June 12, 1956 T. HAUCK 2,750,015

REVERSIBLE WINDOW STRUCTURE

Filed Aug. 29, 1951 4 Sheets-Sheet 1

Fig. 1.

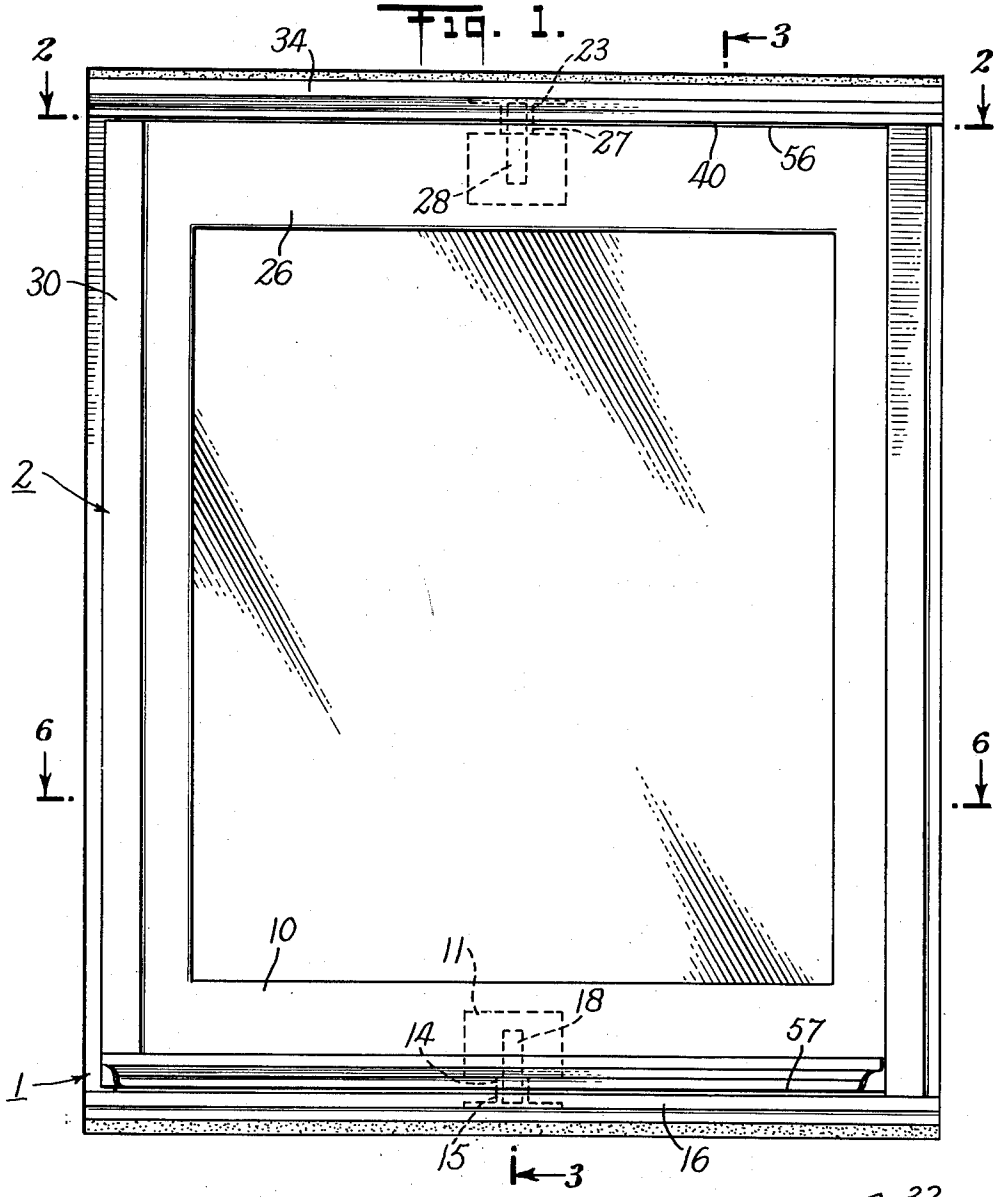
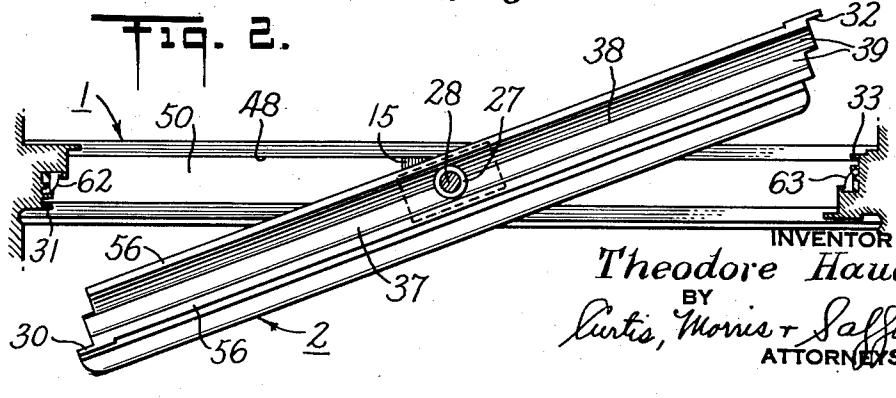


Fig. 2.



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Fig. 3.

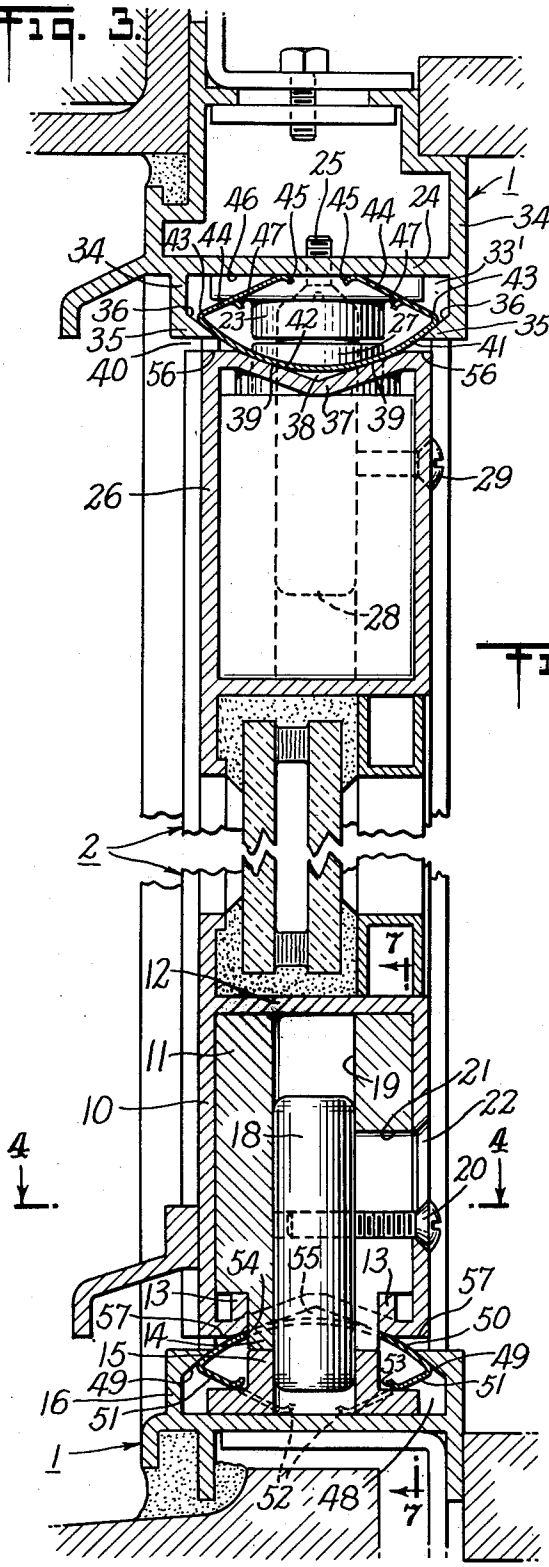


Fig. 4.

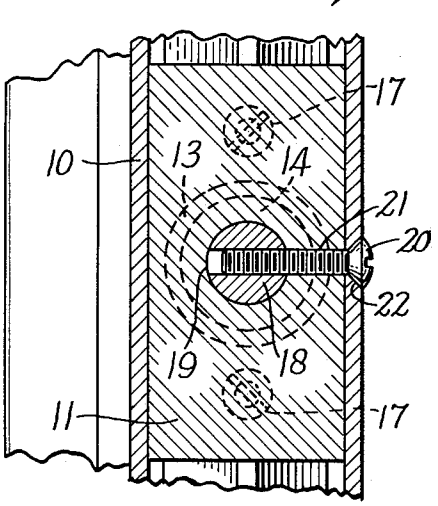
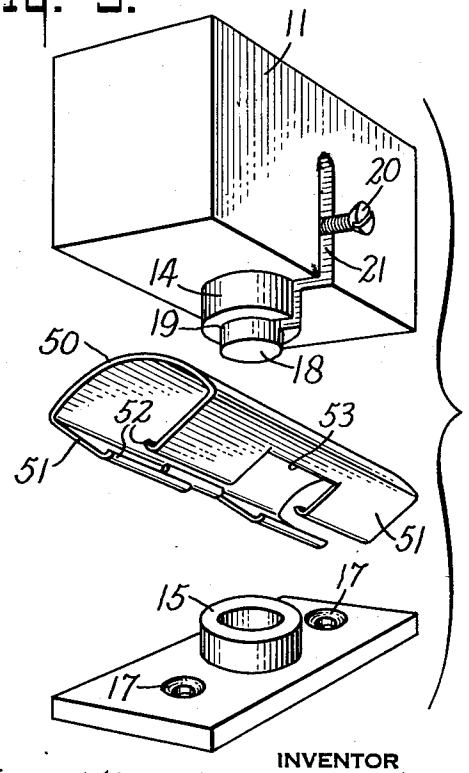


Fig. 5.



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REVERSIBLE WINDOW STRUCTURE

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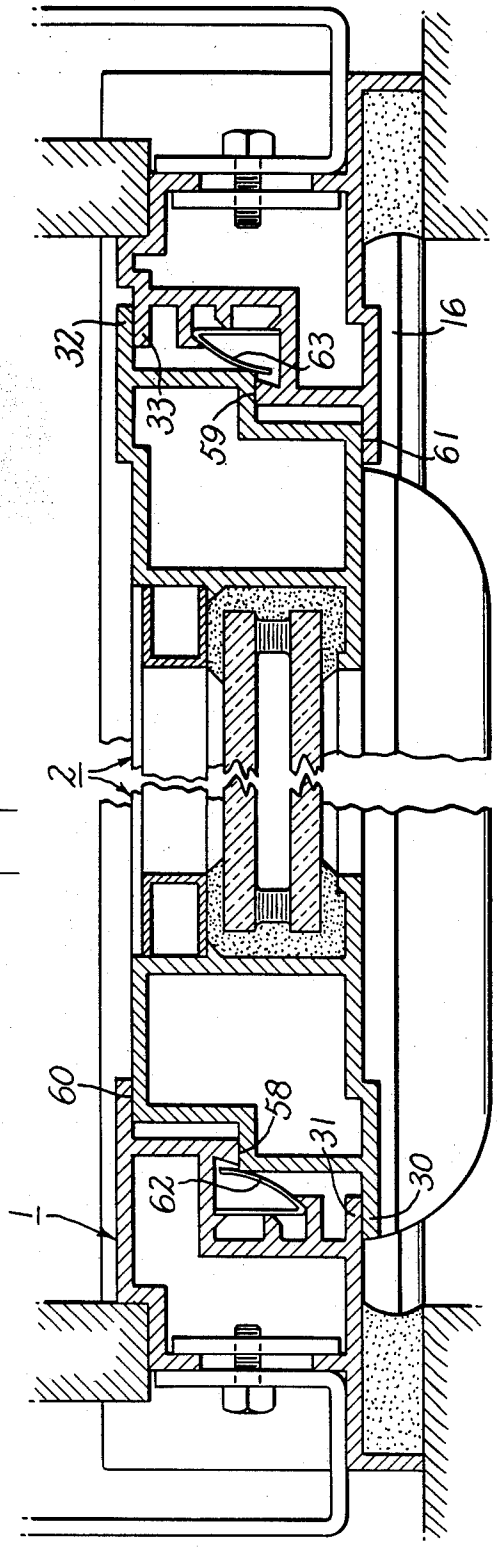


Fig. 6.

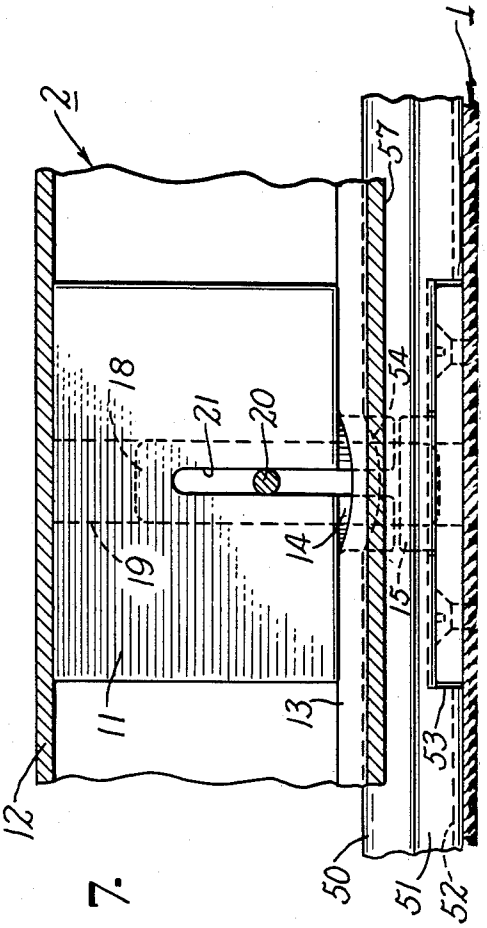


Fig. 7.

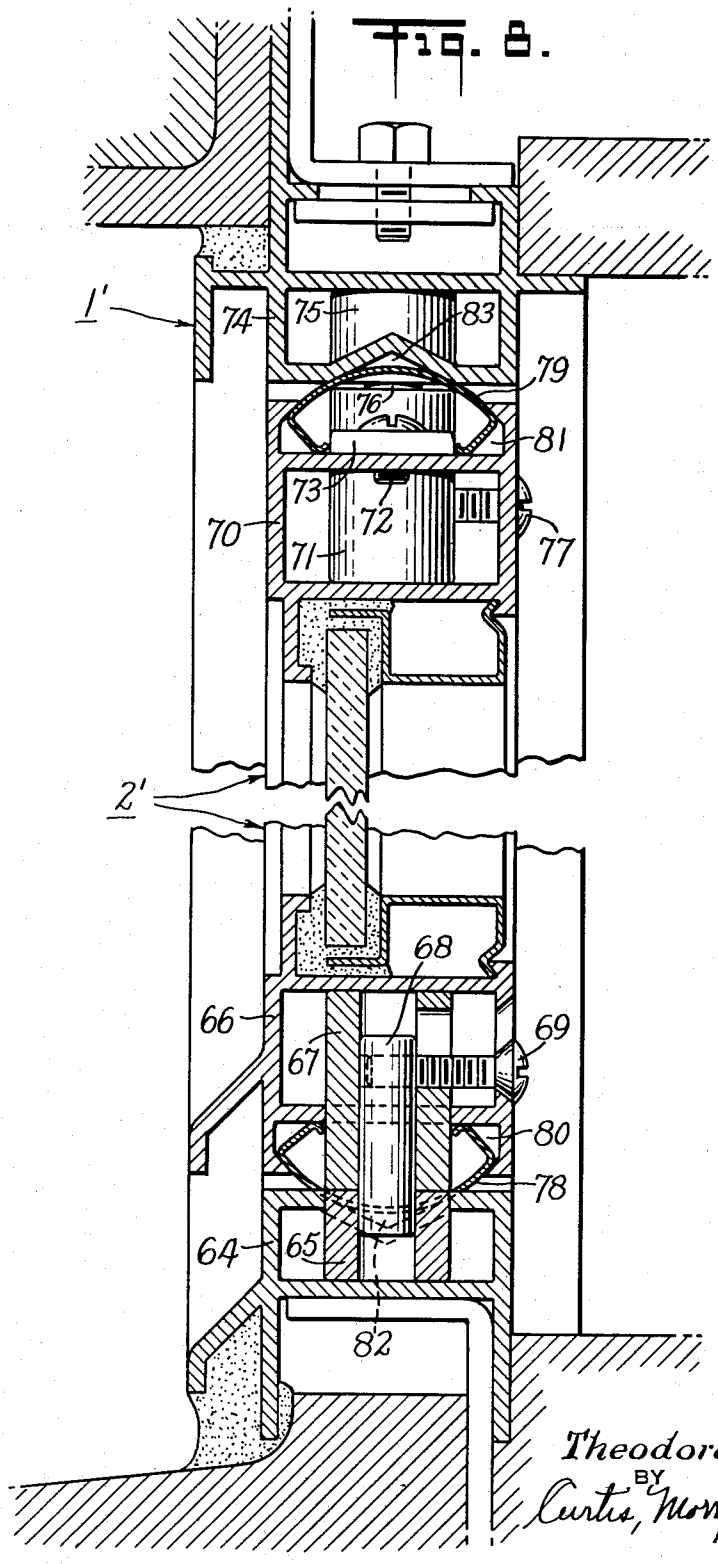
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REVERSIBLE WINDOW STRUCTURE

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Fig. 8.



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United States Patent Office 2,750,015 Patented June 12, 1956

2,750,015

REVERSIBLE WINDOW STRUCTURE

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Application August 29, 1951, Serial No. 244,201

15 Claims. (Cl. 189—69)

This invention relates to a reversible metallic window structure which is vertically pivoted so that its position may be substantially reversed for cleaning and other purposes.

It is an object of the invention to provide a window structure which is adapted to move on a vertical pivot from its closed position to a reverse position of substantially 180°, making it possible for one to clean the glass on both sides while standing in the room and thus eliminating the hazard usually attending the cleaning operation with a consequent reduction of insurance rates for professional cleaners; and to produce such a window wherein the sash, when reversed, will have contact with the sill, header and jambs to effectuate a substantial seal therewith at least to sufficient extent to minimize the disturbance of the air conditioning of the room, and wherein the sash is frictionally latched in such position with the result that, even though the sash be accidentally left in that position, the window opening will be substantially closed.

If desired, an automatic, positive latch may be provided to additionally secure the sash in the reverse position.

It is an object of the invention to provide a structure which may be pre-fabricated at the factory, the frame and sash thereof disassembled for shipment, if desired, and reassembled after installation of the pre-fabricated frame in the building and in such manner that the spaces between the frame and the sash efficiently will be weather sealed, and in which the accidental displacement of the sash will be prevented.

A further object of the invention resides in the provision of a sash, frame and weatherstripping combination of such form and arrangement and in which the elements are so integrated that the horizontal weatherstripping will tend to maintain the sash closed and the application of pressure which tends to open the sash will at the same time render the horizontal weatherstripping more effective as a weather seal and as a resistor to the opening of the sash.

A further object of the invention is to so construct and arrange the sash, frame and weatherstripping that when the sash is in its reversed position, for washing, for instance, the horizontal weatherstripping will tend to maintain the sash in that position.

In the drawings which are for the purpose of illustrating my invention in a physical embodiment:

Figure 1 is a front elevation of this embodiment, partly broken away and showing the general form of the window;

Figure 2 is a horizontal sectional view on line 2—2 of Figure 1, showing the sash in a partly open position;

Figure 3 is a vertical sectional view on line 3—3 of Figure 1;

Figure 4 is a section on line 4—4 of Figure 3;

Figure 5 is an exploded view of the lower sash mounting members and the weather seal and retaining member;

Figure 6 is a horizontal section on line 6—6 of Figure 1;

Figure 7 is a section on line 7—7 of Figure 3; and

Figure 8 is a vertical sectional view of a modified form of the invention wherein the weather sealing and retaining member is carried by the sash rather than by the frame as in the embodiment illustrated in Figure 3, for instance.

In the illustrated embodiment of Figures 1 through 7 of the invention the metallic window frame, which may be of extruded aluminum, is indicated generally by the reference numeral 2, while in the form illustrated in Figure 8 the frame is indicated generally by the reference numeral 1′ and the sash by the reference numeral 2′.

The sash may be swung from its closed position as illustrated in Figure 1, about a vertical axis into the position shown in Figure 2, and this swinging may be continued until the right side of the sash as shown in Figure 2 is adjacent the left side of the frame, in which position the sash will be substantially reversed so that the outside of the sash is presented to the room which, of course, will facilitate cleaning of both sides of the window light or lights.

Referring now to Figure 3, the hollow lower rail 10 of the sash carries a mounting block 11 substantially midway between its ends, which mounting block is housed within the hollow rail and is preferably of the form shown in Figure 5, being held between the upper wall 12 of the lower rail and upwardly turned supporting members 13. Extending downwardly from this mounting block 11 is a cylindrical bearing member 14 which rests upon a supporting bearing member 15 carried by the sill 16 and secured thereto by suitable means such as fasteners passing through the openings 17.

The bearing members 14 and 15 have aligned openings substantially ciruular in cross section. A vertically movable pintle 18, substantially circular in cross section, is mounted in a recess 19 similar in cross section in the mounting block 11 and, when the sash is in position in the frame, extends through the bearing member 14 and into the bearing member 15. This vertically movable pintle is secured in position by a fastener such as a screw 20. This screw has screw threaded engagement with the pintle 18 and extends through a slot 21 in the mounting block 11 and the bearing member 14 and extends, also, through an aligned slot 22 in the lower rail 10 of the sash, the head of the said screw 20 being arranged to frictionally and tightly engage the sides of the slot when the screw is driven home into its securing position.

When the parts of this lower mounting assembly of the sash are in the positions shown in Figure 3 of the drawing the sash is capable of being swung horizontally with the bearing member 14 rotating upon the fixed bearing member 15 so that the window may be swung to its various positions.

The lengths of the pintle 18 and of the recess 19 are such that when the screw 20 is loosened to permit the vertical movement of the pintle the lower end of the pintle may be raised to at least the height of the lower edge of the bearing member 14, which will permit the removal of the lower end of the sash from the frame.

The upper mounting of the sash is somewhat similar to that of the lower mounting. A bearing member 23 is secured to the wall 24 of the header by means such as a screw 25 and the upper rail 26 of the sash carries a bearing member 27. The bearing members 23 and 27 have aligned recesses similar to those in the lower mounting elements. This upper mounting member is provided with a pintle 28 similar to the pintle 18 and the pintle is similarly mounted and vertically movable and held in position in a manner similar to that described in connection with the lower mounting, the securement being by means of a screw 29.

With this mounting the pintles 18 and 28 may be released by the screws 20 and 29 and withdrawn from the bearing members through which and into which they

project, so that the sash will be released for removal from the frame.

Of course in installing the sash in the frame the pintles are similarly withdrawn into the sash and held in their withdrawn position so that the sash may be placed in the frame and the pintles then moved into their operative positions and secured by the screws 20 and 29. The horizontal cross section of this form of the invention illustrates the configuration of the extruded metal frame and sash and discloses the cooperative forms of these members which will permit the sash to swing in the manner heretofore described.

It is to be noted that at one side of the sash there is a flange 30 which engages, when the sash is closed, a corresponding flange 31 on the frame and on the opposite side of the window there is a flange 32 on the sash which engages the flange 33 on the frame, thus forming a weather seal at the opposite sides of the vertical rails of the sash, and permitting the window to be swung to its various open and reverse positions.

Since the window swings about the vertical pivot there are no such flanges on the upper and lower rails of the sash or the header and sill of the frame.

In order that the spaces between the horizontal rails of the sash and the header and sill of the frame may be weather sealed, that the sash will be retained in its closed position even when unlocked, and that the sash will be retained in its various open positions by a resilient frictional latching, I have provided a weatherstripping and retaining arrangement.

In the embodiment shown in Figure 3 of the drawings this comprises an open-sided pocket 33 which extends substantially the full length of each of the header and the sill.

In the header this pocket is formed by downwardly extending flanges 34 which have inwardly turned supporting ribs 35 that extend toward each other and terminate in spaced relation to form an opening therebetween, the supporting ribs extending substantially the length of the header. These supporting ribs are provided with downwardly inclined surfaces 36 which converge toward each other for a purpose that later will be described.

The upper wall 37 of the upper rail 26 is provided with a channel 38 which extends substantially the length of the upper rail and is provided with converging inclined surfaces 39 which intersect substantially midway between the sides of the rail and are in effect and to some extent a continuation of the inclined surfaces 36 of the supporting rib 35, the continuity being interrupted by the space 40 between the upper rail and the header.

A resilient sealing and retaining or sash latching member, indicated by the reference numeral 41, is mounted within the pocket 33' and extends substantially from end to end of the pocket and of the header and upper rail of the sash. This sealing and retaining or sash latching member 41 comprises a transversely curvilinear sash engaging portion 42 which is normally resiliently urged outwardly of the pocket 33, to engage in the channel 38 when the sash is closed and to lie in the path of movement of the upper wall of the sash when the sash is being moved from a closed to an open position.

This sash-engaging portion 42 is itself resilient and may be formed of any desirable and well known metal having such characteristic. This sash engaging portion 42 is supported and retained in the pocket 33' by the inclined surfaces 36 and, as will be noted, the ends 43 thereof terminate short of the side walls of the pocket 33', or otherwise expressed, of the inner remote ends of the supporting surfaces 36 so that it may have freedom of movement along these surfaces to permit this sash engaging portion 42 to move inwardly and outwardly into and from the pocket 33' as required and as effectuated by the movements of the sash.

In order that the sash-engaging portion may be normally extended from the open pocket 33' to engage in the channel 38 when the sash is closed, or to lie in the path of movement of the sash when the sash is being opened or closed, I have provided resilient actuating members 44 which may be integral with the sash-engaging portion 42. These resilient actuating members extend upwardly from the ends 43 of the sash engaging portion 42 and are substantially coextensive longitudinally with the portion 42. The overturned edges 45 of the actuating members 44 forcibly and resiliently engage and are capable of sliding upon the lower surface 46 of the upper wall 24 of the header and they function to resiliently force the sash-engaging portion to extend from the open side of the pocket 33' and yet they slide upon the surface 46 when the portion 42 is forcibly moved upwardly by the movement of the sash.

Where the bearing members 23 and 27 occur the resilient actuating members 44 are recessed to accommodate the bearing member 23 in a manner similar to that illustrated in Figure 5, being provided at this location with turned edges 47 to permit freedom of sliding movement on the base of the bearing member 23.

The sill is provided with a pocket 48 similar to the pocket 33' and this pocket is provided with similar inclined converging spaced surfaces 49. A weather sealing and retaining member similar to that already described is maintained within this pocket 48 and is provided with the sash-engaging portion 50 and the resilient actuating members 51 with the turned edges 52. These actuating members are similarly recessed at 53 to accommodate the bearing member 15. The edges of the sash-engaging portion 50 have freedom of movement on the converging inclined surfaces 39 in a manner similar to that shown and described in connection with the upper construction and the portion 50 is urged resiliently from the pocket 48 in a manner similar to that described in connection with the upper construction. This sash engaging portion 50 is provided with an opening at 54 to accommodate the downwardly extending bearing member 14 and the upper sash engaging portion 42 of the upper sill and retaining member is provided with a similar opening to accommodate the bearing member 27.

The sash-engaging portion 42 of the upper sealing and retaining member 41 has a sealing contact with both of the surfaces 36 and also with the converging inclined surfaces 39 of the channel 38, and because of the curvilinear form of this portion 42 the contacts are substantially line contacts, which in a weather sealing and retaining member of this general type makes possible a longitudinal flexing of the member 41 and consequently an effective sealing arrangement.

In this specific form of the sealing and retaining structure at the upper end of the window it will be realized that there is a four-point sealing and retaining contact, but I wish it to be understood that the invention is not at all limited to this four-point contact because the forms of the integrated structures may be changed to accomplish a lesser or a greater number of contacts as will be realized by one skilled in the art.

In connection with the lower integrated structure of the sealing and retaining arrangement, the portion 50 lies in and engages a channel 55 of a form similar to that of the channel 38 and here again the cooperation is substantially the same as that heretofore described in connection with the upper construction and here again the four-point contact is effectuated, and here again that four-point contact may be increased or decreased by a variation in the forms of the integrated structures.

The principal path that the weather would take, referring to the upper construction as shown in Figure 3, by way of example, would be through the opening 40 between the sash and the header. If air under pressure accompanied by moisture or otherwise, is forced against the window it will tend to pass into the opening 40 and between the adjacent side of the sash-engaging portion 42 and the surfaces of the channel 38 against which that

portion 42 is forced. This pressure will tend to raise that portion as at the left side of Figure 3 for instance, against the counterforce of the adjacent resilient actuating member 44 and in so doing will force the opposite side of the sash engaging portion into tighter contact with the surface of the channel 38 with which this portion of the member 42 is engaged, and thus will tend more effectively to seal the space 40. Moreover, it will be noted that the converging inclined surfaces 39 of the channel 38 and the curvilinear form of the sash engaging portion 42 of the weather sealing and retaining member 41 form a pocket below the portion 42 with surfaces that converge toward the inside of the window and thus if air pressure enters between the sash engaging portion 12 and the surfaces 39 at the outside of the window it will build up a counterpressure in the pocket formed by these converging surfaces, which pressure will tend to repel the entry of the weather between the sash and the frame, and the greater the outside pressure the greater the repelling counterforce. The same actions occur at the sill location because the constructions are substantially the same with only such mechanical adaptations as are necessary.

It will be realized that with this construction that has been described a very effective weather seal will be the result, and it will also be realized that because of the member 41 at the upper end of the sash and the corresponding member at the lower end of the sash, and their cooperation with the channels 38 and 55, the weather sealing and retaining members will also act as resilient latching members to retain the window in a closed position even against air pressure that is exerted on the outside, even if the window is unlocked and even if the air pressure on the opposite sides of the vertical pivot is unequaled. This is because to open a window under the air pressure it is necessary to effectuate a movement of the sash engaging portions 42 and 50 of the weather sealing and retaining or resilient latching members into the pockets in which these members are mounted and against the counterforce exerted by the resilient actuating members 44 and 51.

Moreover, as the window is being opened into the position shown in Figure 2, for instance, the sash engaging portions 42 and 50 must be forced into the pockets against the counterforce of the resilient actuating members 44 and 51 and so these members are placed under greater than normal tension, with the result that when the window is in the position shown in Figure 2, or a position of reversal, or any position between the two, that greater force will exert itself against the surfaces of the upper and lower rails of the sash beyond the channels 38 and 55, which surfaces on the upper sash are indicated at 56 and at the lower end of the sash at 57.

Thus it will be seen that with this construction the spaces between the upper and lower rails of the sash and the header and sill, respectively, effectively will be weather sealed, the sash will be retained in its closed position even when unlocked, by a force which increases as the tendency of the sash to open under air pressure increases, and the sash will be retained or latched in its various open positions by a resilient force, and because of the necessity of the upper and lower rails of the sash to move along the surface of the sash-engaging portions of the weather sealing and retaining members, the frictional contact which is maintained by the resiliency of the actuating member will resist the movement of the sash.

The spaces between the vertical side rails of the sash and the frame may be sealed in any desirable manner. I have pointed out that in the form illustrated in Figure 6 there is a sealing between the flanges 30 and 31 and between the flanges 32 and 33. There is also a sealing at the location 58 on one side of the sash and at the location 59 on the other side of the sash and, additionally, at the locations 60 and 61. These side spaces are also sealed by

the weather stripping 63 on the other side of the sash in a manner well known in the art, and which forms no part of my invention.

When the sash is in its reversed position the flange 30 (Figure 2) will engage the flange 31 on the right side of the frame and the flange 32 will engage the flange 33 on the left side of the frame and this engagement taken with the effectiveness of the weather sealing arrangement at the sill and header will substantially seal the window opening with the result that, even during cleaning, the air condition within the room will not be disturbed.

In the form of the invention illustrated in Figure 8 the principal difference lies in the fact that the weather sealing and retaining members are carried by the sash rather than by the frame and mechanical adaptations are made to put this structure into effectuation.

In this form of the invention the sill 64 carries a bearing member 65 and the lower rail 66 of the sash carries a bearing member 67 in which the pintle 68 is movable as heretofore described in connection with the other form, and which pintle is secured in position by a screw 69. At the upper end of the sash the upper rail 70 carries a bearing member 71, which is secured by a screw 72 passing through a flange 73 to the wall of the upper rail of the sash. In this form of the invention the header 74 carries a bearing member 75 and a pintle 76 which extends downwardly through the bearing member 71 carried by the upper rail of the sash and is secured in said latter bearing member by the screw 77.

The resilient weather sealing and retaining or latching members 78 and 79 are constructed similarly to those heretofore described in connection with the form of the invention shown in Figure 3, and are located and arranged similarly in similar pockets 80 and 81, being properly cut away or recessed to accommodate the bearing members in a manner somewhat similar to that described in connection with the form shown in Figure 3. The sash engaging portion of these weather sealing and retaining members engages in pockets 82 and 83, which pockets are similar to the pockets described in connection with Figure 3 and the sash engaging portions of the weather sealing and retaining members cooperate with these pockets in a manner similar to that described in connection with Figure 3.

It will be realized that this invention lies in a window construction which may be made of extruded metal such as aluminum, and which comprises a frame and a vertically pivoted sash that may be swung horizontally to various open positions or to a reversed position, and it will be further realized that the invention includes a mounting for the sash that is so constructed that the window as a whole may be pre-fabricated in the factory, may be disassembled and the sash and frame shipped to the job as transportation conditions require, and with proper protection, and re-assembled at the job after the frame has been emplaced in the building, and reassembled the sash will be retained in its proper position in relation to the frame against any accidental displacement by an automatically variable force. The invention further includes the provision of an integrated structure which will weather seal the spaces between the upper and lower rails of the sash and the header and sill respectively, and between the side rails of the sash and the jambs of the frame, and in which there is provided an integrated structure which not only effectively weather seals, but which tends to maintain the sash in its closed position, even though unlocked, and against wind pressure, and with an increasing force as the sash tends to open. The invention also includes so integrating this structure that when the sash is open partly, or even to a reversed position, there will be a resilient latching of the sash in its various positions.

I have described two forms of this invention to comply with the statute R. S. 4888, but it is to be understood that I do not wish to be limited to the specific forms illustrated, as various other forms may be used, and such other forms will occur to those skilled in the art upon, and as

a result of, an examination of the embodiments that I have illustrated.

In the claims I have pointed out the combinations that I consider to be my invention, and in each claim I have recited what I consider to be my invention, and I do not desire to have read into any claim limitations expressed in other claims, except in so far as I express those limitations myself.

I claim:

1. In a metallic window construction comprising a frame comprising header, sill and jamb members and a sash, having upper and lower horizontal rails and vertical side rails, and pivoted within said frame on vertical pivots arranged substantially midway between said side rails, the improvement which includes bearing members carried by the header and sill of said frame, complemental bearing members carried by both horizontal rails of said sash and aligned with said first mentioned bearing members, vertically movable pintles mounted in said upper and lower horizontal rails of said sash and extending into said bearing members in sash pivoting positions and vertically removable from said bearing members carried by said header and sill into sash releasing positions and securing devices for securing said pintles in both of said positions, said securing devices comprising a screw member for each pintle carried by the adjacent horizontal sash rail and engageable with said pintle to secure the pintle in both of its said positions, one of said screw members being vertically movable and extending through the adjacent sash rail for manual engagement and movement.

2. The combination of elements recited in claim 1 wherein said pintles are mounted in blocks carried by said upper and lower horizontal rails of said sash through which said screws extend.

3. In a metallic window construction having a frame comprising header, sill and jamb members and a sash, having upper and lower horizontal rails and vertical side rails, vertically pivoted within said frame on pivots arranged substantially midway between said side rails, the combination which includes a combined weather sealing and sash latching structure comprising a resilient, transversely curvilinear sealing and sash latching member arranged between and extending longitudinally along one of said horizontal sash members and the adjacent horizontal frame member and carried by and extending from one of said members and engaged within a longitudinal channel in the other of said members and resilient actuating members resiliently urging said resilient member into said channel, the resiliency of said actuating members being such as to permit said sealing and latching member to move into and out of said channel upon swinging movements of said sash and comprising spring members extending from both edges of said curvilinear member through substantially the entire length of the latter and engaging the horizontal member opposing that in which said channel is located.

4. The combination of elements recited in claim 3 wherein said channel has faces diverging toward the inner and outer sides of said sash and wherein both of said resilient actuating members urge said resilient sealing and latching member into engagement with said diverging faces by forces exerted in divergent directions.

5. The combination recited in claim 3 wherein said resilient sealing and latching member is carried by said frame and said channel is located in the adjacent horizontal member of said sash, both of said actuating members slidably bearing against a face of said frame.

6. The combination of elements recited in claim 3 wherein said resilient sealing and latching member is carried by a horizontal member of said sash and said channel is located in the adjacent horizontal member of said frame, both of said actuating members slidably bearing against a face of said sash.

7. In a metallic window construction having a frame comprising header, sill and jamb members and a sash, having upper and lower horizontal rails and vertical side rails, vertically pivoted within said frame on pivots arranged substantially midway between said side rails, the combination which includes a weather sealing and sash latching construction comprising a resilient, transversely curvilinear sealing and sash latching member arranged between and extending longitudinally along each of said horizontal sash members and the adjacent horizontal frame member and carried by and extending from one of said horizontal members and engaged within a channel in the other of said members and resilient actuating members resiliently urging said resilient members into said channels, the resiliency of said actuating members being such as to permit said sealing and latching member to move into and out of said channel upon swing movements of said sash and comprising spring members extending from both edges of said curvilinear member through substantially the entire length of the latter and engaging the horizontal member opposing that in which said channel is located.

8. The combination recited in claim 7 wherein said resilient sealing and sash latching members are carried by said frame and said channels are located in the adjacent horizontal members of said sash both of said actuating members slidably bearing against a face of said frame.

9. The combination of elements recited in claim 7 wherein said resilient sealing and sash latching members are carried by the horizontal members of said sash and said channels are located in the horizontal members of said frame both of said actuating members slidably bearing against a face of said sash.

10. The combination of elements recited in claim 7 wherein said channels have faces divering toward the inner and outer sides of said sash and wherein said resilient actuating members urge said resilient sealing and latching members into engagement with said diverging faces.

11. In a metallic window construction having a frame including header, sill and jamb members and a sash, having upper and lower horizontal rails and vertical side rails, said sash being vertically pivoted in said frame on pivots arranged substantially midway between said side rails, the combination which includes bearing members carried by the header and sill of said frame, bearing members carried by the horizontal rails of said sash and aligned with said first mentioned bearing members, vertically movable pintles mounted in said upper and lower horizontal rails and extending into said bearing members on said header and sash and vertically movable from said bearing members carried by said header and sill and securing devices for securing said pintles in various vertical positions to permit the removal of said sash from and the installation of said sash in said frame and to secure said sash against accidental displacement from said frame, and resilient securing and latching members arranged between said header and said upper horizontal rail and between said sill and said lower horizontal rail and extending longitudinally thereof for substantially the lengths of said rails and resiliently latching said sash substantially within the plane of said frame irrespective of the positions of said pintles whereby said sash will be maintained within said frame when said pintles are disengaged from said bearing members in said header and sill.

12. The combination of elements recited in claim 11 wherein said resilient securing and latching members are provided with resilient portions having resilient contact with said bearing members.

13. In a metallic window combination having a frame comprising a header, sill and jambs and a sash mounted to swing on vertical pivots located substantially midway between the side edges of the sash, the said sash having horizontal upper and lower rails and vertical side rails, the improvement which comprises a channel in said sill extending substantially throughout its length and having

upwardly and inwardly converging faces terminating in spaced relation to form a longitudinal opening therebetween, a pair of downwardly and outwardly diverging faces on the lower face of the lower horizontal sash rail bridging said opening in said sill and extending substantially coextensive therewith, a weather sealing and sash retaining member mounted in said channel in said sill and substantially coextensive with said channel comprising a curvilinear portion, the edge portions of which slidably engage said upwardly converging faces in said channel and interemdiate portions of which engage the downwardly and outwardly divering faces in the lower rail of said sash and resilient actuating members for urging said curvilinear portion forcibly into engagement with said faces at said contacting portions which actuating members engage and operate against the lower face of said channel in said sill.

14. The combination recited in claim 13 wherein said resilient actuating members extend inwardly and downwardly from the edges of said curvilinear portions into slidable engagement with the lower face of said channel in said sill.

15. The combination recited in claim 14 wherein one

of said pintles is mounted in bearing members located in said lower rail of said sash and in said channel in said sill and wherein said curvilinear portion of said sealing and retaining member is provided with an opening for the reception of said bearing members and said actuating members are provided with resilient portions which slidably and forcibly engage a face of the bearing member located within said channel in said sill.

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