April 27, 1954 E. M. TRAMMEL, SR., ET AL 2,676,367

WINDOW UNIT

Filed May 11, 1949

2 Sheets-Sheet 1

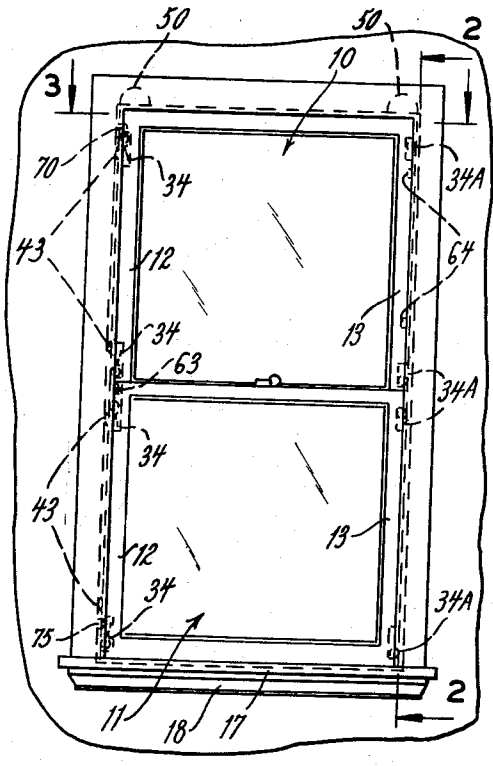

FIG. 1.

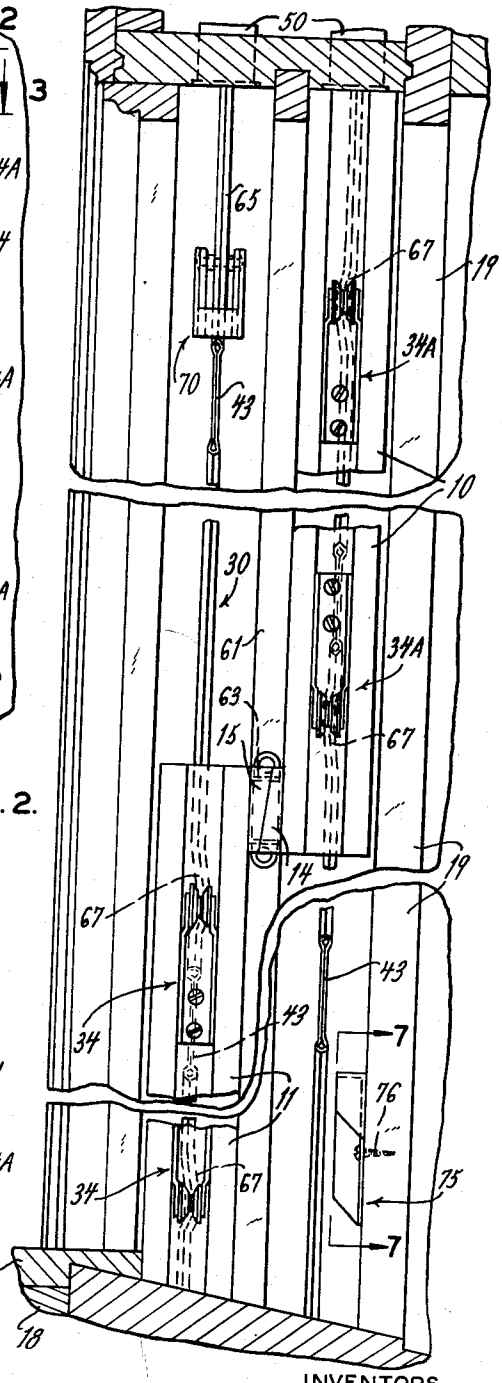

FIG. 2.

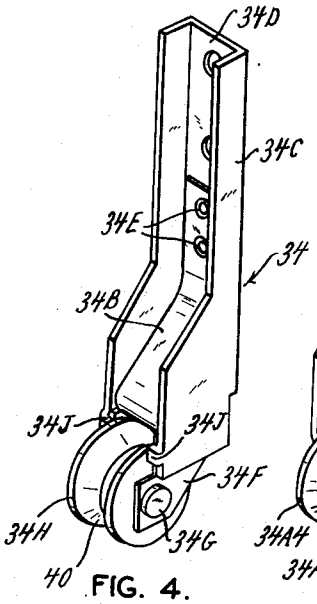

FIG. 4.

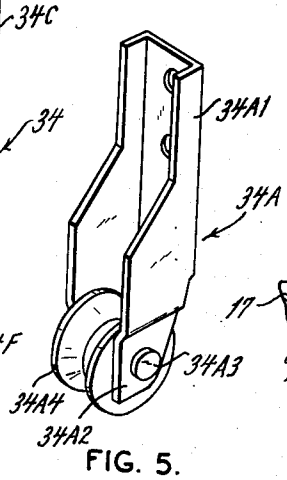

FIG. 5.

INVENTORS
EARL M. TRAMMELL SR.
EARL M. TRAMMELL JR.
BY
ATTORNEY

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Filed May 11, 1949

2 Sheets-Sheet 2

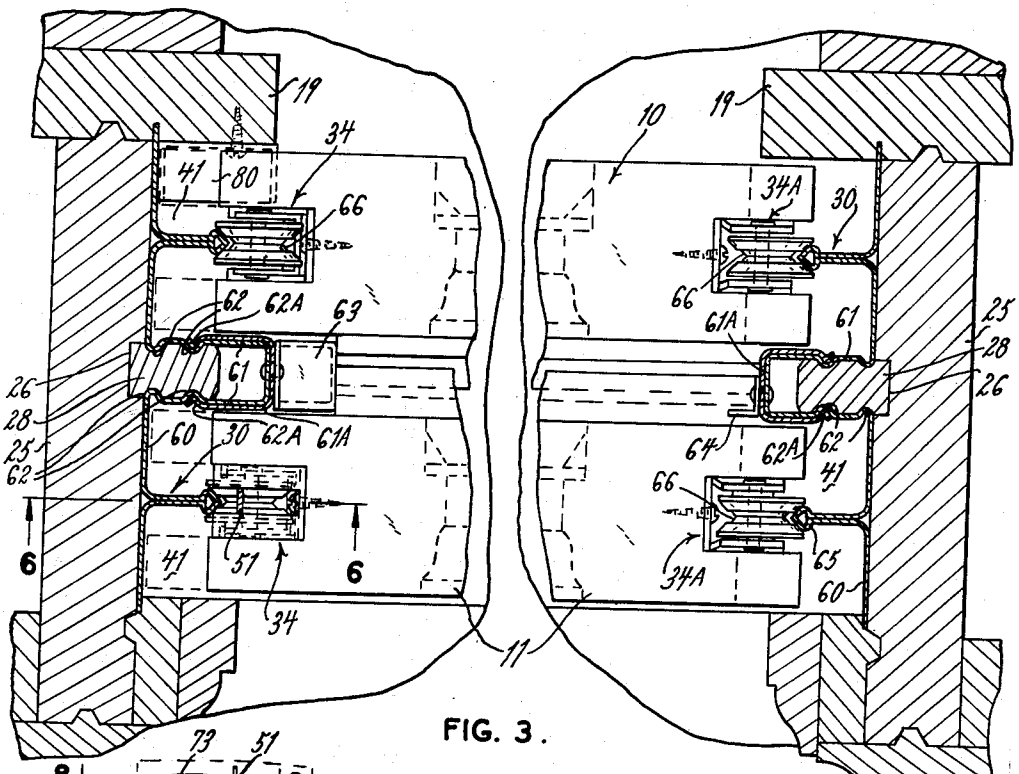

FIG. 3.

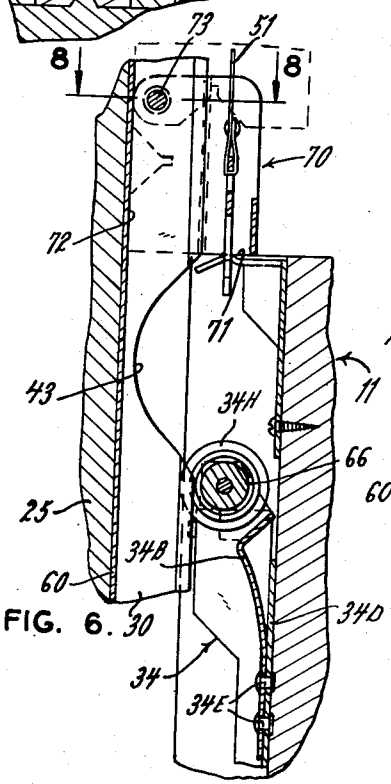

FIG. 6.

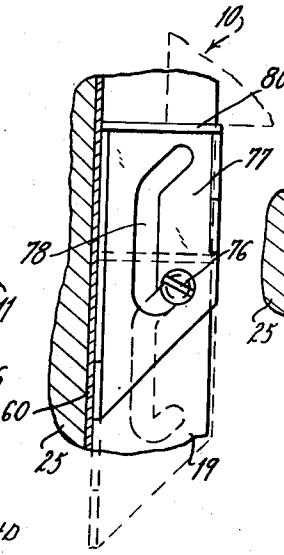

FIG. 7.

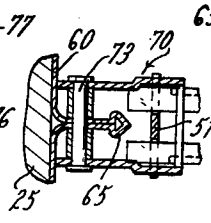

FIG. 8.

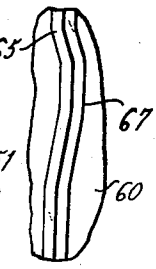

FIG. 9.

INVENTORS
EARL M. TRAMMELL SR.
EARL M. TRAMMELL JR.
BY
ATTORNEY

Patented Apr. 27, 1954

2,676,367

UNITED STATES PATENT OFFICE

2,676,367

WINDOW UNIT

Earl M. Trammel, Sr., and Earl M. Trammel, Jr.,
St. Louis, Mo.

Application May 11, 1949, Serial No. 92,572

7 Claims. (Cl. 20—52.2)

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This invention relates to improvements in window units and accessories, and more particularly to improved agencies and features in and of window units of sliding sash type, to enhance the ease of sash movement, to enhance the sealing qualities of the unit against air and thermal exchange, and very importantly to incorporate in a window unit improved provisions for manual removal of the sash from the sashway.

The subject developments constitute certain improvements over the subject matter of Letters Patent No. 2,426,474 issued to these applicants August 26, 1947, and entitled "Sash and Sash Guiding Means," attention being directed to said patent for a more detailed description of certain difficulties prevailing in older conventional window units and certain practical solutions thereof, resulting from a continuing course of research and development leading to the present improvements.

The present developments may be summarized as embodied in a window unit, usually of double hung sash type in which, in any open position of either sash it is susceptible of a virtually frictionless and effortless lifting and lowering movement, and in which a degree of air-sealing effect is attained which exceeds that of most if not all conventional window units equipped with weather stripping; a further and highly important phase of the present developments is realized in a window unit in which the sash is susceptible of easy manual removal from, and reapplication to the sashway at any time, without tools or especial skill.

While the foregoing statement recounts most of the major objects of the present improvements, there is further noted the objective attainment of improved accessory and hardware features possessing a high degree of individual and combination novelty, and all designed in furtherance of the purposes stated.

A further general object of the invention is realized in a window unit providing the several advantages above noted, and yet which may be factory-produced so as to require but a minimum of assembly operations at the building situs, and which may be produced and sold, in spite of the added features of useful novelty, within fully acceptable price ranges.

The foregoing and many additional objects and advantages of the subject improvements will more clearly appear from the following detailed description of a preferred embodiment, particularly when considered in connection with the accompanying drawing, in which:

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Fig. 1 is a front or side elevational view of a window unit as installed, and in which are incorporated typical embodiments of the present improvements, Fig. 1 being taken as viewed from the interior, or the room side of the window unit;

Fig. 2 is a vertical, partly sectional elevational view taken in a vertical plane, with certain of the parts considerably foreshortened, this view being particularly located by line 2—2 of Fig. 1;

Fig. 3 is an enlarged sectional view taken in a horizontal plane, from which intermediate portions of the window sash have been broken away, Fig. 3 being taken along line 3—3 of Fig. 1;

Fig. 4 is an isometric or perspective view of one form of sash-carried fixture of the present assembly, including a guide roller for coaction with a track or rail element;

Fig. 5 is a view similar to Fig. 4, of a roller fixture carried by the sash but differing somewhat in its structure and purposes from that of Fig. 4;

Fig. 6 is an enlarged, sectional elevation, further showing the construction of the fixture of Fig. 4 and its relation to the sash and sashway, Fig. 6 being located by line 6—6 of Fig. 3;

Fig. 7 is an enlarged elevational view, partly in section, of a rectractible stop element for the upper sash, the location of this figure being indicated by line 7—7 of Fig. 2;

Fig. 8 is a sectional view taken in a horizontal plane particularly located by line 8—8 of Fig. 6, and showing a retractible stop element particularly adapted for coaction under certain conditions with the upper sash, and

Fig. 9 is an enlarged sectional view taken edgewise of a portion of the rail or guide track located at opposite sides of the sashway, Fig. 9 illustrating a camming formation on such track, which acts to urge the sash, when in or near closed position, into a weather-sealing relation with an adjacent stop element of the sashway.

Referring now by characters of reference to the drawing for a disclosure of the parts and their functions, the upper sash is indicated generally at 10, and the lower sash generally designated at 11. Each such sash comprises sash stiles 12 and 13, check rails 14 and 15, and the frame elements include the usual inside casing, stool 17, apron 18, and a blind stop 19, and other suitable or usual framing and sash elements, all familiar to those skilled in this art. There may, however, be mentioned for completeness, a vertical or pulley jamb indicated at 25, into a groove

or channel 26 of which is set the parting bead 28.

The sash assembly illustrated is of a design including rolling elements for guiding each of the upper and lower sash to assure smoothness and ease of operation, and is further of such nature as to facilitate manual removability of the sash, as heretofore mentioned. The physical provisions for these purposes include, at the opposite sides of each sashway, a metal track element 30 provided with suitable anchorage provision, later described, by which each such rail is securely assembled in place in vertical position within the sashway. The term "sashway" as employed herein, denotes the several channel-forming and frame elements within and along which each sash 10 or 11 is guidedly movable and normally restrained to operation in its own plane; for example, as to the upper sash, the sashway is formed by the members 28, 25 and 19, at each of the opposite vertical margins, together with the transverse or horizontal elements at the ends of the window frame.

Coacting with the rails 30, there are provided in the assembly shown, a plurality of roller fixtures, which are of two types, respectively generally indicated at 34 (Fig. 4) and 34A (Fig. 5). These roller fixtures are preferably located in the regions of the opposite lower and opposite upper margins of each sash as shown, and will be hereinafter more fully described, it being presently noted that each such fixture includes a roller provided with a V groove 40, and each of the rails 30 is provided with a bevelled or apexed rail-ball or roller-engaging head portion, as will appear from Fig. 3 and be later detailed. Certain of the roller fixtures include a leaf spring 34B (Fig. 4), by which a roller bracket is carried, such spring tending to bias the roller outwardly of the sash, as will hereafter appear.

By preference, each of the upper and lower sash is marginally routed or otherwise recessed to receive the roller fixtures, and in accordance with the present construction the fixtures 34 are utilized at the upper and lower left hand margins of each sash 10 and 11, as indicated, while in the upper and lower right margins of each sash are disposed the roller fixtures 34A as shown by Fig. 5. A general distinction is noted between the two types of fixtures in that the units 34 of Fig. 4 are of the stated spring type, in which the roller is urged or biased outwardly by a leaf spring 34B, while the rollers of the fixtures 34A are not resiliently mounted. This selection should be understood as without limitation as to possibilities of employing spring-supported roller fixtures throughout, or in other arrangements on the sash.

Further describing the spring-carried-roller fixture 34, the body portion thereof is formed of a channel element 34C which may consist of steel or other metal of requisite rigidity, the base plate 34D of the fixture being suitably apertured as shown for the reception of mounting screws (not shown). The sides of the channel body are in the form of parallel flanges, preferably of a considerably greater width or depth in the lower portion (Fig. 4) of the fixture, and between these widened portions is located the relatively heavy leaf spring 34B attached to the base of the fixture as by rivets 34E. In this form of fixture the free end of the spring or spring arm 34B is attached to an end portion of a U-shape channel member 34F the sides of which are apertured for the reception of a headed pivot pin 34G constituting an axis element for the roller proper 34H, this latter being preferably and as noted, of non-metallic character for silence of operation and long life. The roller is preferably grooved as shown with the sides of the groove 40 bevelled at an angle of 45 degrees, other camming profiles being possible to effect a camming action between the roller and the track or rail 30. The outermost margins of the widened ends of the channel body 34C are inturned as shown at 34J, so as to form stops in this region limiting the possible outward movement of the guide member 34F carried by spring 34B and thus limiting the possible movement of the roller 34H in a direction away from the sash.

Many of the features of construction of the roller fixture 34A are or may be identical with some of those of the fixture 34, but with the omission of the spring arm 34B. In fixture 34A, the sides of the deepened ends of the channel body 34A1 are brought inwardly and extended lengthwise, such extrusions 34A2 being apertured for the roller pin 34A3 serving the roller 34A4, which is or may be identical with roller 34H described above. The base plate of the fixture 34A is apertured for mounting screws in a manner similar to the plate 34D above described.

By preference a clearance is provided considerably exceeding the usual spacing or tolerances in a sliding sash assembly, between the pulley stiles and each adjacent vertical sash stile, this abnormal spacing being provided along at least one, and preferably each of the opposite sides of each sash, as is indicated at 41, and a more than usual clearance is provided at the sides of the pulley stiles so as to permit a latitude of depthwise sash displacement in either direction.

For the purpose of permitting removability of the sash, each of the rails 30 on one side of the frame, in the present example the left hand side (Fig. 1), is provided in particular locations along the sashway, with recessed or cutaway portions 43, there being two such recesses for the rollers on the left hand side (Fig. 1) of each sash, assuming two roller fixtures at this side of each sash, the upper pair of recesses 43 serving the lower sash rollers. A corresponding pair of cutaway portions 43 in the lower part of the rail 30 serving the upper sash, accommodate, for removal, the rollers of the sash 10. These track recesses, together with the clearance provided laterally of each of the sash as indicated at 41, enable each of the sash when positioned with its pulleys opposite the companion cutaway portions, to be laterally shifted, i. e. in the plane of the sash and to the left (Figs. 1 and 3), to permit sash removal, as will later be described more fully.

For completeness of understanding of the full assembly in a preferred form, it may be mentioned, although forming per se no part of the present improvements, that each unit will be provided with one or more sash counterbalance units indicated generally at 50 (Fig. 1) these being suggested as of spring type currently available to the trade, and including a counterbalance tape or other tension element 51, the tape or like tension elements being attached to the respective sash by fixtures providing an automatic captive provision for the counterbalance tapes, incident to sash removal. These features and the fixtures by which this result is accomplished, constitute the subject matter of a copending application for patent by these applicants bearing Serial No. 82,594, filed March 21, 1949, and entitled "Separable Connections Between Sliding Sash and Counterbalance Means," to which attention is

directed for a detailed description of such connectors and fixtures in a presently preferred form.

As before briefly noted, the manual removability of either the upper or lower sash 10—11 is provided for when each such sash is moved to a more or less predetermined location in its own sashway. It has been found most practical to provide a distinct removal zone for each such sash as it approaches its maximum open position. Thus the upper sash 10 will, for purposes of removal, be brought near a bottom position, and the lower sash 11 will be moved to or near its uppermost position. Such a selection of sash removal zones assures the normal guided actuation of the sash throughout all or most of its usual range of opening and closing movement. The sash removal provision in the present structure is identified in part with the track or rail recesses 43, it being here noted by way of a general explanation that these recesses permit a shifting movement of the sash when the rollers on that side of the sash adjacent the recessed track are brought opposite such recesses and the sash thus permitted to be manually moved for example to the left as shown (Fig. 1) to bring the rollers 34H into the recesses 43. The complete sash removal operation will be later referred to. The general purpose of the recesses 43 in the track 30 is introduced at this point for better understanding of certain features of a metal jamb cover constituting a valuable feature of the present improvements, as will now be described.

Overlying by preference each of the opposite pulley stiles 25, is a specially formed metal jamb cover which may be provided in strips or rolls as an article of manufacture, and which in preferred form includes a flat base portion 60 which in effect provides a smooth planar overlay or liner between the pulley stile 25 and the sash. By preference the jamb cover is formed of a metal of non-corroding character, such as anodic aluminum, or aluminum alloy sheet. The jamb cover is of such a width that its side margins extend slightly beyond the sashway proper and are either slotted into or gripped between the adjacent elements, for example the member 19 (Fig. 3) and into a region between the member 25 and an element of the lower trim of the frame. Thus the side margins of the strip are concealed and securely anchored in place. The primary anchorage of the jamb cover consists of a resilient, intermediate, inverted channel with sides 61, including formed internal beads 62, engaging and gripping conforming grooves in the parting bead 28, usually but not necessarily of wood, this interfitting arrangement securely anchoring the cover. In some assemblies, it may be desirable to add a second set of bead formations 62, which serve to retain an optional, resilient, wearing and sealing channel 61A, formed for example of stainless steel, as is advantageous in aluminum sash assemblies, this auxiliary channel having internal, longitudinal beads 62A.

Secured as by riveting or otherwise through the outer part of the resilient channel portion just described, is a dust pad indicated at 63 and serving, when both sash are closed, as a seal between their adjacent marginal portions. This pad forms of itself no part of present improvements, but is mentioned for completeness. Similarly, there may be conveniently secured as to the channel 61 of the right hand jamb cover of the unit, one or more angle stops 64, this provision serving upon introducing the roller sash to the sashway,

to prevent overtravel of the right hand margin of the sash 11, beyond its own sashway, in a depthwise direction.

A further highly advantageous feature of the present improvements consists in combining, preferably as a one piece structure, a metal track element, such as the described member 30 in each sashway, with the jamb cover. It will appear particularly from Fig. 3 that the rail element or guide thus identified, is formed by a double folded portion of the body of sheet metal forming the jamb cover. The zone of fold, or bight, is, however, so conformed to constitute thereof a rail head or ball 65. This ball or head portion engaged by the rollers 34H and 34AH, is of generally triangular sectional shape the opposite sides of the head presenting a slope of the order of 45 degrees to the plane of the flange or body of the rail 30. At this point it may be noted as a preference to form the rollers 34H and 34AH with both an inner groove and an outer groove, the outer groove conforming substantially in slope to that of the sides of the ball 65 of the rail or track, while the inner groove particularly designated at 66 (Fig. 3) will normally prevent contact of the roller with the apex of the rail. This arrangement has been found by experience to conduce to longer life, a considerable increase in area of contact between roller and rail, and to conduce to a better camming relation between the track and roller for a purpose later better appearing.

The jamb cover, preferably formed of a single piece of metal as noted, is characterized by a further important feature consisting of one or more fixed cam formations 67, the locations of such camming portions being best shown by Fig. 2, and their detail best shown by Fig. 9. Each of these fixed cams consists of a laterally deflected portion of the ball or head 65 of the track 30 in the regions shown, the deflection being an out-of-plane deformation of a short section of the rail in a direction tending to urge the lower sash outwardly toward the parting bead 28 and in sealing relation with the jamb cover in this region, and tending to urge the upper sash 10 inwardly or toward the parting bead with a similar weather sealing effect. Thus when such deflecting cam portions are engaged by the sash rollers, the sash is desirably tightened with the noted sealing effects.

From the foregoing it will now have appeared that the jamb cover in its most complete form includes in a single structure the adjacent integral guide rail or track; the recesses such as 43 establishing the zones of sash removal; the resilient self-anchoring assembly feature of the jamb cover identified with its channel 61 and reentrant portions 62, as well as the weather sealing effects in cooperation with the sash stiles, provided by the camming formation 67.

In a structure of the present order it is particularly desirable to minimize the number of parts in, and complexity of the hardware accessories, for minimization of costs and assurance of maximum service-free life. The fixtures F disclosed in our Patent No. 2,426,474, each embody two springs or spring arms acting in planes at right angles to each other. This result has been realized in the improved present design requiring no more than a single spring arm such as 34B (Fig. 4). Though the camming coaction of the bevelled rail ball 65 and the bevelled groove of the spring mounted pulley 34H, it will appear that at such times as each sash is urged into sealing relation to the parting bead, or more specifically

the jamb cover, the bevelled coacting track and pulley will act to displace the pulley inwardly along the plane of the sash against the loading of the spring arm 34B by which the pulley is carried. Thus when the track cam formation 67 acts on the adjacent pulleys 34H, the sash will be urged in a tightening direction depthwise of itself or across its own plane, against the loading of the spring arms.

Conversely, whenever for any other reason the sash is deflected in a depthwise direction from its centered position in the sashway, the ball 65 of track rail 30 in coaction with the groove of the engaging spring mounted rollers, will by reason of the stated camming action cause the spring or springs 34B, to center the sash. Thus by virtue of the camming effect between the rollers and the track the single spring 34B or plurality thereof if more than one such fixture be employed, will provide in effect, a compound spring action in that these springs will tend to center the sash in the sashway both in a lateral direction, and in a depthwise direction.

In view of the provision of a more or less definite and restricted removal zone for each sash, in which manual removal may be effected, it is deemed desirable to preclude any possibility of casual or accidental movement of the sash out of its normal path. With this purpose, provision is made as to the lower sash as will best appear from Fig. 6, showing a part of the sash 11 to indicate a sash portion a little below its uppermost or full-open position. In the position of parts as here shown, the sash-carried roller is slightly below the nearest track recess 43, so that the roller remains in normal operating engagement with the adjacent section of track 30. The sash 11 is precluded normally from being raised above such position by a hinged stop arm generally indicated at 70. This conveniently consists of a channel member which is provided with a linear marginal abutment 71 and with a second abutment margin 72 at a right angle to that shown at 71. This channel element is apertured in its upper left hand corner (as same appears in Fig. 6), for the reception of a pivot pin 73 which extends through a web or flange portion of the track 30. The channel formation of this stop arm is such that the counterbalance tape 51 and one of the counterbalance connector fixtures CCF may extend between the sides of this channel and is so related thereto that the stop arm 70 clears this tape and fixture in any position of swinging movement of the arm. Since the abutment of the sash 11 or a sash-carried fixture with the abutment margin 71, will preclude the adjacent roller from reaching the track recess 43, it will be seen as impossible in this situation to remove the sash. When it is desired to remove or reinsert the sash in a manner which will be described, the stop arm 70 is moved about pin 73 through a ninety degree angle in a counterclockwise direction, to bring it to the dotted position shown by Fig. 6. It will now appear that the sash is permitted a further extent of upward travel which is sufficient to bring the adjacent roller 34H opposite the deep portion of the adjacent track recess 43, thus permitting a shift of the sash to the left for removal purposes. In this manner the stop arm provides a definite abutment in one of its positions, which at once establishes for the operator the exact position of the sash to permit its manual withdrawal.

A provision similar to the foregoing, but serving the upper sash 10 is shown in part in Fig. 2 and in somewhat greater detail by Fig. 7. In this case a channel or angle element 75 is secured as by a screw 76 in a position close to the lower end of the outer sashway serving the upper sash 10. The screw 76 or if desired, a separate screw, extends through a movable plate element 77 with sufficient clearance that the member 77 which constitutes the stop proper may be moved into either of two sash-abutting positions, the vertical spacing of which will appear from the arrangement and proportions of a generally C-shape slot 78 in the member 77. The normal relation of parts with the sash 10 in place, is as shown in full lines by Fig. 7 wherein it will appear that it is impossible to lower the sash 10 below an abutting relation thereof with a bridge or ledge 80 of the member 77. It may be noted that this latter may consist of a short length of channel or angle stock or may consist of a channel element providing a doubled plate portion 77. When it is desired to remove the sash 10 from the sashway, the member 77 is first lifted slightly and moved to the right as same appears in Fig. 7, then lowered or dropped, and is given a short translatory movement to bring the member 77 into a position in which the shank of screw 76 occupies the upper extremity of the slot 78 (see dotted position, Fig. 7), and in which the abutment 80 occupies a position sufficiently lower to enable the upper sash to be lowered to a point such that its left hand rollers 34H may enter the lower pair (Fig. 1) of the track recesses 43 and permit the preliminary shifting movement for sash removal.

It is felt that the function of the several portions of the window unit as an assembly, and of the several fixtures and items of hardware as described, will have become fully apparent from the foregoing description of parts, but it may be noted for further completeness that, assuming it be desired to remove the upper sash, this may be readily done by lowering the stop 77, then bringing the sash 10 to a lowered position such that the rollers 34H on its left hand margin are brought opposite the lower pair of recesses 43 (Fig. 1) thus enabling a movement of sash 10 to the left (Fig. 1) with the sash margin brought into the normally unoccupied clearance space 41 as is shown by dotted lines in Fig. 3. This translatory movement is sufficient to cause the right hand side of the sash to clear its track and stops. The right hand edge of the sash may then be brought bodily toward the operator as with a swinging movement, then moved edgewise or in its own plane to the right (Fig. 1) a distance such that the sash will clear the left hand stops, etc. of the sashway. Reapplication of sash 10 may of course be accomplished by a series of corresponding steps in reverse order from those described for sash removal.

Assuming the lower sash 11 to be in normal operating relation to its sashway, and that it be desired to remove same, as for cleaning or otherwise, the stop arm 70, positioned normally as in Fig. 6, will be raised to the dotted position, after which sash 11 is raised as far as now permitted by the arm, the abutment 72 of which will stop the sash with its rollers opposite the pair of track recesses 43 which appear uppermost in Fig. 1. The sash 11 is then moved to the left (Fig. 1) to bring it to the dotted position (Fig. 3), when the right hand stile of the sash will clear the adjacent frame elements and may be swung toward the operator, then shifted to the right (Fig. 1), and clear of the sashway. Reapplication of

this sash is, now obviously, made by reversing the sequence of steps recited, it being noted that the provision of one or more stop lugs such as 64 (Fig. 3) will now preclude inadvertent movement of the sash beyond its own sashway.

It has been pointed out that the counterbalance tapes are or may be virtually automatically disconnected incident to the aforesaid removal of sash, are similarly properly reconnected to the sash upon reinsertion thereof, being held captive when the sash is out of the frame. As noted, the improvements making for this result are fully disclosed in and by application Serial No. 82,594.

Although the present disclosure is directed primarly to wood sash assemblies, no limtation is thus intended, since the same features are equally applicable to metal window units, such as aluminum sash, in some cases with only minor variations.

Although the invention is herein described in some detail for completeness of instruction, no unwarranted limitation is thereby intended beyond the fair scope of the claims hereunto appended.

We claim as our invention:

1. In a window assembly of sliding sash type, a window frame structure including stops, beads and jambs forming a sashway, a sash vertically movable in the sashway, the sashway being of considerably greater depth than the thickness of said sash, a vertical guide rail in the sashway, a roller carried by the sash and operable along the guide rail, a spring arm by which the roller is supported and secured to the sash, said spring arm being laterally yieldable, the guide rail and roller being provided with coacting beveled formations, the guide rail having a linear camming portion, the roller and guide rail camming portion coacting in and near a closed position of the sash, to deflect the sash in a direction across its normal plane of movement and into sealing relation with a bead in the sashway, against the loading of the spring support of the roller.

2. In a window assembly of sliding sash type, a frame structure including stops, beads and jambs forming a sashway, a sash movable along the sashway, the sashway providing considerable clearance depthwise of the sash, a vertical track extended into the sashway, a track follower carried by the sash and arranged for engagement with the track, a spring arm by which the follower is supported, said spring arm being laterally yieldable the track having a protuberant cam portion near one of its ends, such cam portion being an out-of-plane deformation of a short section of said track and located to coact when the sash is in or near a closed position, to deflect the follower against the loading of the spring arm by which it is carried, in a direction to displace the sash depthwise into weather-sealing relation with a fixed element of the sashway.

3. In a window assembly of a manually removable sliding sash type including stops, beads and jambs forming a sashway, a sash vertically movable in the sashway, the sashway providing a substantial clearance both depthwise and laterally of the sash, and a combination of sash-directing hardware elements comprised of a track rail at each side of the sash and located in the sashway, one or more roller fixtures carried by each side of the sash with the rollers thereof normally in alignment with the track rail, a spring arm by which the roller on one side of the sash is yieldably supported by the sash, the spring arm being laterally yieldable, a sash cam carried by the rail near one end thereof for coaction with the adjacent roller to effect a weather-sealing movement of the sash depthwise thereof against the loading of the spring arm, and the rail being provided with a depthwise recessed portion, said recessed portion being adapted to receive the spring-supported roller, the recessed portion, together with the clearness provided laterally of the sash, permitting the sash to be laterally shifted, whereby to facilitate removal of the sash from the sashway while retaining the stops, beads and jambs in complete assembly.

4. In a window assembly of sliding sash type, a window frame structure including stops, beads and jambs forming a sashway, a sash vertically movable in the sashway, the sashway being of considerably greater depth than the thickness of said sash, a metallic guide rail fixedly supported in a vertical position in the sashway, a roller carried by the sash and operable along the guide rail, a spring arm by which the roller is supported and secured to the sash, said spring arm being laterally yieldable, the guide rail and roller being provided with coacting beveled formations that are normally disposed in interfitting rolling relation, the guide rail having a linear camming portion, said camming portion being extended out of the plane of the guide rail, the roller and guide rail camming portion coacting in and near a closed position of the sash, to deflect the sash in a direction across its normal plane of movement and into sealing relation with a bead in the sashway against the loading of the spring support of the roller.

5. In a window assembly of sliding sash type, a frame structure including stops, beads and jambs forming a sashway, a sash movable along the sashway, the sashway providing considerable clearance depthwise of the sash, a vertical track extended into the sashway, a track follower carried by the sash and arranged for engagement with the track, a spring arm by which the follower is supported, said spring arm being laterally yieldable, a cam on said track, the cam being located near one end of said track to coact when the sash is in or near a closed position, to deflect the follower against the loading of the spring arm by which it is carried, in a direction to displace the sash depthwise into weather-sealing relation with a fixed element of the sashway.

6. In a window assembly of sliding sash type, a frame structure including stops, beads and jambs forming a sashway, a sash movable along the sashway, the sashway providing considerable clearance depthwise of the sash, a vertical track extended into the sashway, a track follower carried by the sash and arranged for engagement with the track, the track and track follower being characterized by beveled portions normally disposed in interfitting relation, a spring arm by which the follower is supported, said spring arm being laterally yieldable, the track having a protuberant cam portion near one of its ends, such cam portion being an out-of-plane deformation of a short section of said track, the cam portion being provided with a beveled formation adapted to interfit the beveled portion of said track follower, and being located to coact when the sash is in or near a closed position, to deflect the follower against the loading of the spring arm by which it is carried, in a direction to displace the sash depthwise into weather-sealing relation with a fixed bead of the sashway.

7. In a window assembly of a manually remov-

able sliding sash type including stops, beads and jambs forming a sashway, a sash vertically movable in the sashway, the sashway providing a substantial clearance both depthwise and laterally of the sash, and a combination of sash-directing hardware elements comprised of a track at each side of the sash and located in the sashway, one or more track followers carried by each side of the sash with the followers normally in alignment with the track, the track and track follower being provided with coacting beveled formations normally disposed in interfitting relation, a spring arm by which the track follower on one side of the sash is yieldably supported by the sash, the spring arm being laterally yieldable, a a sash cam carried by the track, the cam being located near one end of said track for coaction with the adjacent follower to effect a weather-sealing movement of the sash depthwise thereof against the loading of the spring arm, and the track being provided with a depthwise recessed portion, said recessed portion being adapted to receive the spring-supported follower, the recessed portion, together with the clearance provided laterally of the sash, permitting the sash to be laterally shifted, whereby to facilitate removal of the sash from the sashway while retaining the stops, beads and jambs in complete assembly.

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