

Dec. 12, 1961

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3,012,292

REMOVABLE WINDOW WITH SASH COUNTERBALANCE LOCKING DEVICE

Filed Feb. 11, 1959

2 Sheets-Sheet 1

Fig. 2

Fig. 1

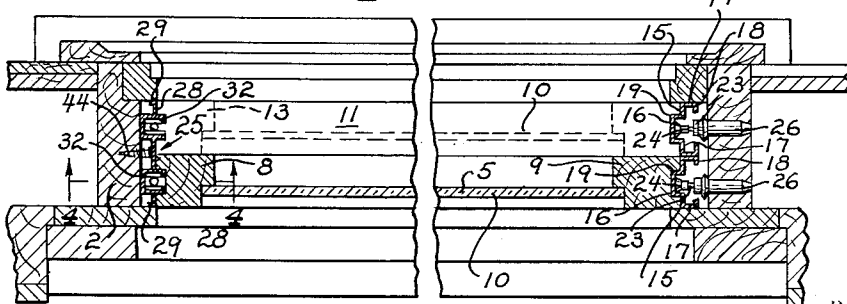
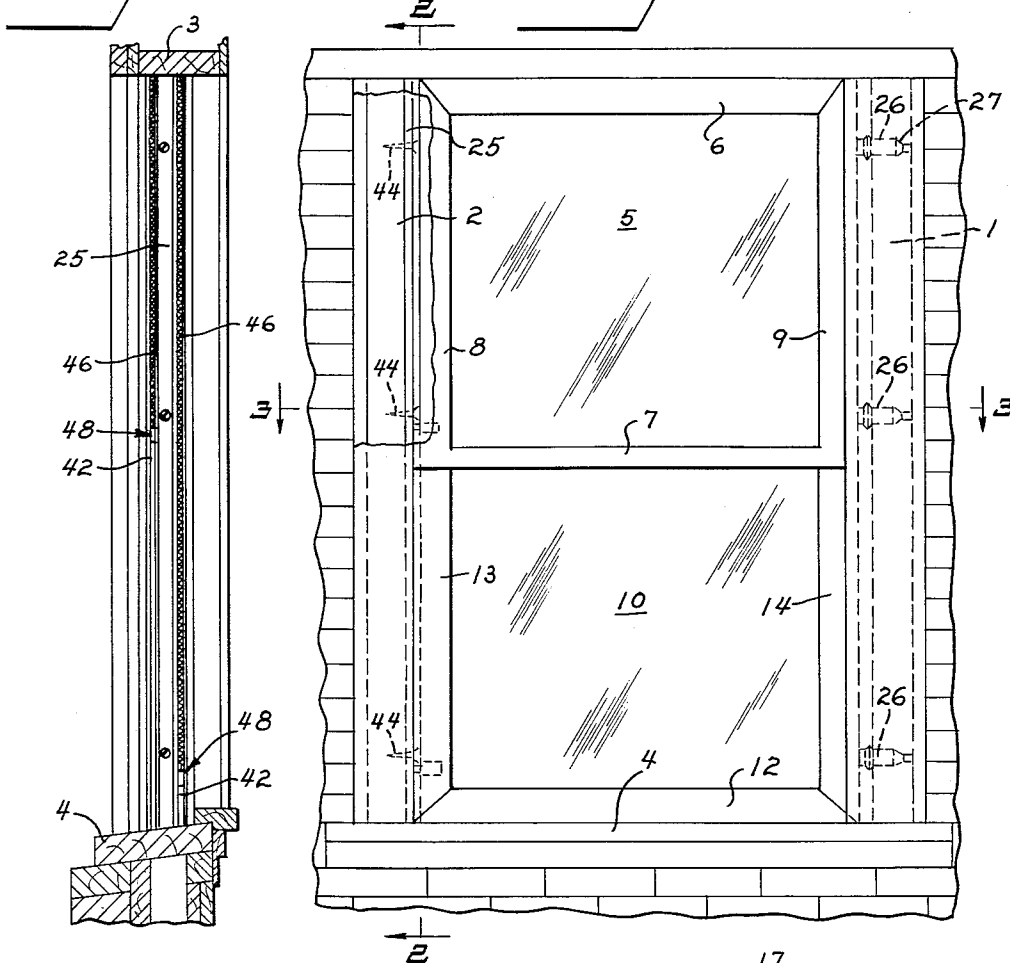


Fig. 3

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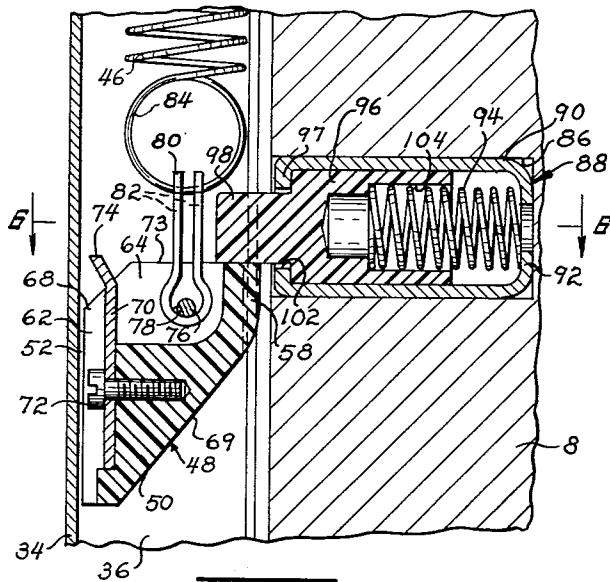


Fig. 4

Fig. 6

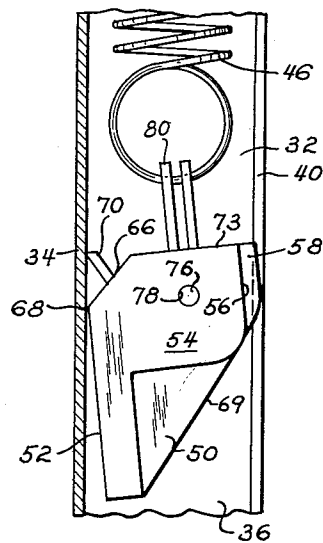


Fig. 5

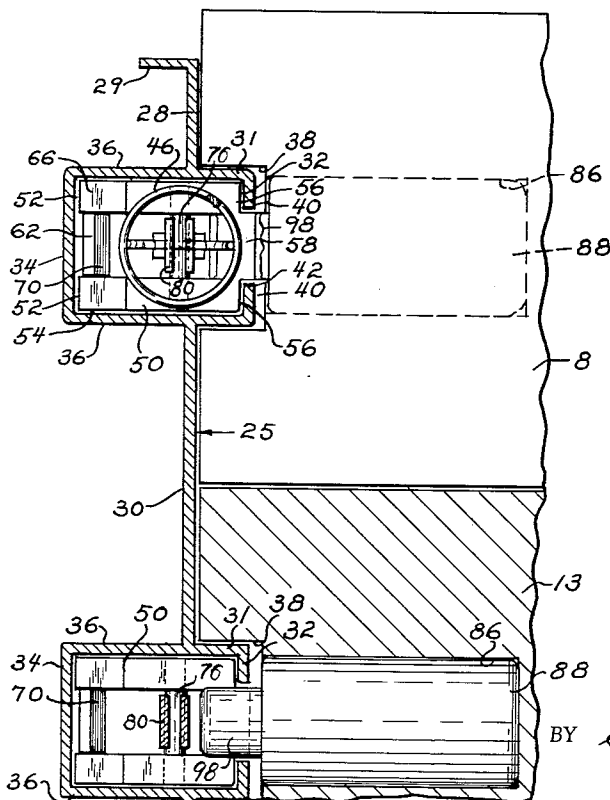


Fig. 7

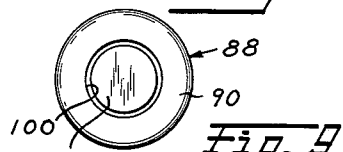


Fig. 9

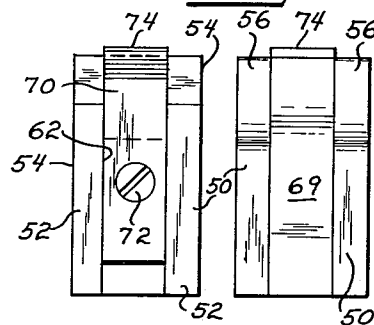


Fig. 8

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1

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REMOVABLE WINDOW WITH SASH COUNTERBALANCE LOCKING DEVICE

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Filed Feb. 11, 1959, Ser. No. 792,653
18 Claims. (Cl. 20—52)

The present invention relates to windows having removable sashes, and more especially to a novel improved simplified locking device for the sash counterbalance in such windows.

The building trade has for many years known and used windows incorporating vertically sliding sashes with a frame having a removable slide rail engaging one of the sash stiles on each window sash whereby the sashes can be removed from the frame. One problem with such windows is that if a sash counterbalance cord or spring is used (and the art has not been successful in its efforts to avoid the use thereof heretofore), the counterbalance cord or spring must be readily disengageable when the window sash is removed from the frame. Another related problem is that of substantial inconvenience if the counterbalance cord or spring is permitted to retract to an inaccessible position adjacent the top of the window, as it will do unless some means is provided to prevent this when the sash is removed from the frame.

There have been a number of devices heretofore suggested and adopted to meet these problems in double hung removable sash windows. However, those prior devices have a number of shortcomings and undesirable features, from the structural, operational and production viewpoints.

Accordingly, it is a primary object of the present invention to provide a new improved sash balance device for removable sliding sash windows, which very effectively solves the above-discussed problems. More especially, it is an object of the present invention to provide a removable sash window with a counterbalance locking device wherein: (1) the sash balance is automatically secured in its position at the location where the window sash is removed, by a compact reliable locking means; (2) the sash locking means is re-engageable from either direction when the sash is replaced in a window frame at either a higher or lower level than that which it occupied when it was disconnected from its sash balance; and (3) the sash automatically unlocks the sash balance when the reinstalled sash is moved in either direction to the position at which it was removed from the frame, so that the sash balance immediately reapplies the tension of the balancing spring or weighted sash cord to the window sash.

It is another related object of the present invention to provide such an improved sash balance locking device of remarkably simplified construction, comprising a spring or sash cord lock means which is of essentially unitary construction, thereby eliminating the small moving parts typical of devices developed in prior attempts to solve these problems. It is still another related object of this invention to provide such a simplified window sash balance locking device which utilizes the force of the balance spring or weighted sash cord for locking operation, eliminating the springs usually incorporated in prior devices of this general type for this purpose. It is yet another object of the present invention to provide such a sash balance locking device combination wherein the lock and slide member mounted on the window frame incorporates a cam surface adapted to cooperate with a simplified yieldable plunger mounted on the window sash stile.

It is still another and primary object of the present invention to provide an improved locking device combi-

2

nation for a removable window sash counterbalance which achieves the foregoing objects and advantages over prior devices, yet is (a) cheaper to manufacture and assemble, (b) easier for the builder to install in the field, and (c) more trouble-free in operation, whereby this novel device has important competitive advantages over prior types so that its use and exploitation is economically feasible in the highly competitive window manufacturing and building industries.

The above and other objects and advantages of the present invention will be apparent from the following description thereof, with reference to the accompanying drawings, wherein:

FIGURE 1 is an elevation view (from the outside) of a removable sash window embodying my invention, certain parts thereof being broken away and shown in section;

FIGURE 2 is a vertical section of the window frame on line 2—2 in FIGURE 1, showing the counterbalance spring and locking portion of my device;

FIGURE 3 is an enlarged horizontal section on line 3—3 in FIGURE 1;

FIGURE 4 is an enlarged vertical section, on line 4—4 in FIGURE 3, showing in detail the sash counterbalance locking device according to the present invention, with the window sash in the frame;

FIGURE 5 is an enlarged vertical section similar to that in FIGURE 4, showing the counterbalance lock means in locked position, with the window sash removed from the frame;

FIGURE 6 is an enlarged horizontal section on line 6—6 in FIGURE 4;

FIGURE 7 is an enlarged end elevation view of the simplified reciprocable plunger which is mounted on the window sash stile for operation of the counterbalance locking device of this invention;

FIGURE 8 is an end elevation view of the slide-lock component of the counterbalance locking device; and

FIGURE 9 is a side elevation view of said slide-lock component shown in FIGURE 8.

Referring to FIGURES 1—3, my invention is incorporated in a window frame having upright side jambs 1 and 2, header 3 and sill 4, mounted in a wall opening, with the slidable window sashes 5 and 10 mounted in said window frame. Upper sash 5 includes a top rail 6, a bottom rail 7, and oppositely disposed stiles 8 and 9. Bottom sash 10 includes a top rail 11, a bottom rail 12, and oppositely disposed stiles 13 and 14.

On the inner face of each of the frame jambs 1 and 2 there is a pair of parallel slide rails which engage the opposed faces of the stiles 8—9 and 13—14 of the sashes 5 and 10. The slide rails 15 at jamb 1 of the window frame are movably mounted and similarly constructed. Each comprises a metallic plate having an outwardly pressed trough-shaped portion 16, and side flanges 17, with the outer ends of flanges 17 being intumed at 18, as clearly shown in FIGURE 3. The trough-shaped portions 16 serve as guide ribs which engage grooves 19 in the opposed faces of the stiles 8 and 14 of the sashes 5 and 10.

Each of slide rails 15 on this side of the window frame may be moved inwardly or outwardly with respect to the window jamb 1. For this purpose, the trough-shaped rib portions 16 of the slide rails 15—18 are provided with pressed countersunk holes which receive heads of screws 23, the shanks of which are provided with collars 24 that are larger than the countersunk holes in rails 15 and maintain the screws 23 in the slide rail without axial displacement relative thereto while permitting said screws to be freely rotated.

As shown in FIGURES 1 and 3, each of screws 23 enters one of a plurality of spring boxes mounted in

jamb 1, generally indicated at 26. In the preferred installation, each of these spring boxes 26 consists of two parts, i.e., a tubular housing which is pressed into a hole drilled in the jamb 1 of the window frame, and a spring of generally hour-glass shape (not shown), which is securely anchored at its base or inner end within the housing 26, with the outer end of the spring engaging the intumed end of spring box housing 26, and having an opening for the passage of screw 23 therethrough. In the preferred embodiment, each spring within box 26 has disposed between its aforementioned end coils, which are of major diameter, coils of restricted diameter forming a helix which receives the threads of screw 23. Thus, when screws 23 are rotated, the slide rail 15 will be adjusted towards or from the window frame jamb 1 thereby permitting adjustment of the distance between the movable slide rails 15 and the fixed slide rails 25 which are mounted on window jamb 2 (and hereinafter more fully described), whereby the side pressure on the window sash can be adjusted as desired. The compression spring section between the screw engaging helix coil and the end 27 of box 26 is free to compress and expand thereby urging the movable rails 15 against sash stile 9 (or 14) but permitting each of rails 15 to be displaced towards jamb 1. Such arrangement permits the window sash to be removed from the window frame without requiring removal of retaining strips from the window frame.

A detailed description of the means for mounting the movable slide rails 15, including screws 23 and boxes 26 etc., is contained in my copending application S.N. 603,334, filed August 10, 1956, now Patent No. 2,888,719, issued June 2, 1959 and entitled "Window Construction," which is incorporated herein by reference. A more detailed description than the above is believed unnecessary herein since the particular construction of the movable slide rail and mounting means does not per se form part of the present invention, and any suitable movable slide rail could be used.

Referring now especially to FIGURES 2-6, a fixed slide rail 25 is mounted on the window jamb 2, and comprises an elongated metal member having a cross-section as shown in FIGURES 3 and 6, and of a length substantially equal to the inside height of the window frame. As will be apparent from FIGURES 3 and 6, this rail member 25 comprises side webs 28 terminating in side flanges 29 perpendicular thereto, and a center web 30 with a pair of intermediate substantially rectangular channels 32, enclosed by rear walls 34, side walls 36, and front intumed flanges 40 which provide a slot opening 42 that extends along the length of the channel 32. The side walls 36 extend forwardly of the webs 28 and 30 forming a pair of ribs 31 on the slide rail 25, and one of these ribs is received within the usual longitudinal groove 38 in the side of the window sash stiles 8 and 13. The fixed slide rail 25 is preferably unitary, and can be made by extrusion of a light metal such as aluminum through an appropriately shaped die, or formed from sheet metal. Rail 25 is secured to the jamb 2 by a plurality of wood screws 44 extending through holes in the central web section 30. (However, slide rail 25 need not be unitary, as will be apparent to those familiar with this art.)

A coil counterbalance spring 46 is arranged in each of the channels 32, and has a suitable terminal portion (such as vertical coil shown at bottom in FIGURES 4 and 5, or a hook end) which is engaged over the upper end of one wall of the channel 32 in a suitable manner. The counterbalance and locking device is the same for both upper and lower sashes excepting for the length of the counterbalance spring 46 and the location of the slide-lock device at the lower end thereof generally indicated at 48 in the drawings.

One slide-locking member 48 is disposed within each of channels 32. It includes a slide block 50 which is preferably made of a plastic such as nylon, and has a

configuration as shown in FIGURES 4, 5, 6, 8 and 9. As will be apparent especially from FIGURE 6, the slide block 50 includes the back surfaces 52, side surfaces 54, and front surfaces 56, which lie in a rectangle having dimensions slightly smaller than the inside diameter of the channel 32. Thus, when the back side 52 is substantially vertical as shown in FIGURE 4, which is the case when the window sash 5 (or 10) is in the window frame, slide block 50 will reciprocate freely in its channel 32 as the window sash is moved up and down. A projection 58 extends from the front surface 56 of slide block 50 through the elongated slot 42 with adequate side clearance, and slightly into the groove 38 in the window sash stile 3 (or 13) as will be apparent from the drawings. The slide block 50 is provided with a longitudinal rear recess 62, and also with a recess 64 extending along the major portion of its top. The upper rear corner of the slide block 50 is cut away at an angle forming surface 66, and thereby providing a fulcrum 68, about which the slide block 50 may pivot. The slide block 50 is also provided with a lower, centrally disposed, sloping surface 69 which merges into the front projection 58, as will be especially apparent from FIGURE 5, forming a cam surface for a purpose amplified below.

A metal brake strip 70 is mounted on the rear of the slide block 50 in the recess 62 by suitable means such as a screw 72. The brake strip 70 is preferably bent, and beveled slightly at its upper end, so that it will readily dig into the rear wall 34 of channel 32, and projects beyond the beveled edge 64 but not beyond the rear surface 52 of the slide block 50. A metal pin 76 is transversely mounted with a press fit in a pair of aligned holes in the opposite side of the slide block 50 formed by the top recess 64. A U-shaped link strap 80 is mounted in the top recess 64 extending around the transverse pin 76. Each side leg of strap 80 has an aperture 82 through which is inserted the vertical coil 84 at the lower end of the counterbalance spring 46, whereby the force of spring 46 is upwardly applied to slide-lock 48. It will be noted, as shown in the drawings, that the transverse pin 76 is eccentrically displaced from the longitudinal axis of the slide block 50 towards its front surface 56, so that the upward force exerted by spring 46 produces a counter-clockwise moment on the slide-lock 48 (in FIGURES 4 and 5). When it can this moment will rotate the slide-lock 48 about fulcrum 68 to cause edge 74 of the brake strip 70 to engage the back wall 34 of the fixed slide rail channel 32.

A hole 86 is drilled into each of the stiles 8 and 13 of window sashes 5 and 10, in communication with the groove 38 in the stile side, and a yieldable plunger unit generally indicated at 88 is press fitted in each hole 86. Plunger unit 88 comprises a tubular cylindrical housing 90, having intumed flange 92 forming an end wall, with a compression spring 94 and a reciprocal plunger 96 retained within the housing 90 by intumed flange 97. Plunger 96 is preferably molded of plastic, and has a cylindrical main section which is slightly smaller than the inside diameter of the housing 90, with a reduced cylindrical section 98 which extends from the aperture 100 in the forward end of the housing 90. The diameter of the reduced section 98 is less than the width of the slot 42 in ribs 31 of the fixed slide rail 25, so that the plunger section 98 can extend freely into channel 32. The inner end of plunger 96 is also preferably provided with a longitudinal bore 104 which receives and seats the forward end of the compression spring 94.

The operation of the counterbalance locking device of the present invention will now be summarized.

Window sashes 5 and 10 are normally installed in the window frame, with the grooves in the sides of the sash stiles receiving the ribs 16 and 31 on the movable and fixed slide rails, respectively, so that the window sashes can be freely slid up and down in the frame.

The plunger 88 is so positioned in each window sash stile, and the respective counterbalance spring 46 for the upper and lower window sashes is of such length that the slide-lock 48 will be suitably positioned with respect to the plunger assembly 88. The positioning is such that when the window is sufficiently raised and then lowered the plunger end 98 engages the top 73 of slide block 50 thereby exerting the weight of the sash 5 (or 10) on the front end of the slide-lock 48, exerting a clockwise moment counter to that of the spring 46 acting on eccentrically placed pin 76. This causes the slide-lock 48 to assume a vertical position as shown in FIGURE 4, so that it thereafter slides freely up and down in channel 32, under the counter forces of spring 46 and sash weight.

The window sash is removed by raising or lowering it to appropriate height, and pushing in the direction of window jamb 1 to displace the movable slide rail 15 toward the jamb 1 under the action of the compression springs in the housing 26, so that the sash can be swung around the rib 16 to clear the opposite cooperating rib 31 on fixed slide rail 25. When the window is removed, plunger 98 is removed from the upper surface 73 of the slide block 50, and the force of the spring on the eccentric pin 76 thereupon causes slide block 50 to rotate counter-clockwise about the fulcrum 68, making the upper edge 74 of brake 70 engage the back wall 34 of channel 32 of slide rail 25, as shown especially in FIGURE 5. This locks the sash balance 48 in the position it occupied when the window sash was removed.

The counterbalance locking device of this invention has the advantage that the window sash can be reinstalled in the conventional way (by a series of steps converse to removal) at any level, either below or above the counterbalance lock 48. The sash counterbalance spring is easily and automatically reengaged when the window is moved up or down to the appropriate level.

If the window is installed high, with the plunger 98 above the slide lock 48, when the sash is lowered the plunger engages the top 73 of slide block 50 causing it to assume a vertical position as in FIGURE 4, thereby disengaging the end 74 of the brake strip 70. If the window sash is reinstalled low, with the plunger 98 below the slide block 50, when the sash is raised the plunger 98 runs up the cam surface 69, retracting partly into housing 90, until it passes over the top surface 73 of block 50, whereupon it will snap outward over the top of block 50. The weight of the sash then causes block 50 to rotate into the vertical position, disengaging the end 74 of the brake strip 70 from the back wall 34 as shown in FIGURE 4 so that the window sash is balanced by the spring 46.

It will be noted that incorporation of the cam surface 69 on slide block 50 makes it unnecessary to provide a cam on the plunger 98 in order that the window sash can be reinstalled at any level. Elimination of any cam from the plunger 98 makes it unnecessary to orient the plunger in the housing 90, thereby achieving a construction that is simpler and cheaper to manufacture and assemble, and easier and cheaper to install. Also this construction avoids any problem of the cam on the plunger mounted on the sash becoming disoriented during window use due to shift of the housing in the stile recess 86.

The slide-lock device 48 above described can be used with a sash cord counterbalance of conventional construction used in some windows of this type. The brake member 70 could be formed integrally with the slide block 50, which could be made entirely of metal, but the above-described construction is preferred. Also, it is preferable to bevel the edge of the brake strip 70 at 74 as above described, but this could be eliminated, with the strip 70 acting as a friction brake. Although the block 50 could be made of metal, certain types of plastic are preferable materials because they can be readily molded at low cost, and also are to some extent self-

lubricating thereby eliminating the problem of binding between the slide 50 and the walls of channel 32.

It will be apparent from the foregoing that the present invention provides a novel improved sash balance lock for removable sash windows which automatically locks in its position when the window sash is removed, and can be re-engaged and automatically unlocked regardless of the height at which the window sash is reinstalled in the window with respect to the locking means. It will also be apparent that the present invention provides a novel improved sash counterbalance device which achieves the objects and advantages over prior devices stated above, yet is of simplified economical design so that it has production and marketing advantages.

The invention may be embodied in other specific forms without departing from the spirit or essential characteristics thereof. The present embodiment is therefore to be considered in all respects as illustrative and not restrictive, the scope of the invention being indicated by the appended claims rather than by the foregoing description, and all changes which come within the meaning and range of equivalency of the claims are therefore intended to be embraced therein.

What is claimed and desired to be secured by United States Letters Patent is:

1. A window of the removable sash type comprising: a frame, with at least one movable slide rail, at least one other slide rail, and at least one window sash slidably mounted therebetween; a counterbalance locking means comprising a member along said other rail and subject to angular displacement with respect to said other rail, said member having a brake portion thereon adapted to engage said other rail; means for exerting a counterbalance force on said window sash in one direction, said means being eccentrically connected to said movable member for angularly displacing it so that said brake portion will engage said other slide rail with a locking action; and means on said window sash for engaging said movable member and displacing it angularly in direction opposite to angular displacement by said counterbalance force means so that said brake portion is disengaged from said other slide rail whereby said locking means is free to reciprocate along said other rail.

2. A window of removable sash type as defined in claim 1, wherein: said means for exerting a counterbalance force on the window sash is a coil spring extending along said other rail.

3. A window of removable sash type as defined in claim 1, wherein: said slide member is a plastic block and said brake portion is a metal piece mounted on said plastic block adjacent said other rail.

4. A window of removable sash type as defined in claim 1, wherein: said last-mentioned means comprises a reciprocable plunger mounted on the stile of the window sash adjacent said other rail.

5. A window of removable sash type as defined in claim 1, wherein: said slide member is a plastic block movable along said other rail, and said brake portion is a metal strip secured to said block and disposed adjacent said other rail; said means on said window sash for engaging said movable slide block member includes a spring-biased reciprocable plunger mounted on the stile of the window sash adjacent said other rail; and said slide block has a cam surface so that said reciprocable plunger can override the slide block when the window sash is moved in the direction of force exerted by said counterbalance force means, but cannot over-ride said slide block when the sash is moved in the other direction.

6. A window of the removable sash type comprising: a frame; at least one vertical slide rail mounted on said frame so that it is movable in a horizontal direction; a vertical slide rail fixedly mounted in said frame, said rail including a substantially enclosed channel along its length with part of the walls of said channel forming a rib, said channel having an inside back wall and opposite

thereto an elongated slot extending along the length of said rib in communication with said channel; a window sash slidably mounted between said slide rails, said window sash having a groove in the stile adjacent the fixed rail which receives said rib; a movable slide block within said channel, having a fulcrum adjacent said back wall of the channel; a brake projection on said slide block adapted to engage said back wall of the channel; means for exerting a counterbalance force on the window sash in an upward direction, said means being disposed within said channel and eccentrically connected with said movable slide block between the center of the slide block and said slot in said rib for angularly displacing said slide block about said fulcrum so that said brake projection will engage said back surface of the channel; said slide block including a portion extending into said slot in the rib formed by said channel walls; and means on said window sash stile for engaging said last-mentioned portion on the slide block to displace said slide block angularly in a direction opposite to displacement by the counterbalance force means so that the brake projection is disengaged from the back wall of the channel and the slide block is free to reciprocate within said channel.

7. A window of removable sash type as defined in claim 6, wherein: said means for exerting counterbalance force on the window sash is a coil spring extending within said channel.

8. A window of removable sash type as defined in claim 6, wherein: said slide block is plastic; and said brake portion is a metal strip secured to said block and disposed adjacent the back wall of said channel.

9. A window of removable sash type as defined in claim 6, wherein: said last-mentioned means comprises a reciprocable plunger mounted on the stile of the window sash and extending through said stile groove a sufficient distance to engage said portion of the slide block extending into said rib slot.

10. A window of removable sash type as defined in claim 6, wherein: said slide block is plastic and said brake portion is a metal strip secured to said slide block and disposed adjacent said back wall of said channel; said means on said window sash for engaging said movable slide block member includes a spring-biased reciprocable plunger mounted on the stile of the window sash adjacent said rib; and said slide block has a lower cam surface so that said reciprocable plunger can over-ride the slide block when the window sash is moved in the direction of force exerted by said counterbalance means, but cannot over-ride said slide block when the sash is moved in the other direction.

11. A window of removable sash type as defined in claim 6, wherein: said last-mentioned means on said window sash comprises a cylindrical housing mounted on said sash stile, a cylindrical plunger reciprocably mounted in said housing, and a spring within said housing yieldably urging said plunger towards said rib so that the plunger normally extends into said slot; and said slide block further comprises a lower cam surface so that said reciprocable plunger can over-ride the slide block when the window sash is moved in the direction of force exerted by said counterbalance force means, but cannot over-ride said slide block when the sash is moved in the other direction.

12. For a window of the removable sash type: a slide rail adapted to be fixedly mounted in a window frame, said rail including a substantially enclosed channel along its length with part of the walls of said channel forming a

rib, said channel having an inside back wall and opposite thereto an elongated slot extending along the length of said rib in communication with said channel; a movable slide block within said channel, having a fulcrum adjacent said back wall of the channel, and a brake projection on said slide block adapted to engage said back wall of the channel; means for exerting a counterbalance force in one direction which would be an upward direction when said slide rail is mounted in a window frame, said means being disposed within said channel and eccentrically connected to said movable slide block with said counterbalance force means between the center of the slide block and said slot in said rib for angularly displacing said slide block about said fulcrum so that said brake projection will engage said back surface of the channel; said slide block including a portion projecting into said slot extending along the length of said rib, whereby said projecting block portion is adapted to be engaged by cooperating means on a window sash stile for displacing said slide block angularly in the direction opposite to its displacement by said counterbalance force means to thereby disengage said brake projection from the back wall of the channel, whereby the slide block will be free to reciprocate into said channel.

13. For a window of removable sash type, a subcombination as defined in claim 12, wherein: said means for exerting a counterbalance force on the window sash is a coil spring extending within said channel.

14. For a window of removable sash type, a subcombination as defined in claim 12, wherein: said slide block is plastic, and said brake portion is a metal strip secured to said block and disposed adjacent the back wall of said channel.

15. A slide block having at least one flat side, with a fulcrum portion at said flat side adjacent the top of said block; a brake projection on said slide block extending beyond said fulcrum towards the top of said block, and adapted to engage a surface with a braking action; means on said slide block for connecting it with a counterbalance force means, said connecting means being disposed eccentrically of the center of gravity of the slide block on the side of center opposite the brake projection.

16. For a removable window sash counterbalance device, a slide-lock comprising: a slide block having back, side and front surfaces; a fulcrum portion on said back surface of said slide block adjacent the top thereof; a brake member on said block, projecting above said fulcrum towards but inside the extended plane of said back surface; means on said block for connecting it to a counterbalance force means, said connecting means being eccentrically disposed between the center of gravity of the slide block and the front surface of the slide block.

17. For a removable window sash counterbalance device, a slide-lock as defined in claim 16, wherein: said slide block is made of plastic, and said brake member is a metal strip secured to the back portion of the plastic block.

18. For a removable window sash counterbalance device, a slide-lock as defined in claim 16, wherein: said slide block further comprises a cam surface at the lower front part thereof.

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UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,012,292

December 12, 1961

Fred C. Brengman

It is hereby certified that error appears in the above numbered patent requiring correction and that the said Letters Patent should read as corrected below.

Column 6, line 30, after "member" insert -- movable --.

Signed and sealed this 17th day of July 1962.

(SEAL)

Attest:

ERNEST W. SWIDER
Attesting Officer

DAVID L. LADD
Commissioner of Patents