

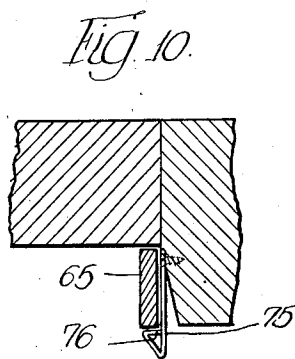
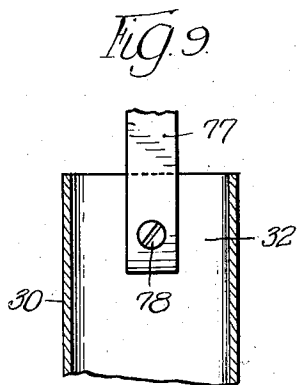
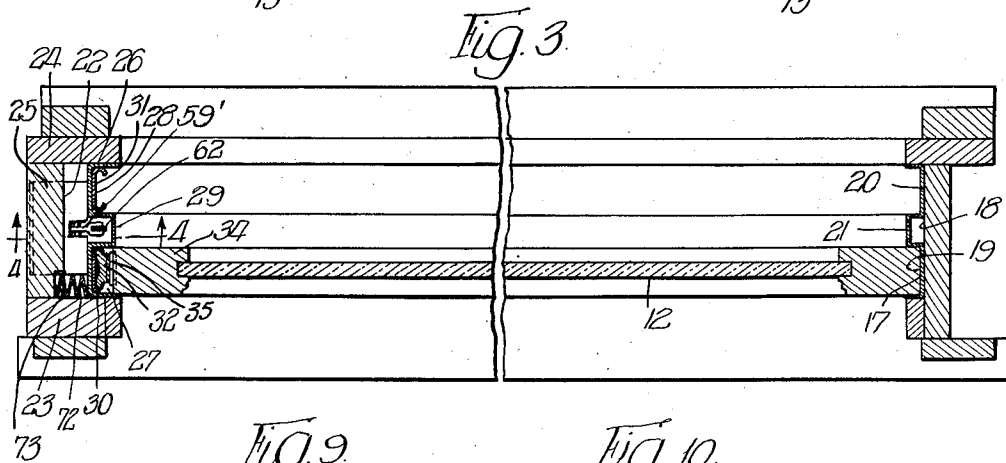
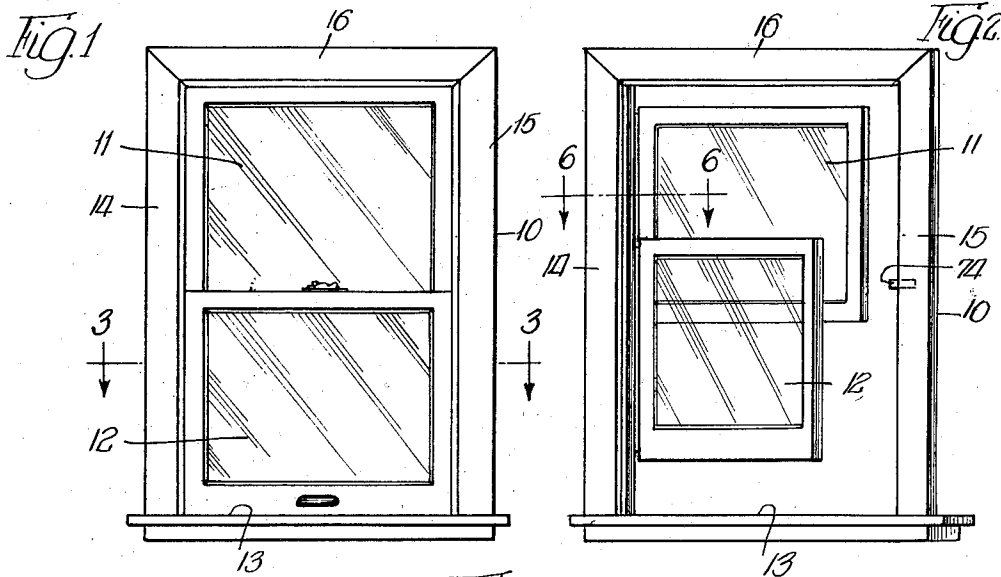
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A. B. CHAPMAN  
WINDOW STRUCTURE

2,802,245

Filed Oct. 20, 1953

3 Sheets-Sheet 1



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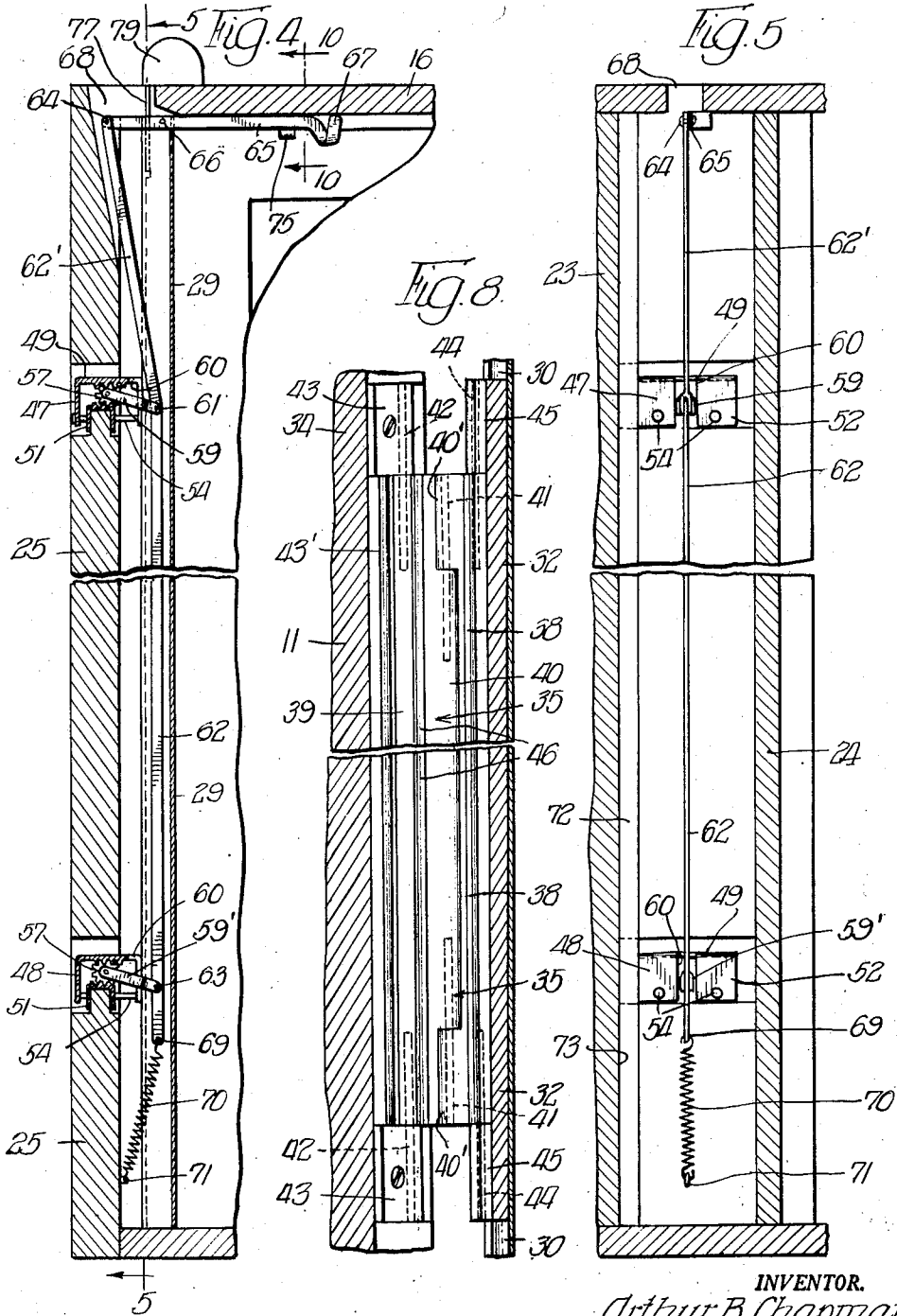
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3 Sheets-Sheet 3

Fig. 7

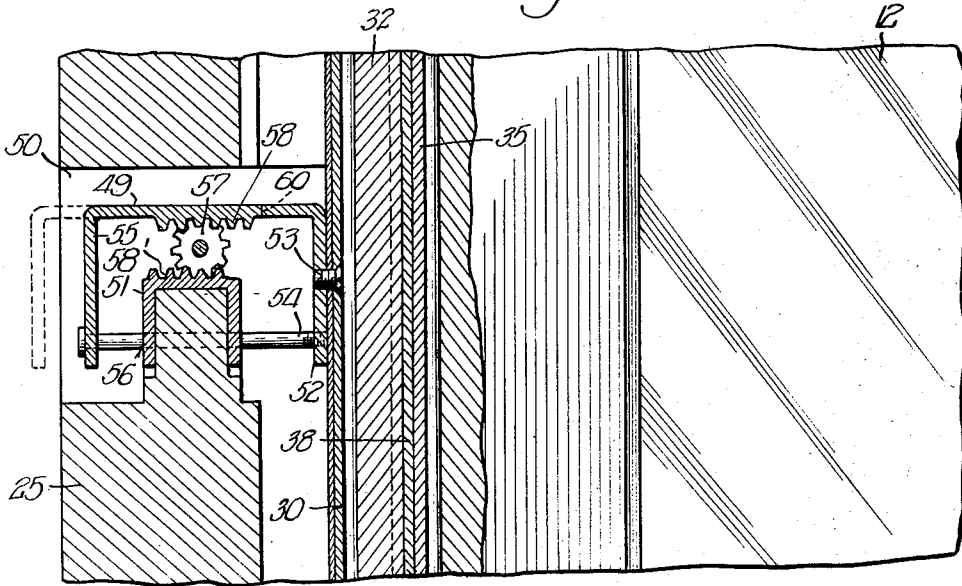
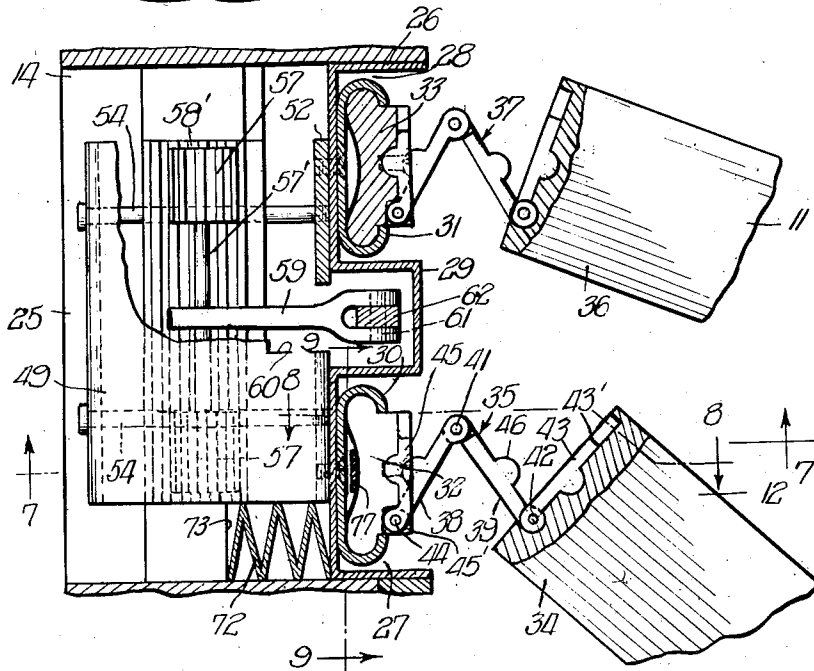


Fig. 6



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2,802,245

## WINDOW STRUCTURE

Arthur B. Chapman, Oshkosh, Wis.

Application October 20, 1953, Serial No. 387,218

12 Claims. (Cl. 20—50)

This invention relates to a window construction and is more particularly concerned with improvements in a window of the sliding sash type wherein the sash is mounted so that it may be swung or pivoted inwardly about one of its vertical edges.

It is a general object of the invention to provide an improved window construction wherein the sash is normally arranged in vertical sliding relation in side guide members with the sash so mounted that it may be released from sliding engagement with one of the side guide members and pivoted inwardly about the other of the side guide members, the vertical position of the sash being controlled by a balance member when the sash is in either position relative to the side guide members.

It is another object of the invention to provide a double hung window wherein both sash are mounted for vertical sliding movement relative to the frame and wherein both sash are so mounted that they may be swung inwardly about one vertical margin thereof to render both faces thereof accessible for washing, cleaning, painting or the like.

It is a more specific object of the invention to provide in a double hung window, wherein the sash are mounted for sliding movement therein, a fixed guide associated with one of the jambs of the window frame in which one of the side rails of the sash is slidably received in interlocking relation, a second guide associated with the other jamb of the frame which second guide is movable toward and away from the first guide and a strip which is slidably associated with the second guide and which is hingedly connected with the sash, whereby, when the second guide is moved away from the first guide, the rail of the sash which is slidably associated with the first guide will be disengaged from the latter, and the sash may be swung on its hinge connection into an open position to render both sides of the same readily accessible.

It is a further object of the invention to provide in a double hung window having a frame with a fixed side guide associated with one jamb and a movable side guide associated with the other jamb, a strip member which is slidably associated with the movable side guide and hingedly connected with the side rail of the sash, together with a mounting mechanism for the movable side guide which is operable by movement of a single member to reciprocate the movable side guide toward and from the oppositely disposed fixed side guide while maintaining the same in parallel relation therewith, whereby to permit disengagement of the sash and the fixed side guide and hinged movement of the sash about the slidable strip in the movable side guide.

It is a still further object of the invention to provide in a window construction of the type described a locking arrangement which is operative for holding the movable side guide rigid when it is in normal, non-retracted position with the sash in proper position in the frame for vertical sliding movement therein.

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It is another object of the invention to provide in a window construction having slidably mounted sash members, an improved multi-plate hinge construction for connecting the sash to movable side guide members, which hinge construction provides a rugged torque resistant pivotal connection between the members and which is capable of withstanding the considerable strain which is encountered in the use of the window.

These and other objects and advantages of the invention will be apparent from a consideration of the window construction which is shown by way of illustration in the accompanying drawings, wherein:

Fig. 1 is an elevation of a window structure having embodied therein the principal features of the invention, the sash being shown in normal closed position;

Fig. 2 is an elevation similar to Fig. 1 with the sash moved to an open position;

Fig. 3 is a cross section, taken on the line 3—3 of Fig. 1, to an enlarged scale, and with portions broken away;

Fig. 4 is a vertical section taken on the line 4—4 of Fig. 3, to an enlarged scale; and with portions broken away;

Fig. 5 is a section taken on the line 5—5 of Fig. 4;

Fig. 6 is a detail section taken on the line 6—6 of Fig. 2, to an enlarged scale, and with portions broken away;

Fig. 7 is a detail section taken on the line 7—7 of Fig. 6 but with the sash in the closed position as in Fig. 1;

Fig. 8 is a detail view taken generally on the line 8—8 of Fig. 6;

Fig. 9 is a detail section taken on the line 9—9 of Fig. 6; and

Fig. 10 is a detail section taken on the line 10—10 of Fig. 4, to an enlarged scale.

Referring to the drawings there is illustrated a window structure having incorporated therein the principal features of the invention. The illustrated structure comprises a window frame 10 and upper and lower sash 11 and 12. The frame 10 includes a horizontal bottom sill 13, vertical side frame members or jambs 14 and 15 and a horizontal top frame member 16. The upper and lower sash 11 and 12 are mounted in the frame 10 for both sliding and swinging movement relative to the same.

The side frame member or jamb 15 is provided with fixed guideways for receiving in vertical sliding relation therein the vertical side edges of the sash 11 and 12. Preferably, a fixed guide member 17 is seated in a recess 18 in the frame member 15, which guide member 17 may be formed of plate material bent and shaped to provide parallel vertical guideway formations 19 and 20 and a connecting parting strip formation 21 adapted to extend between the sash 11 and 12 when they are engaged in sliding relation in the guideways. The guideway formations 19 and 20 and parting strip formation 21 may, of course, be provided by suitable arrangement of the frame members forming the jamb 15 or by recessing the same so that a conventional double hung wooden or metal frame construction may be employed. Also suitable weather-stripping elements (not shown) may be employed either with the bent plate member 17 or with a conventional recessed frame construction.

At the other side of the frame 10 the jamb 14 is constructed to provide a relatively deep recess 22 which extends vertically throughout the length of the jamb. The recess 22 is formed by a front plate 23, a back plate 24 and a connecting cross web forming plate member 25. The recess 22 is adapted to receive therein a movable guideway forming member 26 which is similar in cross section to the fixed guideway forming member 17 in the opposite jamb 15. The guideway forming member 26 is conveniently formed of bent plate material to provide parallel front and rear guide channels 27 and 28 which

are separated by a parting strip formation 29. The channels 27 and 28 are somewhat deeper than the channels 19 and 20 of the fixed guide member 17.

The channels 27 and 28 (Figs. 3 and 6) are adapted to receive in fixed relation therein guideway forming members 30 and 31 which are generally C-shaped in cross section and which receive therein sliding strip members 32 and 33, the latter being hingedly connected to the sash 12 and 11, respectively. The strip member 32 is connected with the side frame portion 34 of the lower sash 12 by a multi-plate hinge 35 while the strip member 33 is connected with the side frame portion 36 of the upper sash 11 by a similar multi-plate hinge 37. Since the hinges 35 and 37 may be identical only one will be described in detail.

The hinge 35 (Figs. 6 and 8) comprises a pair of relatively long generally rectangular plates or leaves 38 and 39 preferably formed of extruded metal sections which are cut along adjoining edges to form a relatively long knuckle 40 on plate 39 and relatively short knuckles 40' at opposite ends of plate 38, with the knuckles being connected by relatively short hinge pins 41. At the other edge, plate 39 is pivotally connected by relatively short hinge pins 42 to a pair of relatively short plate or leaf members 43 located at opposite ends of the plate 39 which are secured in the outwardly opening recess 43' in the edge of the sash frame member 34 so that the outer faces thereof are flush with the edge face of the sash and the hinge plate 39 may be folded into the space between the same. The hinge plate 38 is pivotally connected at its other edge by relatively short hinge pins 44 to a pair of relatively short plate members 45 located at opposite ends of plate 38 which are secured in the inwardly facing recess 45' in the slide strip 32, with the plate 38 foldable into the space between the end plate members 45. In this manner the hinge leaves are well concealed between the surface of the sliding strip 32 and the face of the edge portion 34 of the sash 12, when the hinge is closed, while at the same time the sash is supported from the slide member by a rigid hinge connection which resists any torsional strain due to the weight of the sash and which supports the sash along the full length or height thereof. The hinge plate members 38, 39, 43 and 45 may be conveniently formed from extruded metal stock with the cross section shown in Fig. 6, the bead-like edge formations providing reinforcing along the side edges which is cut away as required along the adjoining edges of plates 38 and 39 to form the knuckles 40 and 40', the latter being drilled to receive the hinge pins 41. The free edges of plates 43 and 45 are cut away to avoid interference when the hinge is closed. A reinforcing rib 46 is provided intermediate the side edges.

The movable guideway forming member 26 is mounted in the recess 22, for reciprocating movement toward and from the guideway forming member 17 in the opposite jamb, by means of two mounting mechanisms 47 and 48 which are arranged in vertically spaced relation and which may be identical in construction. The upper mounting mechanism 47 comprises an upper or outer bracket member 49 which extends transversely of the frame and which may be a structural member of inverted channel-like or U-shaped cross section. The bracket member 49 extends through an aperture 50 in the cross web 25 of the jamb and straddles a smaller inner bracket member 51, also of inverted U-shaped cross section which is rigidly attached to the web member 25 at the bottom edge of the aperture 50. The bracket members 49 and 51 are arranged with their vertical side flanges and horizontal cross webs in parallel spaced relation. The inner flange 52 of the outer bracket member 49 is attached to the guideway forming member 26 by machine screws 53. A pair of laterally spaced guide rods 54 connect the inner and outer vertical flanges 52 and 55 of the bracket member 49 and are received in suitable bearing apertures 56 in the vertically positioned flanges of the inner bracket

member 51 to connect the bracket members in sliding relation. Relative movement of the bracket members 49 and 51 is controlled by a pair of pinion elements 57 and cooperating spaced parallel rack formations 58 and 58' on the inner face of the horizontal web portion of the outer bracket member 49 and the outer or upper face of the horizontal web portion of the inner bracket member 51. The operating pinion elements 57 are spaced at opposite ends of a connecting rod 57' which is provided at its center with a radially extending arm 59. The engagement of the pinion elements 57 with the spaced rack formations 58 and 58' provides for substantial movement of the outer bracket member 49 with a relatively small rotation of the pinion elements 57 while the effective width or length of the pinion elements 57 is sufficient to insure non-twisting movement of the movable bracket member 49 relative to the fixed bracket member 51. The arm 59 projects through a slot 60 in the outer bracket member 49 and is pivotally connected at 61 to a vertically extending rigid operating bar or rod 62. The bottom mounting mechanism 48 has a like pinion arm 59' which is pivotally connected to the vertical rod 62 at 63. The rod 62 is pivotally connected at its upper end at 61 to a link bar member 62' which is in turn pivotally connected at 64 to a relatively short bar 65. The bar 65 is pivoted at 66 on the top frame member 16 and is provided with a finger grip or handle formation 67 on the free end thereof. The frame members 16 and 25 are cut away at 68 to provide clearance for vertical movement of the members 62' and 65. At the lower end the vertical rod 62 is connected at 69 to a tension spring 70 which is anchored at 71 to the frame member 25. The spring 70 tends to urge the rod 62 in a downward direction and helps to hold the guideway supporting or carrying mechanisms 47 and 48 against movement when the guideway forming member is in normal extended position at the limit of its movement toward the fixed guideway forming member 17. A locking or latching spring member 75 (Fig. 10) is provided for securing the operating arm 65 against swinging movement about its pivot 66 when it is in the position shown in Fig. 4, thereby holding both retracting mechanisms 47 and 48 against movement. The arm 65 may be released from the latch member 75 by springing it away from engagement with the ledge 76 or by springing the member 75 laterally out of engagement with the same. The rod 62 ties the two retracting mechanisms 47 and 48 together for simultaneous operation and prevents tilting movement of the channel member 26, when member 26 is being moved and also when it is stationary, with link 62', pivoted bar 65 and latch 75 cooperating with the rigid rod 62 to hold the member 26 stationary and rigid when the sash 11 and 12 are in the normal sliding position in the frame.

The mechanisms 47 and 48 do not extend the full width of the recess 22 in the jamb 14 and an accordion pleated weather strip 72 is inserted at the inner side of the recess 22, which extends preferably the full length or height of the jamb and provides a stop preventing the passage of air and dust or the like. The jamb member 25 may be cut away at 73 along the vertical face to provide a deepened recess for receiving the weather strip 72. The weather strip 72 may be formed of any suitable sheet material which is somewhat resilient so that the strip collapses when the movable channel member 26 is moved inwardly of the recess and expands as it moves outwardly thereof.

Each of the sliding strip members 32 and 33 is adapted to be connected at its upper end with the lower end of a balance tape 77 (Fig. 9) which is secured to the outer face thereof by a screw 78 or similar fastening. The tape 77 extends to the usual casing 79 arranged at the top of the frame 10.

The sash 11 and 12 are normally positioned as shown in Fig. 1 with the free edges thereof seated in slidably

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relation in the recesses 19 and 20 in the fixed channel member 17, the movable channel member 26 being extended to the limit of its movement in the direction towards the fixed channel member 17 and being held in that position by the linkage controlling the movement of the pinions 57. The pull of the tension spring 70 on the end of the operating bar 62 and the latch 75 holds the channel member 26 rigidly in position through the linkage 62, 62' and 65. The sash 11 and 12 are free to slide vertically since they are connected to the bar members 32 and 33 which are slidably mounted in the C-shaped guide channels 30 and 31 with the vertical position controlled by the balance tapes 77. When it is desired to hinge the sash 11 and 12 inwardly they are moved to an intermediate or open position as in Fig. 2 and the operating bar 62 is moved upwardly by grasping the handle 67 and swinging the bar 65 clockwise about its pivot 66. The upward movement of bar 62 operates the mechanisms 48 and 49 simultaneously to retract the movable channel member 26 without any tilting movement of the same within the recess 22. This withdraws the edges of the sash 11 and 12 at the opposite side evenly from the channels 19 and 20 and frees both sash simultaneously for swinging movement on the hinges 35 and 37 (Figs. 2 and 6). A suitable stop 74 may be provided on the frame 10 to prevent the top sash 11 from swinging outwardly, if desired. The bar 65 may be released allowing the bar 62 to be moved downwardly by the tension spring 70 after the sash are released from the fixed guideway forming member 17 and swung inwardly of the frame. The sash 11 and 12 may, of course, be slidably moved under the control of the balance tapes 77 while they are swingably supported providing free access to both sides of the sash for cleaning, painting or repairs. Swinging movement of the sash 11 and 12 does not interfere with the operation of the balance tapes 77 since the sliding members 32 and 33 are mounted in fixed sliding relation in the guideway channel 26. The sash may be returned to the position shown in Fig. 1 by retracting the movable guideway forming member 26 and swinging the sash to bring the opposite edges into position for movement into the guideways 19 and 20 when the operating handle bar 65 is released. When in free swinging position the sash 11 and 12 are prevented from sagging by the rigidity and resistance to torque of the hinges 35 and 37 which connect the sash to the slide strips 32 and 33.

While specific materials and particular details of construction have been referred to in describing the illustrated form of the invention it will be understood that other materials and other details of construction may be employed within the spirit of the invention.

I claim:

1. In a window having a frame structure for receiving a sash in slidable relation therein, said frame structure comprising oppositely disposed jambs, a side guide fixed in the jamb in one side thereof and adapted to receive one side of the sash in sliding relation therein and a recess in the jamb on the opposite side thereof, an inwardly opening channel member forming a side guide for the opposite side of said sash mounted wholly within said recess for bodily movement toward and from the fixed side guide, vertically spaced pairs of mounting mechanisms for said movable side guide, each pair of said mounting mechanisms comprising inner and outer channel shaped members slidably connected by guide pins, one of said channel shaped members being connected to the movable side guide and the other being connected to said jamb, rack and pinion connections between said channel shaped members and means including a manually movable member associated with the rack and pinion connections for bodily moving the movable side guide while holding the same in a vertical plane.

2. In a window having a frame structure and a sash slidably mounted in said frame structure, said frame structure having oppositely disposed jambs, a side guide fixed in the jamb in one side of the frame structure and

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adapted to receive one side of the sash in sliding relation therein and a recess in the jamb on the opposite side of the frame structure, an inwardly opening channel member forming a side guide for the opposite side of said sash mounted wholly within said recess for bodily movement toward and from the fixed side guide, vertically spaced pairs of mounting mechanisms for said movable side guide, each pair of said mounting mechanisms comprising two bracket members of inverted U-shaped section slidably connected by guide pins, one of said U-shaped members being connected to the movable side guide and the other being connected to said jamb, rack and pinion connections between said U-shaped members and means including a manually movable member associated with the rack and pinion connections for bodily moving the movable side guide while holding the same in a vertical plane.

3. In a window having a frame structure and a sash slidably mounted in said frame structure, said frame structure comprising oppositely disposed jambs, a side guide fixed in the jamb in one side of the frame structure and adapted to receive one side of the sash in sliding relation therein, the jamb on the opposite side of the frame structure having a vertical recess, a side guide mounted within said recess for bodily movement toward and from the fixed side guide, and adapted to receive the other side of said sash, said movable side guide having vertically spaced double rack and pinion connections with said frame structure, a manually movable rigid bar associated with the rack and pinion connections for operating the same simultaneously to bodily move the movable side guide while holding the same parallel with the fixed side guide and latch means for holding said rigid bar against movement when the sash is in sliding relation with said fixed side guide.

4. In a window having a frame structure and, a sash slidably mounted in said frame structure, said frame structure comprising oppositely disposed jambs, a side guide fixed in the jamb in one side of the frame structure and adapted to receive one side of the sash in sliding relation therein, the jamb on the opposite side of the frame structure having a recess, a side guide mounted wholly within said recess for movement toward and from the fixed side guide and adapted to receive the other side of said sash, said movable side guide being connected to the frame structure by vertically spaced mounting brackets, each of said brackets having members which are connected for relative movement by a rack and pinion, and means including a manually movable bar associated with the rack and pinion connections for simultaneously moving the bracket members relative to each other whereby to move said movable side guide while holding the same parallel with the fixed side guide.

5. In a double hung window having a frame structure and a pair of sash, said frame structure comprising oppositely disposed jambs, a side guide fixed on the jamb at one side of said frame structure for receiving the one vertical side edge of the sash in interlocking sliding relation, the jamb on the other side of said frame structure having a recess, a movable side guide positioned in said recess and adapted to receive the other vertical side edge of said sash, a pair of spaced rack and pinion devices intermediate the ends of said movable side guide, a rack of each device being fixed to said movable side guide, a cooperating rack mounted in said recess, the pinions of said devices each having an operating arm extending inwardly relative to the recess, a bar connecting said pinion arms for simultaneous movement whereby to adjust the position of said movable side guide in said recess, a spring connecting said bar to said frame structure to normally urge the bar to a predetermined position with the movable side guide at its innermost position relative to said fixed side guide, and a pivotally mounted operating lever connected to said bar.

6. In a window having a frame structure for receiving a sash, said frame structure comprising oppositely dis-

posed jambs, a side guide fixed on the jamb at one side of said frame structure for receiving the one side edge of the sash in interengaging and sliding relation and the jamb on the other side of said frame structure having a recess, a movable side guide positioned in said recess and adapted to receive a slide bar in sliding interlocked relation therein which slide bar is provided with a multiple plate hinge for connecting the opposite side of said sash with said slide bar, bracket members secured intermediate the ends of said movable side guide and extending into said recess, other bracket members fixed in said recess, the bracket members on the side guide and the bracket members in the recess having rack and pinion connections with said pinions each having an operating arm extending into said recess, a bar connecting said pinion arms for simultaneous movement thereof, resilient means urging said bar toward a predetermined position to hold said movable side guide against retracting from its innermost position relative to said fixed side guide.

7. In a window having a frame structure for receiving a sash, said frame structure comprising oppositely disposed jambs, a side guide fixed on the jamb at one side of said frame structure for receiving the one side edge of the sash in interlocking sliding relation, and the jamb on the other side of said frame structure having a recess, a movable side guide positioned in said recess and adapted to receive a slide bar in sliding interlocked relation therewith, which slide bar has a multiple plate hinge connection with the other side of said sash, vertically spaced cooperating pairs of bracket members, the bracket members being secured intermediate the ends of said movable side guide, rack and pinion connections between the bracket members of each of said pairs with the pinions each having an operating arm, a connecting member between said pinion arms for simultaneously moving said pinions, means to normally urge said connecting member to a predetermined position where the movable side guide is extended toward said fixed side guide, and a manual means for moving said connecting member to retract said movable side guide.

8. In a double hung window having a frame structure and a sash, said frame structure comprising oppositely disposed jambs, a side guide fixed on the jamb at one side of said frame structure for receiving the one side edge of the sash in interlocking sliding relation, the jamb on the other side of said frame structure having a recess, a movable side guide positioned in said recess and adapted to be connected to a slide bar having a multiple plate hinge connection with the other side of said sash, pairs of relatively movable vertically spaced bracket members connecting said movable side guide with the jamb, a rack and pinion connection between the bracket members of each pair, an arm connected to each pinion and extending inwardly of the recess, a vertical bar connecting said pinion arms for simultaneous movement, a spring connecting the lower end of said bar to said frame structure to normally urge the bar to a predetermined position, and a swingably mounted operating lever connected to the upper end of said bar for moving said bar to retract said movable side guide and withdraw the opposite side edge of the sash from engagement with said fixed side guide.

9. In a window having a frame structure and a sash slidably mounted therein, said frame structure comprising oppositely disposed jambs, a side guide fixed in the jamb in one side of the frame structure and adapted to receive one side of the sash in sliding relation therein, the jamb on the opposite side of the frame structure having an inwardly facing vertical recess, a side guide mounted within said recess for movement toward and from the fixed side guide, said movable side guide extend-

ing across the inner face of said recess and adapted to receive the other side of said sash, said movable side guide having vertically spaced mounting brackets supporting the same in said recess, each of said brackets having members which are movable relative to each other, means including a manually movable vertically extending bar connected to said bracket members for simultaneously moving the members of said brackets whereby to move said movable side guide while holding the same parallel with the fixed side guide, and an accordion folded weather strip extending between said movable side guide and the portion of the jamb defining the outer side of said vertical recess.

10. In a window having a frame structure comprising oppositely disposed jambs and a sash slidably and pivotally mounted therein, wherein a fixed side guide is provided on the jamb at one side of said frame structure for receiving the one vertical side edge of the sash in interengaging sliding relation and the jamb on the other side of said frame structure is provided with a recess having a movable side guide positioned therein for receiving the opposite vertical side edge of the sash in sliding relation therein; a slide bar mounted in sliding interlocked relation in said movable side guide and a multiple plate hinge connecting the other vertical side edge of said sash with said slide bar, said hinge having the plates thereof extending substantially the full height of said sash to provide a continuous rigid hinge connection between the edge of the sash and the slide bar throughout substantially the full height of the sash for supporting said sash in swinging relation on said movable side guide and for distributing the weight thereof along the slide bar.

11. In a window as recited in claim 10 and said slide bar and the side edge of said sash having confronting recesses for receiving and concealing therein said multiple plate hinge when said hinge is in collapsed condition with said sash engaged in sliding relation with both the fixed and movable side guides.

12. In a window having a frame structure comprising oppositely disposed jambs and a sash slidably mounted in said frame structure, wherein there is a fixed side guide formation in the jamb in one side of the frame structure which is adapted to receive one side of the sash in sliding relation therein and wherein there is a recess in the jamb on the opposite side of the frame and a side guide mounted within said recess for bodily movement toward and from the fixed side guide; means for slidably and pivotally connecting the other side of the sash to said movable side guide comprising an elongate slide member received in interlocked sliding relation in said movable side guide and a multi-leaf torsion-resistant hinge connecting said slide member with the other side of said sash, one leaf of said hinge being connected along an edge thereof to said slide member and another leaf being connected along an edge thereof to the side edge of said sash, with said leaves being connected to each other along their opposite edges and extending continuously from a point adjacent the bottom of the sash to a point adjacent the top thereof.

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