Jan. 8, 1952 G. B. ARNOLD 2,581,465

WINDOW CONSTRUCTION

Filed Feb. 7, 1950 3 Sheets-Sheet 1

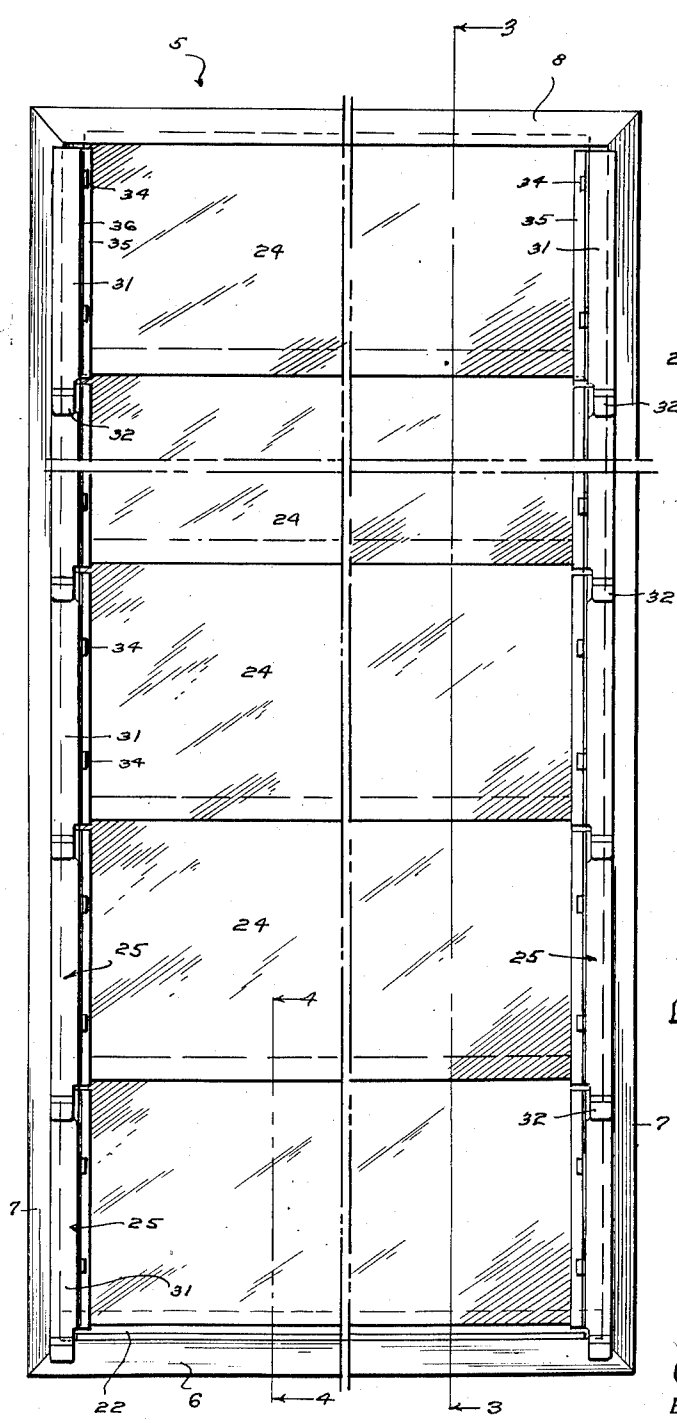


FIG. 1.

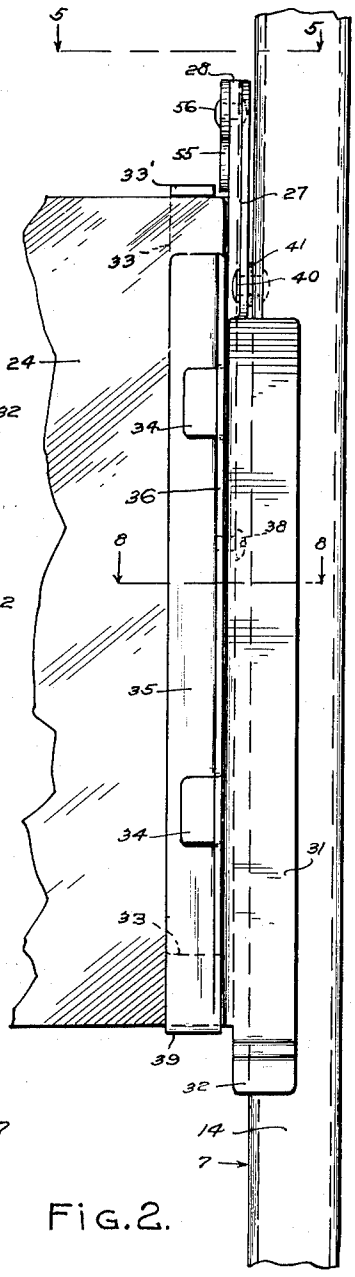


FIG. 2.

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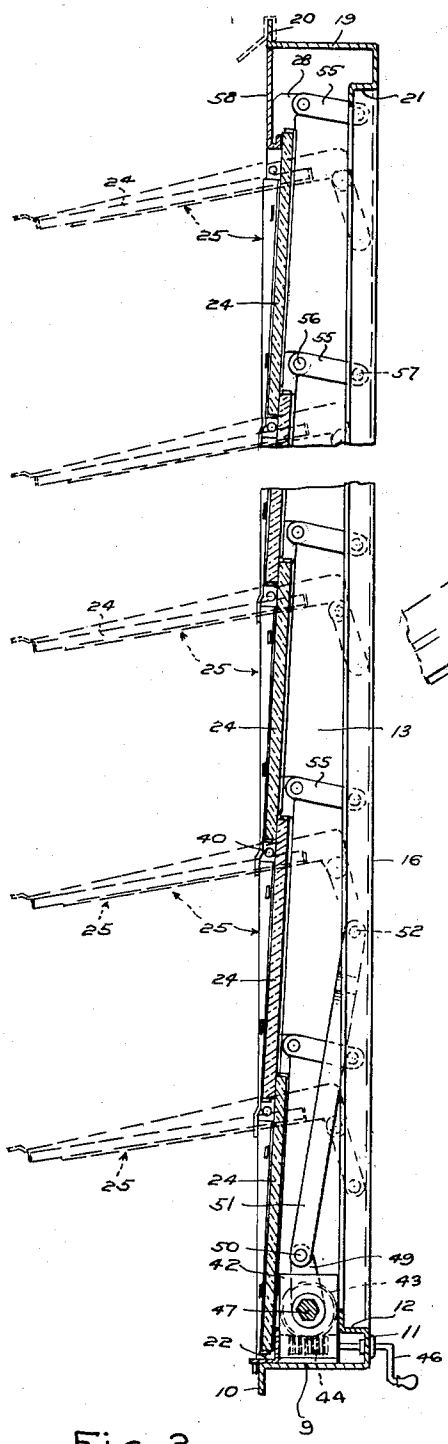


FIG. 3.

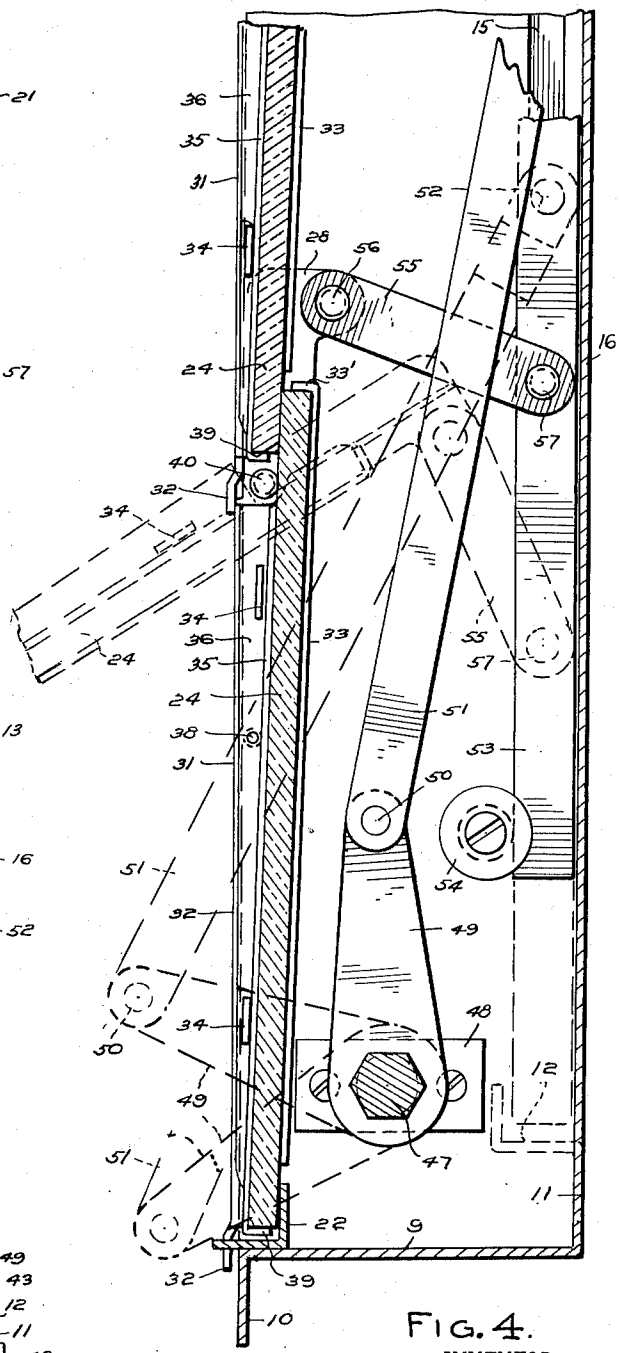


FIG. 4.

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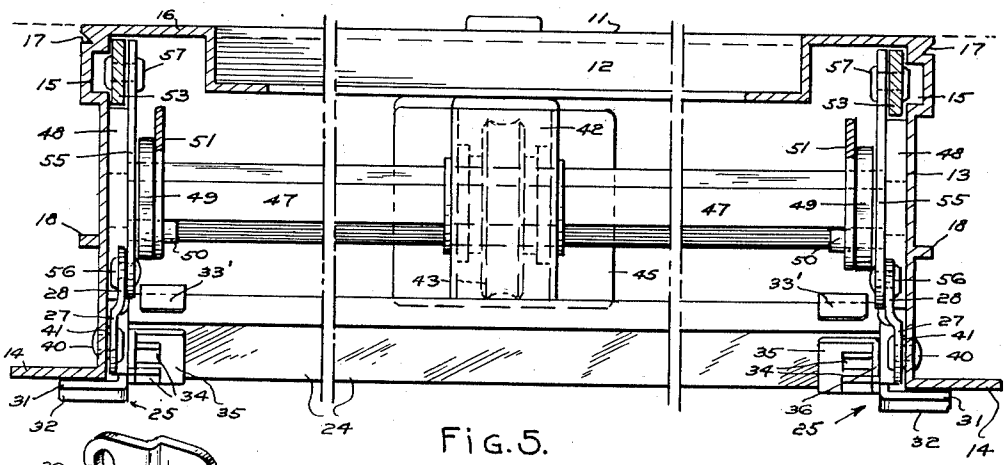


Fig. 5.

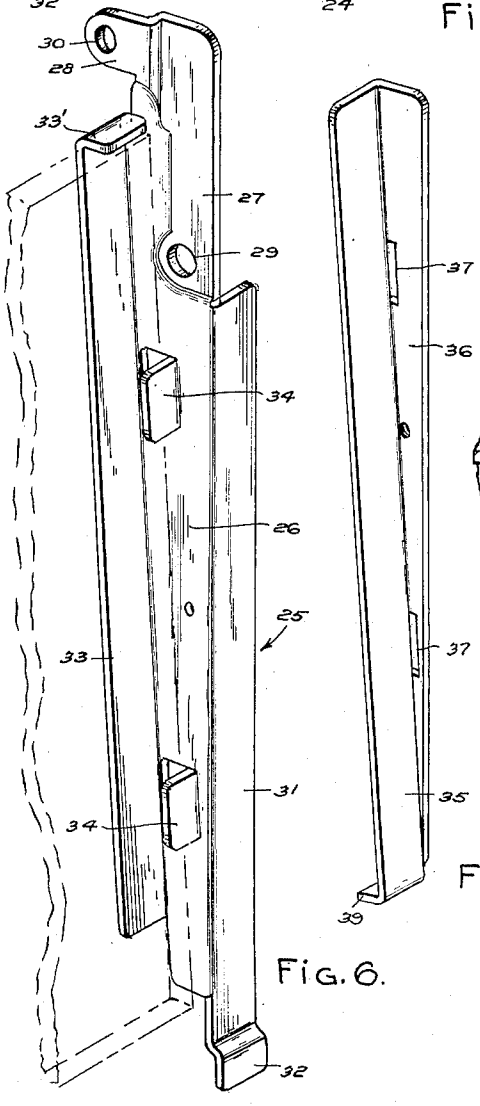


Fig. 6.

Fig. 7.

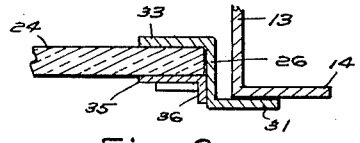


Fig. 8.

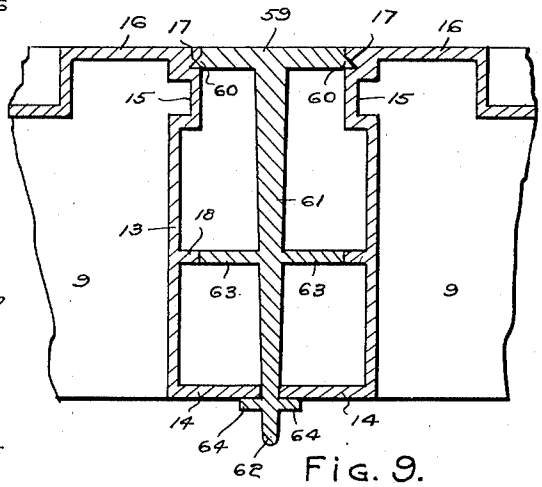


Fig. 9.

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Patented Jan. 8, 1952

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UNITED STATES PATENT OFFICE

2,581,465

WINDOW CONSTRUCTION

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Application February 7, 1950, Serial No. 142,870

10 Claims. (Cl. 189—62)

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This invention relates to improvements in window structures and has particular reference to windows of the type having a plurality of horizontally swung panels to be shifted in unison in a vertical plane.

A very important object of the invention resides in a novel manner of supporting the several panels or louvers with their horizontal edges in overlapping relation in weathertight engagement and with the several panels being angularly disposed in an identical manner with respect to the side jambs of a supporting frame.

A further and very important object of the invention resides in novel forms of end brackets for the mounting and swinging support of preferably transparent panels, through the medium of which the panels are shifted to unison in an arc of approximately ninety degrees with the end brackets constructed in a manner to overlie the reveal of the frame jambs to provide an adequate weather stop for the ends of the several panels, with the overlying portions of the brackets arranged at an angle with respect to the panels and having parallel weathering contact with the jamb reveals when the panels are in the fully closed position.

An outstanding objectionable feature of louvered or panelled windows heretofore employed, is their inability to exclude the entry of foreign matter past their end mounting brackets, permitting the passage of rain and wind thereby, thus limiting the usefulness of the window. The structure of prior art windows having the above objectionable features eventually become difficult to operate, due to dust and dirt collecting about and on the operating mechanism, requires a continuous maintenance cost and the leakage of air past their brackets presents a serious objection, especially during cold spells.

The window of the present invention, due largely to the very novel form of end brackets and their unusual rigid construction, permits of the use of relatively wide panels of glass, plastic, wood or any other suitable material and, when employing glass, presents a very desirable closure having the appearance of the commonly referred to picture windows, provides a maximum opening for the passage of air and due to their peculiar mounting and operating mechanism, are easily swung to open and closed position with a minimum of effort. The end brackets, while providing a very effective weather stop between the ends of the panels and the frame jambs, further overlap each other at their upper and lower ends.

Another and very important object of the invention resides in the mechanism for swinging the several panels to open and closed position with the torque equally distributed to each bracket in a manner that avoids any tendency toward a twisting of the panel, imparts an equal pressure upon each panel throughout its length to insure a perfect weathertight engagement with each other when closed and further, when the panels are closed, presents individual braces at the ends of each panel, thus maintaining them against rattling or chattering in high winds and prevents the movement of the panels to any degree against unauthorized shifting.

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A further important object of the invention resides in a very simple and novel manner of securing the panel ends in the brackets against displacement and unauthorized removal of the securing means.

The structure readily lends itself to various stock sizes of window openings or, by the mounting of fixed filler panels, the device may be constructed to accommodate any special size.

Other important novel features of construction will be readily apparent during the course of the following detailed description, reference being had to the accompanying drawings, wherein has been illustrated a preferred example of the invention and wherein like characters of reference are employed to designate like parts throughout the several figures.

In the drawings:

Figure 1 is an outer side elevation of a complete window constructed in accordance with the invention,

Figure 2 is an enlarged fragmentary outer side elevation of an end bracket and associated glass panel, in mounted position,

Figure 3 is a vertical section, taken on line 3—3 of Figure 1,

Figure 4 is an enlarged vertical section of the lower portion of the window, taken on line 4—4 of Figure 1,

Figure 5 is a horizontal section through the window frame illustrating one complete panel and associated operating elements in the closed position,

Figure 6 is a perspective view of one end bracket,

Figure 7 is a perspective view of one retaining angle for the ends of the panels,

Figure 8 is a fragmentary horizontal section taken on line 8—8 of Figure 2, and,

Figure 9 is a horizontal sectional view of a pair of adjacent window jamb sections with an improved mullion therebetween.

Referring specifically to the drawings, the numeral 5 designates a window frame as a whole, embodying a sill section 6, side jambs 7 and a header 8. The several sections are rigidly connected at their abutting ends in any desirable manner, such as angle brackets, or the like, not shown. The window frame is mounted and secured in the preformed wall or other opening in any conventional manner. The frame is preferably formed of a light weight extruded metal, such as aluminum.

The sill 6 comprises a flat horizontal wall 9 terminating at one longitudinal edge in a downwardly extending right angle flange 10 and at its inner portion, the wall is bent upwardly to form a right angle vertical flange 11, in turn bent inwardly at a right angle and then upwardly at a right angle to provide an insect screen mounting channel 12. Each side jamb comprises a flat vertical wall 13, terminating at its outer edge in a right angle flange 14. The wall 13 is equal in width to the wall 9 and at a right angle thereto, while the flanges 14 are identical in dimensions to the flange 10 as to width. Each wall 13 is grooved adjacent its inner edge, as at 15, to provide clearance for rivet heads, to be described. The wall 13 at its inner edge is bent inwardly at a right angle, as at 16, corresponding in width to the angle 11 and is then bent inwardly again at a right angle to parallel the wall 13 and then outwardly, to form a continuation of the insect screen channel 12. The screen channel 16 is of such depth as to support the insect screen flush with the inner surface of the window 5. The jambs are further provided with a triangular groove 17, adjacent their inner edges and for their entire length, for a purpose to be later described. Each jamb wall 13 is provided with a rib 18 for its entire length, with the ribs and grooves being formed upon the outer side of the wall. The header 8 is formed identical to the sill 6, embodying a horizontal wall 19, an outer right angular flange 20 and the screen groove 21. The screen channels define the inner opening of the window, while the walls 9, 13 and 19 define the outer opening of the window, with the flanges 10, 14 and 20 extending entirely around the outer opening and serving to overlie the wall opening, when the window is used as a single unit. Welded or riveted to the sill wall 9 and extending for the full length thereof, is an angle stop 22, positioned in such manner that the horizontal leg of the angle extends beyond the face of the window to provide a water drip. A conventional water drip 23 for the header 8, is shown by dotted lines in Figure 3 and frictionally clips upon the free edge of the flange 20 for its full length, as is customary.

The closure for the window of the present invention consists of a plurality of rectangular shaped, preferably transparent panels 24, adapted to be supported within the outer window opening in a manner to swing in a vertical plane. The several panels 24 are horizontally arranged and are supported at their opposite ends for swinging movement, by end brackets, designated as a whole by the numeral 25. As clearly shown, the panels when in the closed position are angularly disposed with respect to the faces of the jambs 7 and lie in overlapping and contacting position throughout their length. The panels may be formed of glass, plastic or the like and may be in various combinations of transparent and obscure, or certain of the upper panels may be colored for purposes of controlling the brilliance of the light. Obviously, wood panels may be employed, if desired.

Each end bracket, see particularly Figure 6, is formed of a single piece of formed metal, preferably aluminum and embodies a flat web section 26, tapering downwardly for its full length. The upper portion of the web 26 is offset outwardly, as at 27, with its upper terminal end provided with a rearwardly extending and inwardly offset arm 28. The offset portion 27 and the arm 28 are parallel with the web 26. The offset 27, adjacent its point of offset from the wall 26, is provided with a circular stud receiving opening 29, for the pivotal mounting of the bracket with respect to the jamb walls 13, while the arm 28 is provided adjacent its terminal end with a circular stud receiving opening 30 for a link connection, to be described. The forward edge of the web 26 is bent at a right angle, providing a weathering flange 31 which, in use, lies in parallel weathering engagement with the outer flange 14 of the jambs when the window is in the closed position. The flange 31 at its upper end terminates adjacent the point of offset 27, while its lower end projects below the lower terminal end of the web 26 and is offset outwardly to provide an overlapping tongue 32 for overlapping engagement with the upper end of the next adjacent bracket flange 31, when the window is in the closed position. The rear edge of the web 26 is bent at a right angle to form a glass supporting flange 33, extending in a direction opposite to the flange 31. The flange 33 is angularly disposed in accordance with the taper of the wall 26. The flange 33 extends above the point of offset for the portion 27 and has its terminal end bent outwardly to form a stop 33' for the panel 24. The lower end of the flange 33 terminates short of the lower end of the web 26. The web 26 has struck therefrom, a pair of spaced tongues 34, parallel with the flange 33 to serve as anchoring means for panel retaining angle strips 35, see particularly Figure 7. The strips 35 are provided with a right angle flange 36, for the major portion of their length and the flanges 36 are slotted at 37 for engagement over the tongues 34. The flanges 35 are further provided with a threaded opening for the reception of a retaining screw 38, shown by dotted lines in Figure 2. Each flange 35 has its lower terminal end bent at a right angle to form a lip 39 for engagement under the lower edge of the panel 24, at assembly. The several brackets are formed in rights and lefts and are identical on each side of the window.

In assembly of the structure so far described, the groups of left and right brackets 25 are pivotally supported in the frame 5, through the medium of cylindrical rivets 40, passing through the openings 29 and corresponding openings formed in the jamb walls 13, adjacent the outer flanges 14. Fiber or other spacing washers 41 are positioned between the wall 13 and the offset 27, to relieve frictional engagement of the offset 27. As clearly shown in Figure 8, the offset 27 adequately spaces the bracket web 26 for suitable clearance with the walls 13, thus insuring freedom of swinging movement. With all of the brackets pivotally positioned in the window opening, it then becomes necessary to assemble the operating mechanism for the swinging movement of the several brackets in unison.

Mounted upon the inner surface of the wall 9 of the sill, preferably intermediate its length, is an operating gear box 42, of any well known and desirable form, enclosing a vertically disposed

worm wheel 43, driven through the medium of a worm 44. The worm and worm wheel 44 and 43 are suitably journalled in the box 42. The box is rigidly held in position in any suitable manner, as by leg flanges 45, bolted or otherwise fixed to the wall 9. An operating crank 46, passes through a suitable opening in the angle 11 for non-rotative engagement with the worm 44. The worm wheel shaft is provided axially thereof with a non-cylindrical opening that slidably receives a non-cylindrical horizontal shaft 47. The shaft 47 is parallel to the sill wall 9 and extends for the full width of the window opening. The terminal ends of the shaft 47 are formed cylindrical and are rotatably journalled in end bearings 48, suitably attached to the walls 13 with their bearing openings in axial alignment with the shaft of the worm wheel 43.

Mounted adjacent each cylindrical end of the shaft 47, are crank arms 49, having an opening in one end of a shape corresponding to the cross-sectional shape of the shaft. The free ends of each crank are provided with a cylindrical stud 50, having pivotal engagement with the lower ends of relatively long links 51. The links 51, at their upper ends are pivotally connected at 52 with vertically shiftable operating bars 53. The bars 53 parallel in slidable engagement the angles 16 of the jambs and overlie the grooves 15. The bars 53 are maintained in their correct sliding travel by flanged antifriction rollers 54, rotatably supported on the jamb walls 13. Pivotally connected with each arm 28 of the brackets, are short link members 55, freely pivotal thereon through the medium of cylindrical rivets 56. The offset of the arms 28 assures freedom of frictional engagement of the rivets with the walls 13. The opposite ends of the links are connected with the bars 53, through the medium of rivets 57. The rivets are provided with flat heads for added strength and the several rivets engaging the bars having their heads extending into and traversing the grooves 15, thus avoiding unnecessary frictional engagement with the walls 13.

The brackets and their operating linkage having been mounted and connected, it now becomes necessary to individually mount the several panels 24. The several brackets are swung to a partial open position through the medium of the linkage just described. A panel 24 is then inserted with its opposite ends engaging a bracket and resting upon the flanges 33. The panel is moved inwardly until its upper edge contacts the stops 33'. Held in this position, the retaining strips 35 are positioned with the lip 39 engaging beneath the lower edge of the panel. The strip 35 is then shifted sidewise until the slots 37 of the flange 36 engages over the tongues 34. In this position, the strip underlies the tongues 34, with the lip 39 and stop 33' preventing vertical shifting of the panel with respect to the bracket. The screw 38 is then engaged in the threaded opening of the flange 36 and the retaining strip is securely held against accidental displacement. Endwise shifting movement of the panels are avoided due to the contacting engagement of the panel ends with the webs 26 of the brackets. Thus, the panels are securely held against displacement in all degrees of angularity of the brackets.

It is to be stressed at this point, that to insure of an adequate stop against the leakage of water past the brackets, yet permit freedom of swinging movement, the several brackets must

of necessity have an overlap with respect to each other. The upper offset end 27 of each bracket is such as to permit an overlapping engagement by the lower end of the tapered web 26. The termination of the lower end of the flange 33 is sufficient to pass over the stops 33' of the next adjacent panel, thus permitting the longitudinal edges of the several panels to overlie each other in firm weathering engagement throughout their length against the passage of foreign matter when the panels are swung to closed position. As before pointed out, the flanges 31 have snug weathering engagement with the face of the jambs 7 when the window is in the closed position, with their offset lower ends 32 overlapping its next adjacent flange 31. Thus, any tendency for water to pass around the lower ends of the walls 26, is stopped by the offsets 27, while an adequate seal is provided throughout the height of the window by the overlapping weathering flanges 31. The lowermost panel 24 contacts the angle 22, in closed position, providing an adequate seal along the length of the sill 6. It has been found desirable, in view of the necessary clearance for the swinging movement of the offset 27 and arm 28 of the uppermost brackets, that a fixed panel 58, either of metal or some transparent or translucent material be installed to serve as an abutment for the upper marginal edge of the uppermost panel. The panel 58 may be varied as to size and serves as a filler where the window differs in height from a stock size.

When the window is to be opened, the operator rotates the crank 46 and, through the medium of the gear mechanism, causes the shaft 47 to rotate, swinging the cranks 49 outwardly in the direction of the arrow in Figure 4. Swinging movement of the cranks 49 pull upon the links 51, shifting the bars 53 downwardly. Movement of the bars 53 downwardly, pulls upon the links 55 and through the medium of their pivotal connection with the arms 28, causes the several panels 24 to simultaneously swing outward upon their pivots 49 to the desired degree of angularity. A reverse movement of the crank 46, causes the several panels to swing simultaneously to the closed position, with the marginal edges of the panels in overlapping contacting relation throughout their length. The tapered brackets 25 maintain the several panels in angular parallelism throughout the height of the window and angularly disposed with respect to the perpendicular flat face of the jambs 1, while the forward weathering flanges 31 of the brackets parallel and firmly engage the outer flat face of the jambs throughout the height of the window opening with the lower ends of the several flanges 31 overlapping its next adjacent flange. The angularity of the links 55, in the closed position are such as to firmly brace the several brackets individually against shifting and the degree of bracing action is determined by the pressure exerted upon the shifting mechanism by the operator.

In Figure 9, a novel form of mullion has been illustrated for rigidly joining two adjacent window frames. The mullion comprises an extruded structure adapted to extend for the full height of the jambs 7 and includes a separator plate 59, the marginal edges of which are provided with triangular ribs 60 for their full length adapted, at assembly, to snugly engage in the triangular grooves 17 of the jambs, with the outer face of the plate 59 flush with the

inner face of the jambs. A centrally disposed and right angular tapered web 61, carried by the plate 59, extends forwardly to a point beyond the forward face of the jambs 7, providing a water baffle 62 for the full height of the window frame. Lateral ribs 63 extend from the sides of the web for engagement with the ribs 18, thus permitting the jambs and mullion to be securely clamped together in any conventional manner without distortion of the jambs. Outwardly of the face of the jambs 7, the web is provided with lateral weather stops 64 for preventing the passage of water across the window when blown at an angle, thus avoiding any tendency of the water to enter beneath the flanges 31 of the brackets.

It will be apparent, that a very novel and highly efficient window structure has been provided. The construction of the end brackets and their method of assembly and operation in the window frame provides a positive stop against leakage of air and water between the ends of the panels and the frame. The bracket construction is such as to permit of the use of relatively wide panels, thus adding greatly to the ornamental appearance of the window and, when open, offers less interference to the passage of air and light, since obviously, fewer panels will be necessary in a given opening. The brackets are light in weight and are strong and the relatively little friction between the moving parts permits the panels to be freely swung with a minimum of effort. The inclusion of the fiber washers 41 completely space the brackets from frictional contact with the jambs 7. The use of the supporting strips 35 is also novel and avoids the use of expensive and time consuming installation of the panels. The brackets and the retaining strips 35 are stamped from a single piece of material, thus greatly minimizing the cost thereof. The installation of the several parts, exclusive of the panels 24 may be conveniently done at the point of manufacture and the assembled structure conveyed to the point of use and installed in a wall opening in any conventional manner. The parts are few and simple, are strong, durable, requires a minimum of attention and assures of a highly efficient window structure adequately protected against the leakage of foreign elements.

It is to be understood that the invention is not limited to the precise shape and arrangement of parts, but that it includes within its purview whatever changes fairly come within either the terms or the scope of the appended claims.

Having described my invention, what I claim is:

1. In a window structure including an open frame having side jambs, of a plurality of closure panels horizontally mounted in the frame to swing in a vertical plane, end brackets for the support of the panels in swinging movement, weathering flanges on the brackets adapted to have parallel contacting weathering engagement with the jambs when the panels are closed, the panels being angularly disposed to the weathering flanges and having their upper and lower edges in overlapping engagement in the closed position, means for swinging the panels to open and closed position, said swinging means serving to individually lock the several panels against movement in the closed position with the weathering flanges in weathering contact with the jambs and in weathering overlapping contact with each other.

2. In a window structure including a frame comprising a header, a sill and side jambs, a plurality of panels horizontally spanning the frame in overlapping relation to swing in a vertical plane, end brackets for each panel that is pivotally supported in the frame, weathering flanges carried by the brackets to have parallel contacting weathering engagement with the outer faces of the jambs when the window is closed the ends of the brackets having weathering overlapping engagement with each other in the closed position, the panels being angularly disposed to the weathering flanges, weathering stops for the upper and lower panel in the closed position, operators for controlling the swinging movement of the panels in unison and means whereby the operators exert individual locking pressure to each panel in the closed position with the weathering flanges in weathering contact with the jambs and with each other and with the panels in weathering overlapping contact with each other.

3. A window including an open frame having side jambs, a header and a sill, a plurality of panels horizontally arranged and spanning the opening of the frame, end brackets for each panel that are pivotally supported on the jambs, the panels being supported in the brackets at an angle to the jambs when the window is closed, weathering flanges carried by the brackets adapted to have parallel weathering contact with the jambs when the window is in the closed position, the several flanges having overlapping weathering engagement with each other when the window is in the closed position, the several panels under the influence of the brackets adapted to be swung in a vertical plane to open and closed position, with the panels in overlapping weathering engagement along their upper and lower edges in the closed position, operating bars shiftable in the frame, links connected with the bars and with the several brackets, the movement of the bars serving to swing the brackets and their supported panels through the medium of the links to open or closed position, with the several links individually locking the several brackets and their panels against movement in the closed position with the panels in weathering contact with each other and the flanges in parallel weathering contact with the faces of the jambs and with each other and weathering stops carried by the header and sill for engagement by panels in the closed position.

4. In a window consisting of an open frame having a header and sill and vertical parallel side jambs, a plurality of horizontally disposed closure panels adapted to span the frame opening in parallel overlapping relation, brackets for the support of the panel ends, such brackets being pivotally mounted in the frame opening upon the jambs, each bracket including a panel supporting flange and a weathering flange with the supporting flange being disposed at an angle with respect to the weathering flange, the weathering flange adapted to lie in parallel weathering engagement with the face of the jambs when the window is in the closed position for disposing the several panels at an angle with respect to the weathering flange so that each panel overlaps the adjacent panel in horizontal weathering engagement throughout their length, means for swinging the panels si-

multaneously in a vertical direction through the medium of the brackets and means connected with each of the brackets and having a common operator, said last named means serving to individually swing the brackets and their supported panels to open and closed position, said last named means individually bracing the several brackets when the window is in the closed position for maintaining the weathering flanges in weathertight engagement with the jambs and the several panels in weathertight engagement with each other along their horizontal edges.

5. In a window structure including an open frame having a header, a sill and connecting vertical jamb members, a plurality of horizontally disposed and vertically swinging panels mounted in the frame, a plurality of panel supporting members comprising pivotally mounted web members, an outwardly extending flange carried by each web member adapted to having weathering engagement with the jambs, an inwardly extending flange carried by each web member to support the ends of the panels at an angle to the outwardly extending flanges so that the adjacent panels overlap each other in horizontal lines coincidentally with the flanges which overlap the jambs vertically to produce a weathertight structure.

6. In a window structure including a frame having a header, a sill and side jambs, a plurality of glass panel supporting members that comprise a web portion disposed parallel to the inner faces of the jambs, means for pivotally supporting the webs upon the jambs to swing in a vertical plane, a weathering flange extending at a right angle from the web so as to contact the outer faces of the jambs when in the closed position, a glass panel supporting flange extending at right angle to the web and lying at an angle to the weathering flange, the weathering flanges having end to end overlapping engagement with each other in the closed position, link means for controlling the swinging movement of the supporting members and their supported panels, the link means adapted to exert a toggle action to lock the several supporting members in weathering engagement with the jambs when in the closed position, operating bars for shifting the links and gear means for controlling the bars.

7. The structure as recited in claim 6, wherein clamping bars having detachable connection with the webs are employed to retain the ends of the glass panels in seated position upon the panel supporting flanges with the glass panels angularly disposed to the weathering flanges and overlapping along their horizontal edges in weathertight engagement in the closed position.

8. In a window structure including a frame having a header, a sill and parallel jambs, a plurality of pivoted glass panel supporting members positioned in the frame operating bars in the frame and connected to the supporting members by links, the links adapted to impart swinging movement to the supporting members and glass panels supported thereon, said links being so disposed as to preclude involuntary swinging of the supporting members when in the closed position and gear means for shifting the bars.

9. In a window structure having a frame including a header, a sill and side jambs, of a plurality of glass panel supporting members pivotally supported in the frame to swing in an arc vertically, the said members comprising a flat web parallel to the inner faces of the jambs, a weathering flange extending outwardly at a right angle from one edge of the web for parallel weathering engagement with the outer face of the jambs when in the closed position, an inwardly extending right angle panel supporting flange formed from the opposite edge of the web, the panel supporting flange being disposed at an angle with respect to the weathering flange whereby the glass panels will be supported at an angle for overlapping longitudinal engagement with the adjacent panels throughout their length when the weathering flanges are in weathering engagement with the outer faces of the jambs, the upper and lower ends of the weathering flanges having weathering overlapping engagement with each other in the closed position, links pivotally connected with each of the supporting members, operating bars vertically shiftable in the frame, the links at their opposite ends having pivotal connection with the bars, links pivotally connected with the bars to shift the bars vertically, the links connected with operating means, angle members detachably connected with the supporting members for maintaining the ends of the panels in supported position upon the supporting flanges, the bars and links serving to swing the supporting members and their supported panels through an arc to a horizontally extended position in one direction and to exert a toggle action through the medium of the first named links to lock the several supporting members and their panels in weathertight closed position with the weathering flanges in weathertight engagement with the jambs and the panels in weathertight overlapping engagement with each other and with the ends of the weathering flanges in overlapping weathering engagement.

10. In a window structure comprising an open frame having a header and sill and connecting side jambs, of a plurality of transparent panels adapted to horizontally span the frame opening, the panels overlapping along their horizontal edges throughout their length, supporting means for the ends of the panels whereby the panels may swing in a vertical plane, the supporting means comprising a web that is pivotally mounted upon the inner face of the jambs, a weathering flange formed on the web at a right angle to have parallel weathering engagement with the outer face of the jambs when in the closed position, each of the flanges having an offset at its lower end to have overlapping weathering engagement with the next adjacent flanges in the closed position, a second flange formed on the web at a right angle thereto and at a vertical angle to the weathering flange for the support of the ends of the panels at an angle to the weathering flanges, stops on the support flanges to limit the supporting position of the panels, angle bars having detachable connection with the webs and overlying the face of the panel ends, right angle flanges formed on the lower ends of the bars to engage beneath the lower edge of the panels, shifting bars slidable in the frame, individual links pivotally connected with each supporting means and with the bars whereby the shifting movement of the bars is imparted to the supporting means through the medium of the links to open or closed position of the window, the bars having connection with shifting means, the bars and links serving to swing the supporting means and the panels through an arc to lie in

a horizontal position when open, said links in the closed position serving to individually impart a toggle action to lock the several support means in closed position with the weathering flanges in weathering contact with the jambs and with each other and with the several panels in overlapping weathering contact along their edges, angle stops along the sill for weathering contact by the lower edge of the lowermost panel and a header panel for weathering contact with the upper edge of the uppermost panel.

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