

June 9, 1959

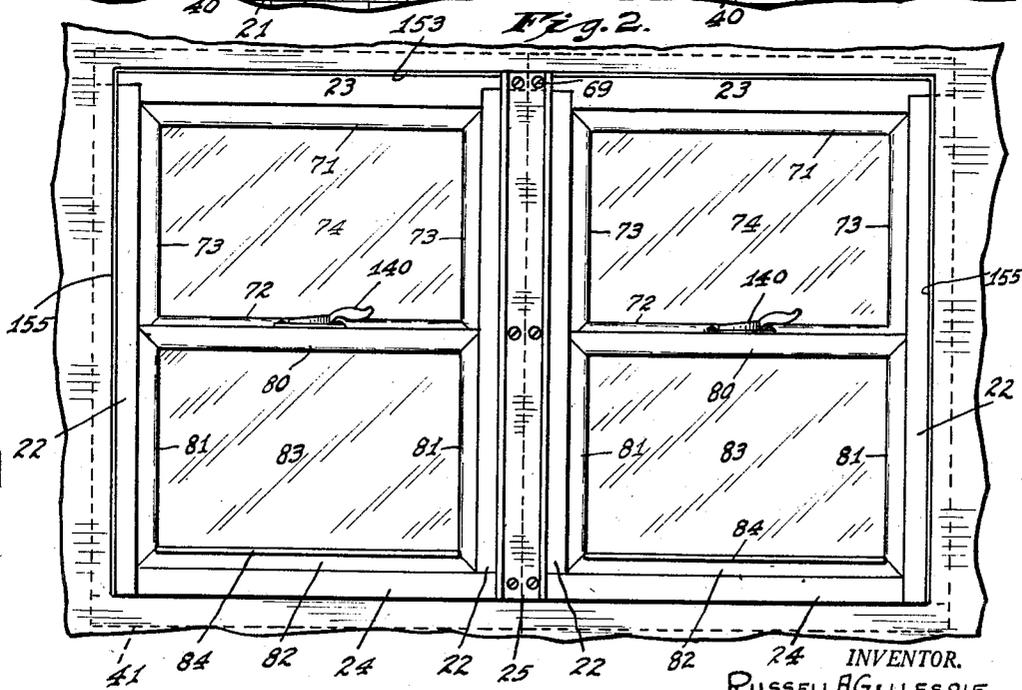
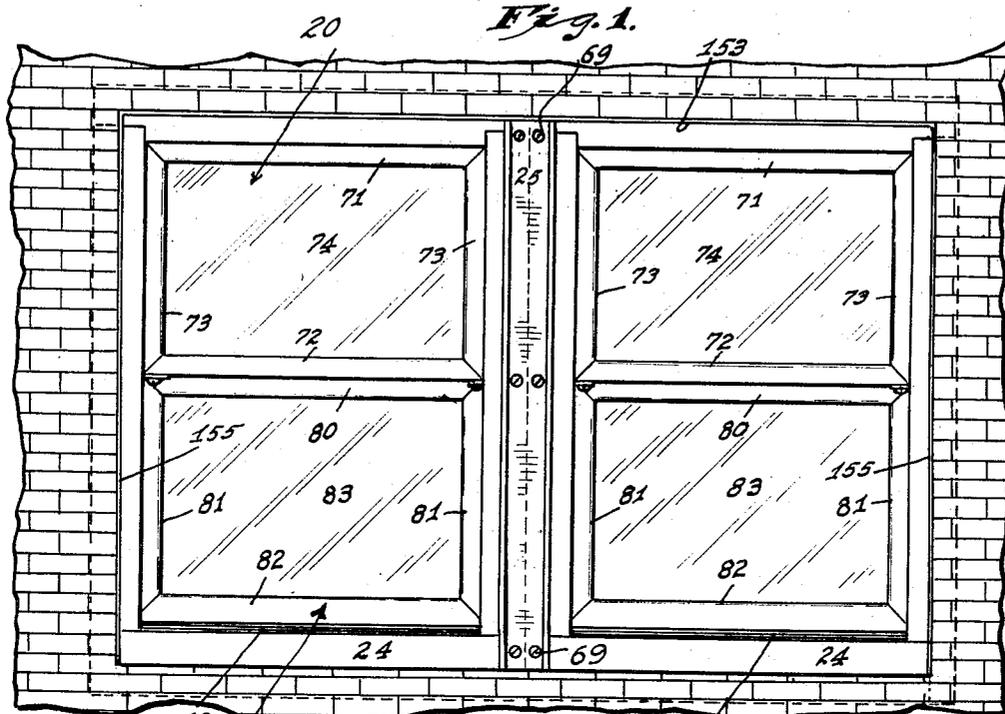
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2,889,588

METAL WINDOW STRUCTURE

Filed May 18, 1953

5 Sheets-Sheet 1



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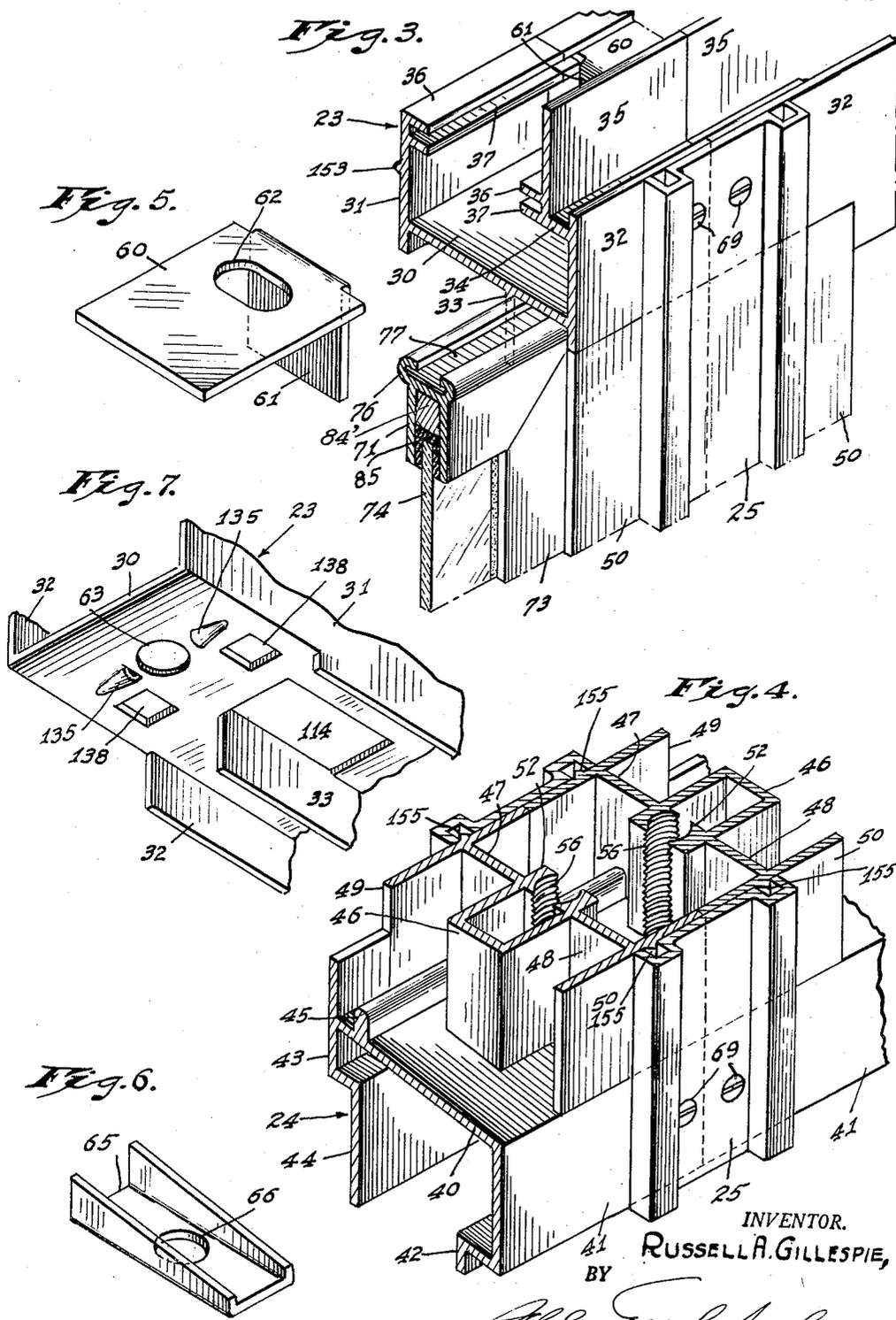
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METAL WINDOW STRUCTURE

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5 Sheets-Sheet 2



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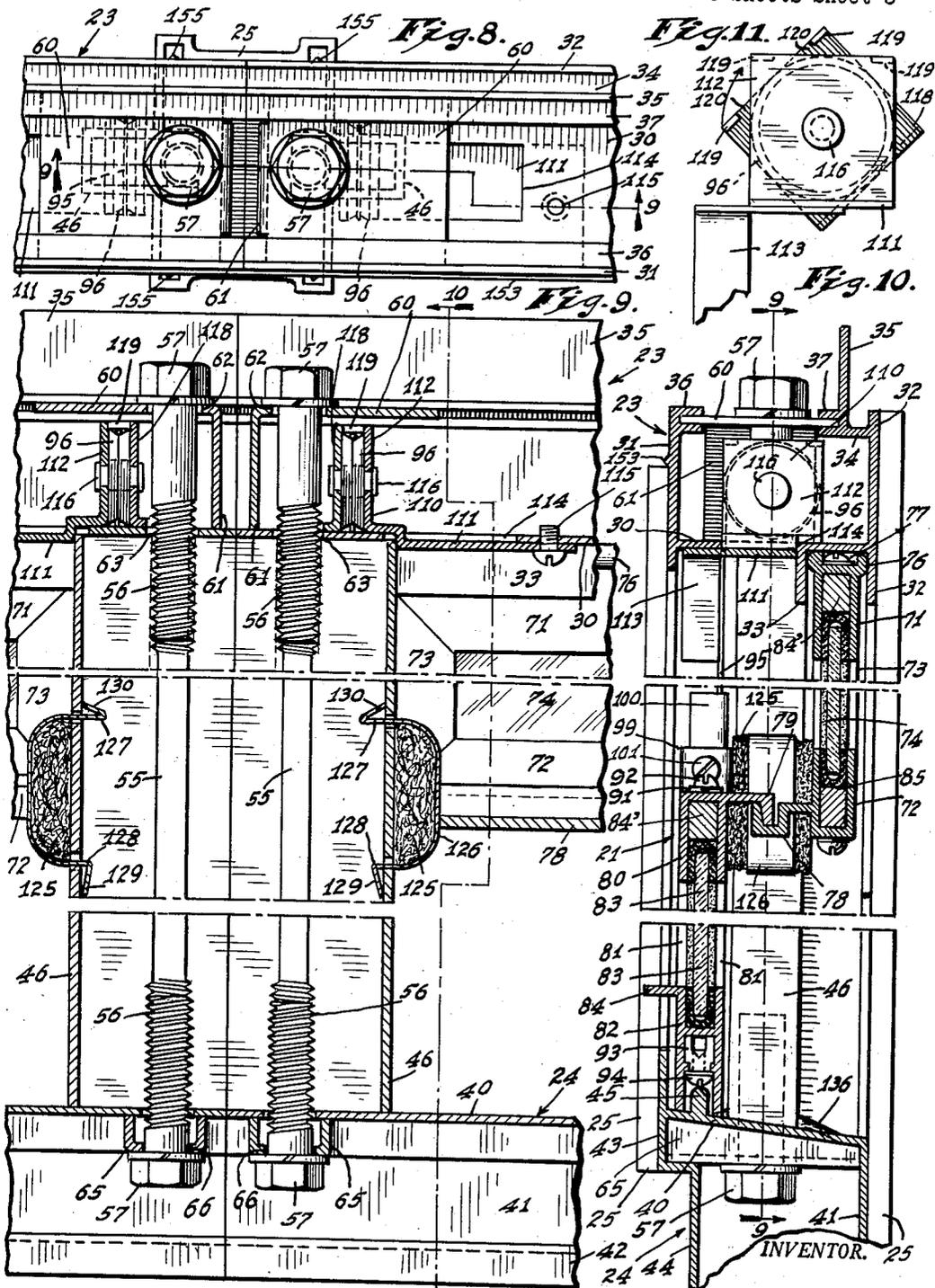
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METAL WINDOW STRUCTURE

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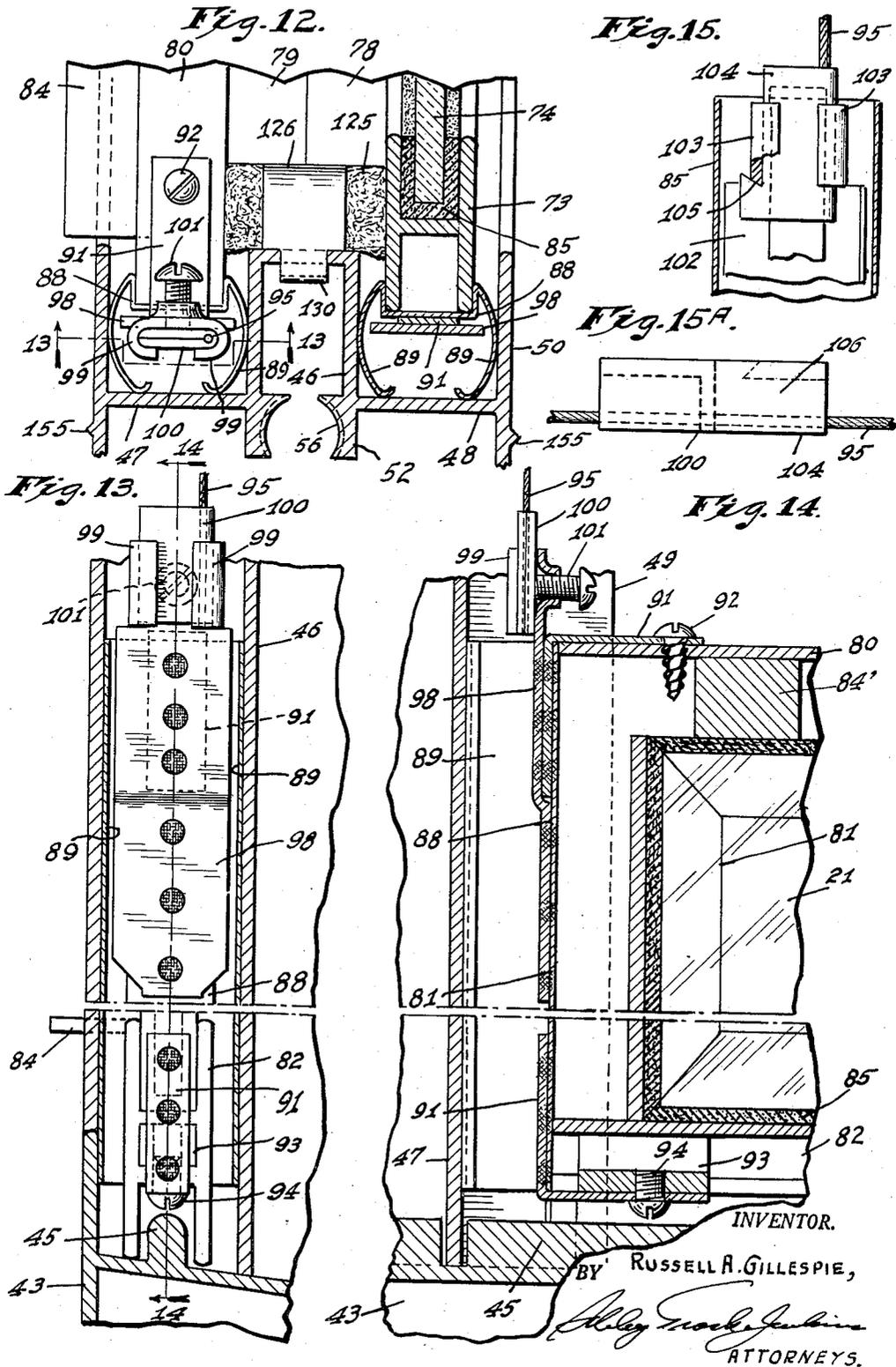
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Fig. 16.

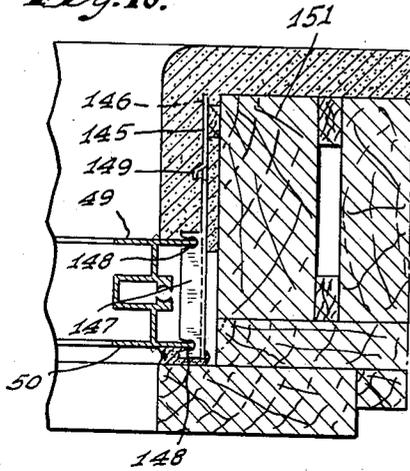


Fig. 17.

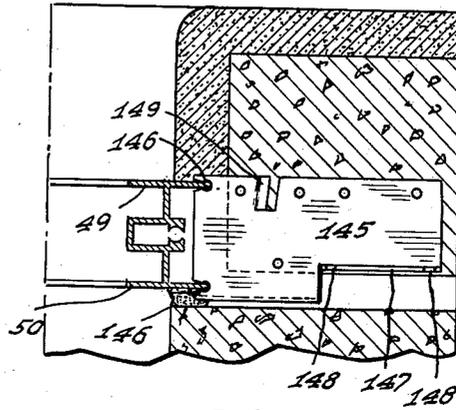


Fig. 18.

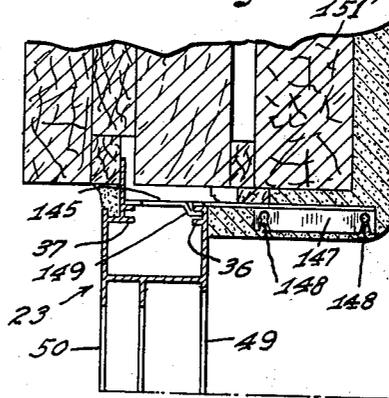
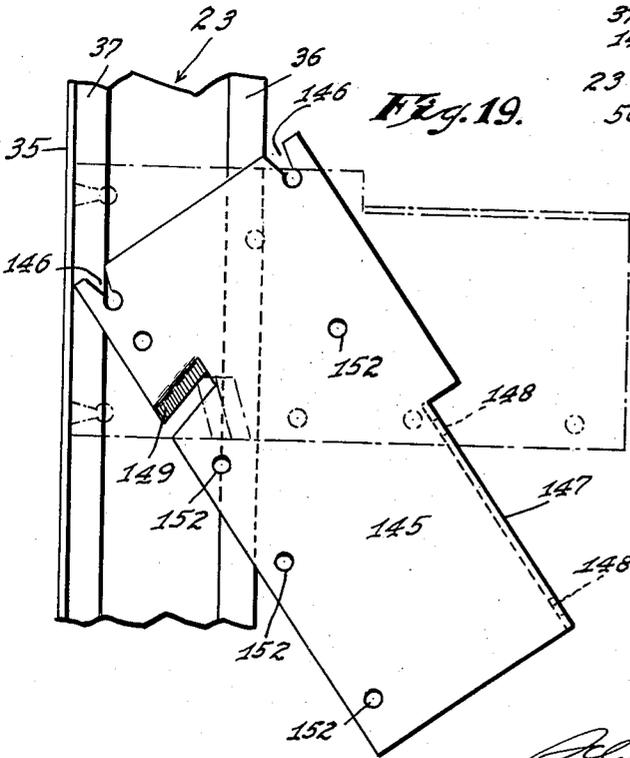


Fig. 19.



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METAL WINDOW STRUCTURE

Russell A. Gillespie, Indianapolis, Ind., assignor, by direct and mesne assignments, of thirty-three and one-third percent to Carl F. Spickelmier, thirty-three and one-third percent to Edith S. Greer, and thirty-three and one-third percent to Betty S. Spickelmier, all of Indianapolis, Ind.

Application May 18, 1953, Serial No. 355,489

3 Claims. (Cl. 20—52)

This invention relates to metal windows of the double-hung type. It is an object of the invention to improve the construction of double-hung metal windows, to reduce the cost of such windows, and to produce a window having advantageous features of operation. A further object of the invention is to produce a window frame and window sash which lend themselves to economical construction from extruded metal shapes. A further object of the invention is to employ in association with a window sash an element which will serve both as a weather strip and as a means for holding the sash assembled. Still another object is to provide an improved means for anchoring a metal window frame into the building structure.

In carrying out the invention I form the window frame of upper, lower, and side members each conveniently a metal extrusion which can readily be cut to any desired length. The side members are formed each with a longitudinally extending slot the walls of which form opposed portions of a cylindrical surface the diameter of which is such that the slot, at the ends of a side member cut to length, can be tapped for reception of a clamp screw by means of which the upper and lower members of the frame are held in place. In addition, the side members are formed with parallel guideways for receiving the upper and lower sash. Each sash comprises top, bottom, and side rails of channel section to receive the glass and mitred at their corners. A weather strip extending along each side of each sash serves both to hold the elements of the sash together and to provide a seal with the sides of the guideways in the side members of the window frame. The upper and lower sash run freely in their guideways and are interconnected by cables in a counterbalanced arrangement, so that as the lower sash is raised the upper sash will descend, and vice versa.

Other objects and features of the invention will be apparent from the detailed description which follows.

The accompanying drawings illustrate the invention: Figs. 1 and 2 are, respectively, outer and inner elevations of a mullion window embodying the invention;

Figs. 3 and 4 are fragmental isometric views illustrating details of the construction of the window frame;

Figs. 5 and 6 are isometric views illustrating clamp elements employed in assembling the window frame;

Fig. 7 is an isometric view showing a preferred construction for each end of the head frame;

Fig. 8 is a fragmental top plan of the window frame;

Fig. 9 is a vertical section on the lines 9—9 of Figs. 8 and 10;

Fig. 10 is a vertical section on the line 10—10 of Fig. 9;

Fig. 11 is an elevation illustrating a detail of construction;

Fig. 12 is a fragmental horizontal section through one side of the window frame;

Fig. 13 is a vertical section on the line 13—13 of Fig. 12 showing the attachment of a cable to the lower sash;

Fig. 14 is a vertical section on the line 14—14 of Fig. 13;

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Fig. 15 is a fragmental view similar to Fig. 13 showing the attachment of the cable to the upper sash;

Fig. 15-A is a detail view illustrating a preferred method of forming the sash-balancing cables;

Fig. 16 is a fragmental horizontal section illustrating a frame anchor as used in association with a side jamb to secure the window frame in place in wood-framed construction;

Fig. 17 is a view similar to Fig. 16 showing the anchor as used in masonry construction;

Fig. 18 is a vertical section showing the anchor in operative association with the head member; and

Fig. 19 is a fragmental plan view of the arrangement shown in Fig. 18.

The window construction shown in the drawing is of the mullion type comprising a pair of double-hung windows each having an upper sash 20 and a lower sash 21. Each window has a pair of side jambs 22 extending vertically between a head member 23 and a sill 24. The adjacent side jambs of the two window frames are lapped interiorly and exteriorly of the window by trim strips 25. The mullion construction is shown merely by way of example, and it is to be understood that my invention is not limited to it.

Referring to Fig. 3 it will be seen that the head-member designated in its entirety by reference numeral 23 in Figs. 1 and 2 comprises a horizontally extending web 30, having at its ends inner and outer vertical flanges 31 and 32. The flanges 31 and 32 extend upwardly from the web 30 and also (Fig. 7) downwardly from the web except at the ends of the head-member. Spaced inwardly from the outer flange 32, the web 30 has a supplemental flange 33 defining in cooperation with the lower portion of the outer flange a channel adapted to receive the upper edge of an upper sash-frame. Spaced upwardly from the web 30, the flange 32 has a supplemental inwardly extending web 34 from which there projects upwardly a supplementary vertical flange 35. The flanges 31 and 35 are provided on their opposed faces with vertically spaced ribs 36 and 37 defining coplanar grooves the purpose of which will hereinafter become apparent.

The sill, which was designated in its entirety by the reference numeral 24 in Figs. 1 and 2, comprises a web 40 (Fig. 4) inclined transversely of its extent to slope downwardly and outwardly in the assembled frame. Along its outer edge the web 40 has a downwardly projecting outer flange 41, the lower portion 42 of which may be offset inwardly. Along its inner edge, the web 40 has a flange 43 which projects both upwardly and downwardly from the web and conveniently has a lower portion 44 offset inwardly. Inwardly from the flange 43 is a longitudinal rib 45 of less height than the upper portion of the flange 43.

The side jambs of the window-frame (Fig. 4) comprise vertically extending channels 46 from the opposite sides of which coplanar inner and outer webs 47 and 48 project. At its edge, the web 47 has a flange 49 projecting in both directions parallel to the plane after frame, and the web 48 is provided with a similar flange 50.

The head, sill, and jambs of the window frame are conveniently cut to desired lengths from extruded stock. The over-all horizontal width of the various frame members is the same so that in the assembled window the outer flanges 32 and 41 of the head member and sill will be coplanar with the outer flanges 50 of the jambs, while the inner flanges 31 and 43 of the head member and sill may be coplanar with the inner flanges 49 of the side jambs.

The two sides of the channel 46 in each side jamb are thickened at their edges, as indicated at 52 in Fig. 4, and the opposed faces of the thickened portions are shaped to form segments of a cylindrical surface and define a slot 55 (Fig. 9) extending for the length of

the jamb. The ends of such slot are adapted to be tapered to provide screw threads 56 for the reception of screws 57 by which the head member 23 and sill 24 are secured to the side jambs at the ends thereof.

At the corners of the frame, the frame members are trimmed or coped so that the head 23 and sill 24, lap the ends of the side jambs 22. Conveniently, the upper end of each side jamb is cut off square, and (Fig. 3) the flanges 31, 32, and 33 at each end of the head member are cut away to accommodate for the flanges 49 and 50 and channel 46 of the jamb. The lower end of each side jamb may be cut off obliquely at the inclination of the sill-web 40, the flange 49 of the jamb being cut away so that its lower end will engage the upper edge of the unmodified sill-flange 43. The rib 45 on the sill may be slotted transversely to receive the jamb-web 47. For the upper end of each side jamb there is provided a clamp member 60, conveniently formed as a sheet-metal stamping to have a horizontal body portion receivable in the coplanar grooves between the ribs 36 and 37 of the head member and a down-bent ear 61 adapted to rest on the upper surface of the web 30 of such head member. An opening 62 provided in the body of the clamp permits passage of a clamp screw 57, which extends through such opening and an opening 63 in the web 30 into the threaded end of the slot 55 and can be tightened to secure the head member 23 firmly in position against the upper end of the side jamb 22.

At the bottom of each side jamb, I provide a clamp 65 (Fig. 6) conveniently formed as a sheet-metal stamping of channel section. The edges of the flanges of the clamp member 65 are trimmed obliquely to fit against the lower surface of the inclined web 40 of the sill while the web of the clamp member lies horizontal. The web 65 is provided with an opening 66, and the web 40 with a similar opening, through which a clamp screw 57 may pass into the threaded end of the slot 55 to secure the jamb and sill together.

In a mullion window, two frames assembled in the manner just described are placed in abutting relationship and secured together through the medium of trim strips 25, which lap the joint between the frames and are attached to the flanges 50 and 49 of the two side jambs by screws 69 (Figs. 1 and 2).

The upper sash, which occupies the groove defined in each side jamb by the outer flange 50 and the adjacent side of the channel 46, comprises (Figs. 9 and 10) top and bottom rails 71 and 72, and side rails 73, mitred at their corners to constitute a frame embracing the edges of a pane of glass 74, each rail having along its inner edge a groove in which the pane is received. The top and bottom rails may be of U-shaped cross-section and the side rails of H-shaped cross-section (Fig. 12). The top rail 71 is provided along its upper edges with ribs 76 which define a groove 77 between them and provide for the rail an over-all width substantially equal to that of the groove or channel between the flanges 32 and 33 of the head member. The bottom rail has an inwardly projecting extension or flange 78 adapted to cooperate with a complementary extension 79 on the upper rail 80 of the lower sash frame. Such lower sash frame, in addition to the upper rail 80, comprises side rails 81, which may be of H-section similar to the rails 73, and a lower rail 82. The latter is conveniently also of H-shaped cross-section, the lower portions of its flanges straddling the rib 45 on the sill 24 and the upper portions of its flanges embracing the lower edge of the lower pane 83. The inner flange of the rail 82 may be provided with an inwardly extending lip 84 for use in raising and lowering the lower sash. Preferably, the panes do not seat against the bottoms of the grooves in the rails 71, 72, and 80, but are located in spaced relation thereto by spaces 84'.

Like the side jambs 22, head member 23, and sill 24, the side, upper, and lower rails of the sash frames are desirably formed by extruded stock cut to length. Com-

pressible packing material 85 preferably lines the pane-receiving groove of each rail. Additional means for securing the sash-frame members together comprises the weather stripping shown in Figs. 12, 13, and 14.

The weather stripping just referred to is formed of some resilient material, conveniently stainless steel, shaped to provide a central channel-like portion 88 which embraces a side rail of a sash frame and also to provide side portions 89 adapted to bear resiliently against the sides of the groove in which the sash is slidably received. Each weather strip is provided at each end with an L-shaped clip 91 one leg of which overlies and is secured as by spot-welding to the center portion of the weather strip and the other leg of which projects inwardly of the window frame. The clip 91 at the upper end of the weather strip overlies the upper face of the sash rail 71 (or 80) to which it is removably secured, as by a screw 92. The lower clip underlies the lower face of the lower rail 72 (or 82). In the case of the lower sash, the lower clip lies below the web of the H-shaped stock from which the rail 82 is formed; and interposed between the clip-leg and such web is a spacer 93 to which the clip-leg is removably secured, as by a screw 94. The vertical spacing of the clips is such that their horizontal legs cooperate to locate the upper and lower sash rails in position; and the entire sash with the two associated weather strips is held assembled by the four screws 92 and 94.

In the window illustrated in the drawing, the upper and lower sashes 20 and 21 are interconnected so that they may be jointly opened and closed, such interconnection being affected by cables 95 which run from the upper corners of the lower sash over pulleys 96 in the head member 23 to the upper corner of the upper sash. Each cable is preferably secured to the lower sash through a weather strip; and to that end, I employ a cable anchor 98 conveniently in the form of a sheet-metal stamping welded to the weather strip-base 88 and extending upwardly above the top sash-rail 80. At the upper end of the anchor, infolded ears 99 provide a socket for reception of a clip 100 secured to the end of the cable 95. As will be clear from Fig. 14, the clip 100 is a piece of sheet metal folded to embrace the cable-end tightly. A clamp screw 101 mounted in the anchor 98 clamps the clip 100 securely in place in its socket.

The opposite end of the cable is secured to the upper corner of the upper sash conveniently in the manner indicated in Fig. 15. This arrangement embodies a cable anchor 102 having in-folded ears 103 similar to the anchor 98 previously described; but in this instance, the anchor has no clamp screw 101 and is so located on the weather strip that it does not project above the top of the upper sash. The cable-end to be attached to the upper sash is provided with a folded clip 104 similar to the clip 100 but provided beneath one of the ears 103 with a hook 105 engageable with the lower end of such ear.

Conveniently, the cables 95 with their attached clips are produced by securing to a stock cable at appropriately spaced intervals folded pieces of sheet metal 106 (Fig. 15A) each large enough to form a pair of clips 100 and 104. After being secured to the cable, the metal piece 106 is cut along the dotted lines of Fig. 15A, severing the cable and simultaneously forming clips 100 and 104 in adjacent ends of two separate cables.

The pulley 96 previously referred to is supported within the head member 23 through the medium of a sheet-metal bracket 110 (Figs. 9 and 10). The bracket 110, as shown, is in the form of a sheet-metal stamping having a base portion 111, an upwardly projecting ear 112, and a downwardly extending finger 113. The base 111 is associated with an opening 114 in the web 30 of the head member and is secured to the lower surface of the web 30 by a screw 115 located inwardly of the window frame beyond the opening 114. From the screw 115, the base

111 extends across the opening 114 and then is upwardly offset to rest on the upper surface of the web 30 beyond the limits of such opening. The cable-pulley 96 is mounted on a shaft 116 secured in and projecting from the ear 112.

To retain the cable 95 in association with the pulley, there is rotatably mounted on the remote end of the shaft 116 a retainer plate 118. As shown, both the ear 112 and the retainer plate 118 are square, and their centers lie on the axis of shaft 116. At its upper corners, the retainer plate is provided with fingers 119 (see also Fig. 11), adapted when the plate and ear are in registering relation to extend above the pulley 96 substantially into contact with the ear 112. In applying the cable 95 to the pulley 96, the retainer plate 118 is moved out of registry with the ear 112, as to the position indicated in full lines in Fig. 11. In this position, the fingers 119 lie beyond the sides of the ear 112 to provide gaps 120 through which the cable may be inserted into the plane of the pulley 96. After such insertion of the cable, the plate 118 is rotated in clockwise direction to bring the fingers 119 into the dotted-line positions shown, where, by extending between the plate and the ear 112, they prevent the cable from moving out of association with the pulley.

In inserting the bracket 110 into the head member 23 to occupy the position shown in Figs. 9 and 10, the bracket, with the cable retained in the manner just described, is held so that the base extends in a plane normal to the plane of the window frame, and the ear 112, with the pulley and retainer plate, is inserted upwardly through the opening 114, which is both long enough and wide enough for the purpose. After such insertion, the bracket is rotated about a vertical axis to bring it into the position shown in Fig. 9, whereupon the screw 115 may be applied to retain the bracket in position. With the bracket in position, the finger 113 extends downwardly in position to engage the upper edge of the lower sash and limit upward movement thereof. Desirably, the plate 118 is so shaped that with the bracket in place it will rest on the web 30 of the head member and provide support for the outer end of the shaft 116. By reverse manipulation, the bracket 110 can be removed to replace a worn or broken cable.

Both the upper and the lower sash are freely slidable in the frame. When the lower sash is raised as by application of a lifting effort to the rib 84, the upper sash will drop to a corresponding extent, thus opening the window at both top and bottom. To close the window the lower sash is moved downwardly, and the cable serves to draw the upper sash upwardly. Any convenient lock 140 (Fig. 2) operating between the lower rail of the upper sash and the upper rail of the lower sash may be employed for retaining the window closed. The screw 101 permits the effective length of the cable 95 to be varied to insure that the upper and lower sashes reach closed positions substantially simultaneously.

The window frame desirably embodies rubbing blocks bearing on the sides of the upper and lower sash. As shown in Figs. 9 and 10, each rubbing block comprises a block 125 of felt or equally appropriate material held in place by a strip 126 of spring metal. Conveniently, the strip 126 is of a general U-shape having parallel legs 127 and 128 extending inwardly through openings punched in the base of the channel 46 midway of the height of the side jamb. One of the legs, shown as leg 128, is shown as having its end 129 bend downwardly through somewhat more than 90°, while the other leg has its end 130 bent upwardly through even a greater angle. In applying the rubbing block, the clip 126 is placed over it; and with the block in a generally horizontal position, the leg-end 129 is inserted through its opening into the channel 46. The block and clip are then rotated into a vertical position, the leg-end 130 being collapsed on the leg 127 and forced through the upper opening, whereupon

the leg-end 127 springs back to its original position and secures the clip and block in place. The width of the block, as shown in Fig. 10, is such that it bears on the side rails of both the upper and lower sash.

In order to locate the various members of the window frame transversely of the plane which the frame occupies, the head member 23 and sill 24 may have provisions engaging and locating the side jambs. As shown in Fig. 7, the web 30 may be provided on opposite sides of the opening 63 with downstruck portions 135 the opposed ends of which are spaced apart to receive closely between them the channel 46 of a side jamb. In similar fashion, the web 40 of the sill may be provided with upstruck portions 136 (Fig. 10) for the same purpose. The upstruck portions 135 and 136 are desirably located on opposite sides of the holes which receive the screws 57 so as to support the walls of the channel 46 against the spreading or separating tendency resulting from tightening of the screws.

At each end of the head member 23 (Fig. 7) openings 138 are provided for passage of the cable 95. Desirably, these openings are large enough to permit passage of one or both of the clips 100 and 104 on the ends of the cable, so that those clips may be applied to the cable before the latter is brought into association with the window frame.

In assembling a window from frame members cut to length, the upper and lower sash are first assembled, the weather stripping being applied to each as an incident to such assembly. The two sash are then brought into association in closed-window relation and held there by convenient lock 140 (Fig. 2) having co-operating parts mounted respectively on the meeting rails of the two sash. The two side jambs 22 are applied to the sash, and the head member 23 and sill 24 secured in place by the screws 57 and clamp members 60 and 65. To remove a sash after the frame has been assembled, the screws 92 are removed and the horizontal legs of the clips 91 are bent until the sash can be disassembled.

For the purpose of securing a window in place, I may employ an anchor of the type shown in Figs. 16-19. Such an anchor comprises a sheet-metal stamping 145 provided at one end with a pair of keyhole-like notches 146. Extending longitudinally along the stamping from the remote end thereof is a flange 147 provided with a similar pair of notches 148. Near the notched end of the stamping, a portion of the metal adjacent one edge is struck out of the plane of the stamping to form a torque 149, which preferably is obliquely dispersed as shown.

The anchor 145 is made of material harder than the material of the window frame, the two notches of each pair (146 or 148) are spaced apart by a distance equal to the spacing of the jamb flanges 49 and 50, and the sides of each notch converge inwardly to a minimum spacing slightly less than the thickness of those flanges. Either pair of notches may be applied to a side jamb and the anchor driven inwardly thereof to cause the notches to bite into the flanges 49 and 50, thus establishing a firm connection of the anchor to the jamb.

In masonry construction (Fig. 17) the end slots 146 may be applied to the jamb at an elevation such that the horizontally extending anchor can occupy the joint between successive courses of the masonry. In wood-framed construction (Fig. 16), the notches 148 may be applied to the jamb with the anchor extending inwardly of the building for attachment to studding 151. For this purpose, the anchor may be provided with nail-receiving holes 152. For use in association with the head members 23, the anchor may be applied thereto by positioning it obliquely (full-lines position in Fig. 19) in the upper ribs 36 of the head member with the torque 149 extending downwardly between these ribs, and the anchor is then swung to the chain-line position to bring the torque 149 beneath the inner rib 36 with the end of the anchor substantially abutting the flange 35 of the head member. The projecting body of the anchor may then be nailed to

the framing 151' (Fig. 18). To permit such applications of the anchor, the tongue 149 and flange 147 are located at the opposite sides thereof, are spaced apart longitudinally, and project perpendicularly in the same direction from the body of the anchor.

Desirably, the flange 31 of the head member 23 and the flanges 49 and 50 of the jambs are provided on their outer faces with longitudinally extending ribs 153, 155, which may be employed as stops for plastering or caulking. In the mullion window shown, the trim-strips 25, 10 which serve to interconnect the abutting jambs 22 of adjacent frames, are formed to provide spaced longitudinal channels accommodating the ribs 155 (Fig. 4).

I claim as my invention:

1. In a double-hung window structure, a frame, upper 15 and lower sash slidable in said frame, pulleys mounted in said frame near the top thereof, a cable passing over each pulley and having its ends secured respectively to said upper and lower sash, a bracket for each pulley, a pulley-supporting shaft projecting horizontally from the 20 bracket, and a cable-retainer mounted on said shaft beyond the pulley, said retainer having a finger projecting across the pulley into cable-retaining proximity to the bracket, said retainer being rotatable on said shaft relatively to said bracket to a position in which said finger 25 lies beyond the limits of the bracket to permit the cable to be removed from or brought into association with the pulley.

2. In a double-hung window structure, a frame having 30 side jambs and a head member, said head member having a horizontal wall provided with an opening, a bracket having a first portion adapted to lie against the lower surface of said horizontal wall in overlapping relation with edges of said opening, means for securing

said bracket to said horizontal wall, said bracket having a second portion extending upwardly through the opening near one end thereof, resting on the upper surface of the wall beyond said opening, and projecting vertically upward, a pulley rotatably mounted on the vertically projecting part of the bracket, upper and lower sash slidable in said frame, and a flexible member extending over said pulley and having its ends respectively connected to said sash, said opening being large enough 5 to permit passage through it of the second bracket portion and the pulley thereon.

3. The invention of claim 2 with the addition of a shaft projecting horizontally from the vertically extending part of the bracket, said pulley being rotatable on 15 said shaft, and a plate secured to said shaft beyond the pulley and resting on said wall to provide support for the shaft.

References Cited in the file of this patent

UNITED STATES PATENTS

88,471	Goodwin	Mar. 30, 1869
729,885	McSherry	June 2, 1903
848,882	Charroin	Apr. 2, 1907
964,590	Weitzel	July 19, 1910
1,111,260	Hurd	Sept. 22, 1914
1,395,074	Wing	Oct. 25, 1921
1,686,101	Oakley	Oct. 2, 1928
1,690,204	Nye	Nov. 6, 1928
1,751,679	Barringer	Mar. 25, 1930
2,187,490	Dewey et al.	Jan. 16, 1940
2,211,473	Lyon	Aug. 13, 1940
2,270,348	Rumney	Jan. 20, 1942
2,375,553	Hodson	May 8, 1945
2,608,277	Storms	Aug. 26, 1952