a window, an upper track member, a hinge for the latter located at the top thereof and having a horizontal axis of rotation.

a lower track member, a hinge for the latter located at the bottom thereof and having a horizontal axis of rotation, said axes of rotation being in the same vertical plane, a pair of stops one on each side of said upper track member, each stop lying in the path of travel of said upper track member to limit the oscillatory motion thereof, a second pair of stops one on each side of the lower track member, each second stop lying in the path of travel of said lower track member to limit the oscillatory motion thereof, a second upper stationary track member located on one side of the first upper track member, a second lower stationary track member located on the other side of the first lower track member, said first upper and lower track members being in vertical alignment when each is abutted against one of its associated stops, and said first upper and lower track members being aligned with the second lower and upper track members respectively when each is abutted against the other of its associated stops, and a pair of window panes carried by said track members, and movable therealong.

2. A combination as set forth in claim 1 having a vertical guide for the hinge of one of the first track members which permits said hinge to reciprocate transversely of the axis of rotation and thereby allows the track members to be moved out of registration.

3. A combination as set forth in claim 1 in which there is provided a vertical guide for the hinge of one of the first track members which permits said hinge to reciprocate vertically and thereby allows the track members to be moved out of registration.

4. A combination as set forth in claim 1 in which there is provided a vertical guide for the hinge of the first lower track member which permits said hinge to reciprocate vertically and thereby allows the track members to move out of registration, and means to urge the lower hingedly mounted track members upwardly.

5. A combination as set forth in claim 1 in which the first lower track member and the associated second upper track member have a similar slight longitudinal curvature and the pane which slides between said track members has a similar curvature, and in which the first upper track member and the associated second lower track member have a similar slight longitudinal curvature and the pane which slides between said latter pair of members has a like curvature.

6. A combination as set forth in claim 1 in which there is provided a vertical guide for the hinge of one of the first track members which permits said hinge to reciprocate vertically and thereby allows the track members to be moved out of registration, in which the lower first track member and the associated second upper track member have a similar slight longitudinal curvature and the pane which slides between said track members has a similar curvature, and in which the first upper track member and the associated second lower track member have a similar slight longitudinal curvature and the pane which slides between these said latter pair of members has a like curvature.

7. A window comprising a frame, an upper track member, a hinge for the latter located at the top thereof and having a horizontal axis of rotation, a lower track member, a hinge for the latter located at the bottom thereof and having a horizontal axis of rotation, said axes of rotation being in the same vertical plane, a pair of stops one on each side of said upper track member, each stop lying in the path of travel of said upper track member to limit the oscillatory motion thereof, a second pair of stops one on each side of the lower track member, each second stop lying in the path of travel of said lower track member to limit the oscillatory motion thereof, a second upper stationary track member located on one side of the first upper track member, a second lower stationary track member located on the other side of the first lower track member, said first upper and lower track members being in vertical alignment when each is abutted against one of its associated stops, and said first upper and lower track members being aligned with the second lower and upper track members respectively when each is abutted against the other of its associated stops, a pair of window panes carried by said track members and movable therealong, and retroverted marginal edges on said track members, said edges serving to maintain said panes in any adjusted position along said track members.

JULIUS KIRSCHSTEIN.
CARMINE C. J. MAFFEI.

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