March 25, 1969 G. W. LOVE 3,434,237

SELF-LOCKING SPRING SASH BALANCE FOR TILTABLY-REMOVABLE SASH WINDOWS

Filed April 12, 1967 Sheet 1 of 2

FIG. 1

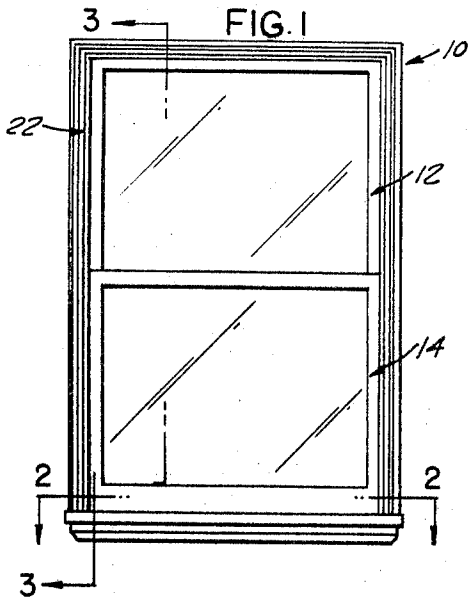


FIG. 7

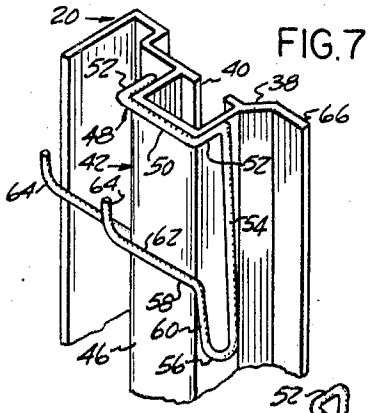


FIG. 8

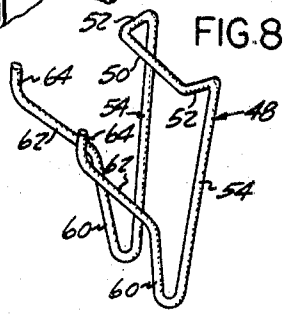
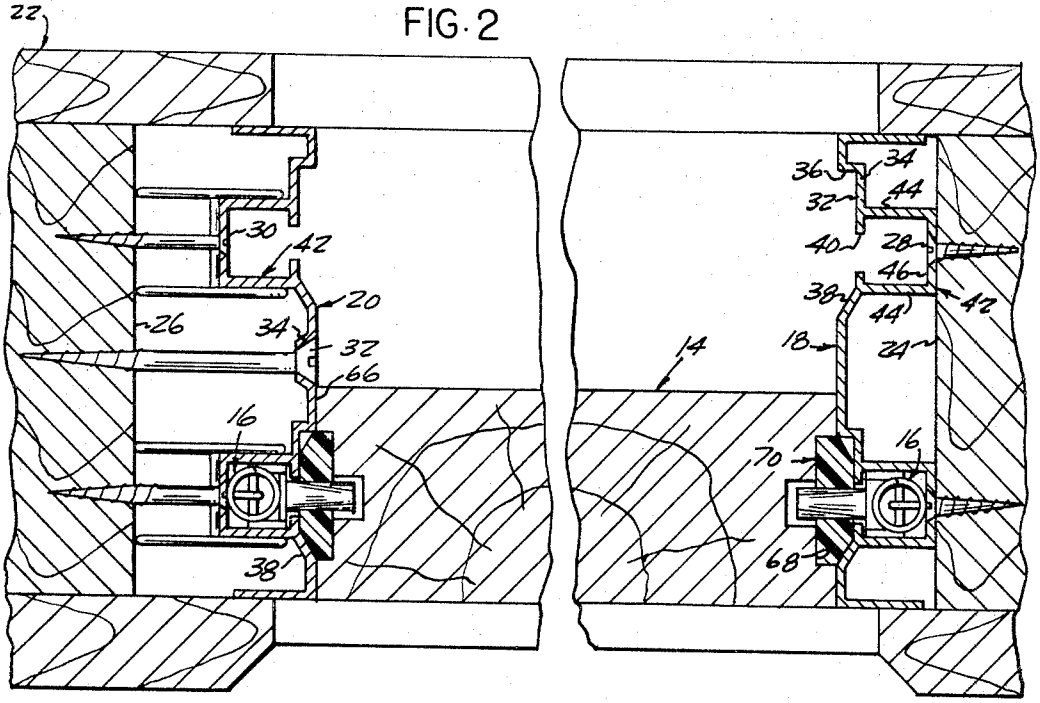


FIG. 2



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FIG. 3

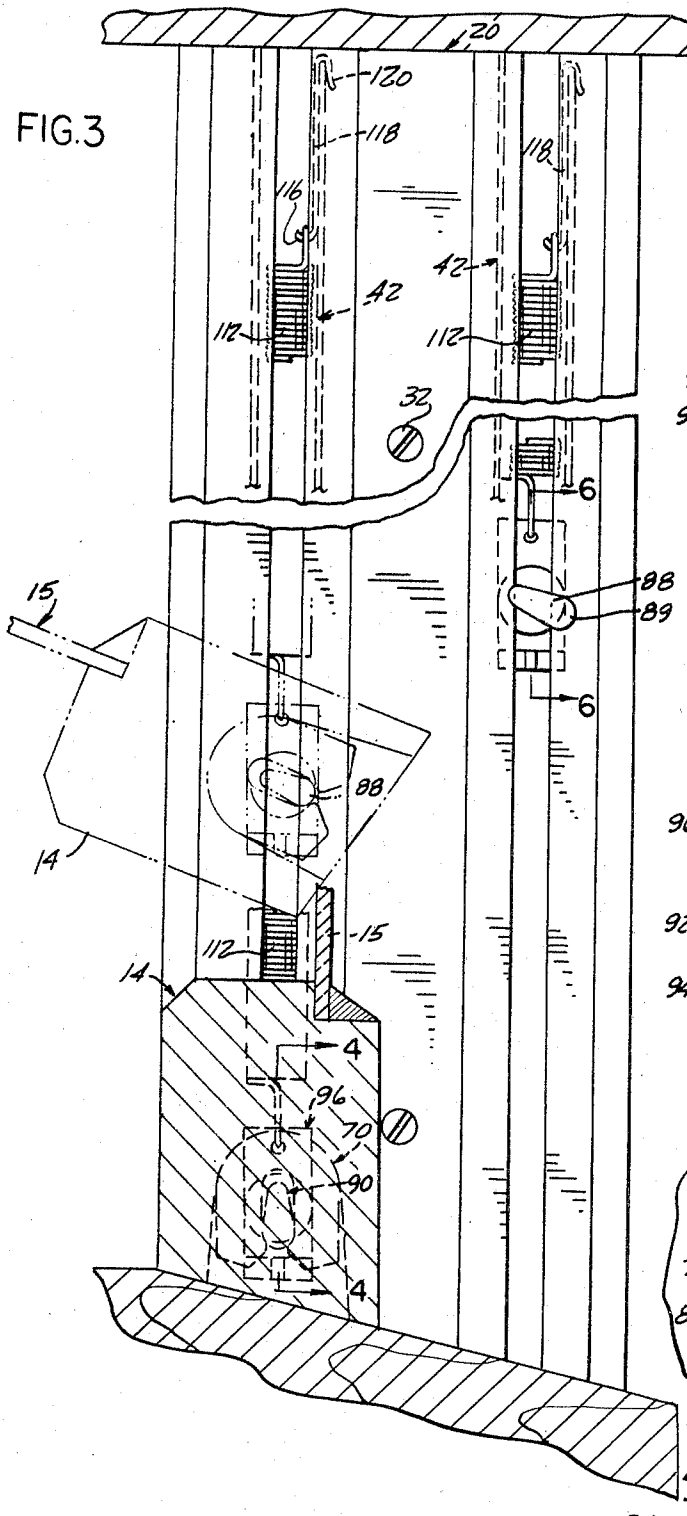


FIG. 4

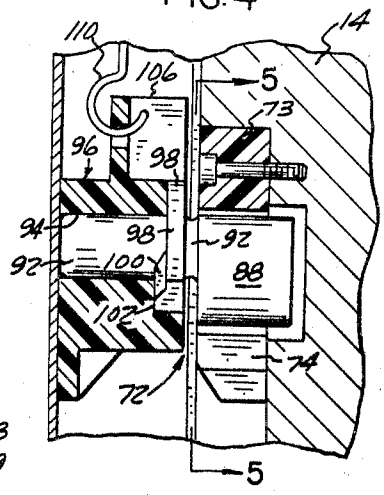


FIG. 6

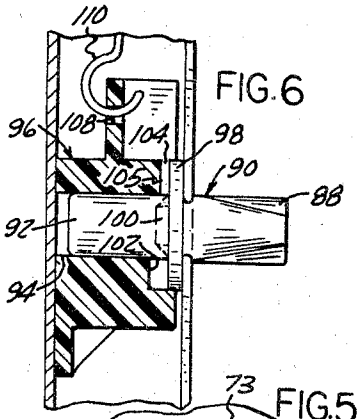
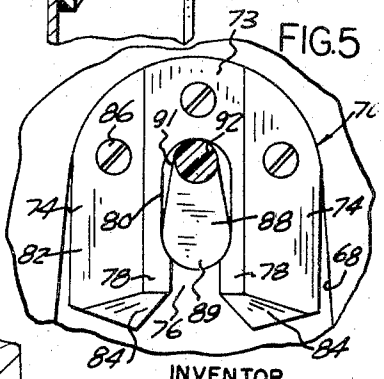


FIG. 5



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SELF-LOCKING SPRING SASH BALANCE FOR TILTABLY-REMOVABLE SASH WINDOWS

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ABSTRACT OF THE DISCLOSURE

A self-locking spring sash balance for tiltably-removable sliding sash windows wherein the sash can only be swung inward for cleaning or removal, such swinging locking the spring sash balance in its attained position by a camming action of the spring-attached slide block against the channel sash guide. Accidental and unintended sash removal with consequent dropping and possible pane breakage is impeded by a bulbous wedge-shaped pivot element normally seated in a stiffly-yieldable C-shaped or U-shaped pivot block, the stiff arms of which normally resist yielding but which can be wedged apart by the bulbous element to intentionally remove the sash by a quick forceful pull.

Background of the invention

Self-locking spring sash balances for removable sliding sash windows are known where at least one of the metal channel sash guides is spring-mounted to yield sidewise either by a sidewise push on the sash to dislodge one edge thereof from the non-yieldable sash guide whereupon the sash is removed bodily sidewise, or frontwise by a tilting and camming action of the sash upon the yieldable sash guide. In the former, the removal of the sash releases a locking element which in response to the pull of the sash balance spring digs into the sash guide and locks the spring in its attained position. This has the disadvantage of requiring complete removal of the sash in order to clean both sides of the pane, with the awkwardness of having to handle the weight of the entire sash and the danger of dropping it and breaking its pane. In the latter, the pivoting action performs a wedging effect between the slide block of the sash balance and the sash guide. This has the advantage of cleaning both sides of the pane without removing the sash, but involves the danger of accidental and unintended dislodgement and dropping of the sash either in an outward or inward direction.

Summary of the invention

By the construction summarized above in the Abstract of Disclosure, the invention, by the use of a single-hump sash-balance-locking cam permits sash removal only in an inward direction. It ordinarily resists such removal yet readily permits tilting. Intended removal, however, can be effected by a quick and forceful pull upon the sash greatly in excess of the force required to tilt the sash.

In the drawings:

FIGURE 1 is a rear elevation of a double-hung tiltably-removable sliding sash window installation, equipped with the self-locking spring sash balance of the present invention;

FIGURE 2 is a fragmentary horizontal section, upon an enlarged scale, taken along the line 2—2 in FIGURE 1;

FIGURE 3 is a fragmentary vertical section upon an enlarged scale, taken along the broken line 3—3 in FIGURE 1, showing the outer sash removed and the inner sash in process of removal, and showing the sash balance

in its locked position above and in its unlocked position below;

FIGURE 4 is a vertical section taken along the line 4—4 in FIGURE 3;

FIGURE 5 is a vertical section at right angles to that of FIGURE 4, taken along the line 5—5 in FIGURE 4;

FIGURE 6 is a vertical section through the locked sash balance after the sash has been removed, taken on the line 6—6 in FIGURE 3;

FIGURE 7 is a fragmentary rear view of a portion of one of the yieldable channel sash guides with one of the mounting springs mounted thereon; and

FIGURE 8 is a perspective view of one of the mounting springs of FIGURE 7 in its relaxed condition removed from its channel sash guide.

Referring to the drawings in detail, FIGURE 1 shows a rear view, looking from inside the room toward the window, of a tiltably-removable sliding sash window installation, generally designated **10**, wherein the upper and lower tilting sashes **12** and **14** with panes **15** are equipped with pivoting self-locking removal-resisting but tiltably-removable spring sash balances **16** mounted in fixed and yieldable channel sash guides **18** and **20** respetively (FIGURE 2) mounted in and secured to a conventional wooden window frame **22** having opposite vertical side members **24** and **26** to which the channel sash guides **18** and **20** are secured by screws **28** and **30** respectively. The channel sash guides **18** and **20** are of oppositely-facing but substantially identical construction, differing only in their means of mounting in that the yieldable sash guide **20** is additionally provided with longer guide screws **32**, the heads of which are seated in conical-walled holes **34**.

Each channel sash guide **18** and **20** (FIGURE 2) has double sash guide grooves **32** disposed in spaced parallel relationship for slidably receiving the upper and lower sashes **12** and **14** respectively. Each sash guide groove **32** has a back wall **34** bounded by a perpendicular side wall **36** on one side and a flared or oblique side wall **38** on the other. The back wall **34** is interrupted by an elongated vertical slot **40** and integral with a vertically-elongated spring sash balance housing **42** having opposite parallel side walls **44** and a rear wall **46**, the latter being drilled at vertically-spaced intervals to receive the screws **28** in the case of the fixed channel sash guide **18** and the screws **30** in the case of the yieldable sash guide **20**.

Yieldability is imparted to the yieldable sash guide **20** by double-armed wire springs **48** disposed at vertically-spaced intervals along the outside of each of the spring sash balance housing **42** in gripping engagement therewith. Each spring **48** (FIGURES 7 and 8) consists of a central lower bridge portion **50** from which two lower horizontal portions **52** extend perpendicularly. From the ends of the horizontal portions **52**, vertical portions **54** extend upward to terminate in upper loops **56**. From the loops **56**, spring arms **58** extend downward, commencing in substantially vertical upper portions **60**, continuing in inclined intermediate portions **62**, and terminating in approximately vertical lower end portions **64**.

In the relaxed and removed condition of each spring **48** (FIGURE 8), the vertical portions **54** converge upwardly toward one another so that the loops **56** are closer together than the lower horizontal portions **52** and the spring arms **58** diverge downwardly away from one another. When the springs **48** are installed, as shown in FIGURE 7, the vertical portions **54** and **60** and the loops **56** are wedged apart from one another by the spring housings **42** so that they firmly and frictionally grip the outer surfaces of the opposite side walls **44**. As shown in FIGURE 2, the end portions **64** press against the vertical window frame side member **26** to resiliently urge the sash guide **20** against the adjacent side edges **66** of the sashes **12** and **14** (FIGURE 2).

Recessed as at **68** into the lower corners of the sashes **12** and **14** are two oppositely-facing pivot blocks or coupling lock actuators **70** of otherwise similar construction which serve as pivot bearings upon which the upper and lower sashes **12** and **14** pivot during tilting (FIGURES 2 to 5 inclusive). Each pivot block **70** serves as the first component of a separable pivotal locking coupling, generally designated **72**, and is of approximately C-shaped, U-shaped or horseshoe-shaped form and preferably formed from nylon or some other stiffly resilient material. The pivot block or coupling lock actuator **70** (FIGURE 5) has a central bridge portion **73** positioned uppermost, and has parallel arms **74** extending downwardly toward a narrower gap **76** between their lower ends or entrance portions **78**. Between the arms **74** is formed a vertically-elongated race-track-shaped slot or aperture **80**, the lower end of which opens into the narrower gap **76**. The opposite outer sides of the arms **74** and the lower ends **78** thereof are beveled as at **82** and **84** respectively to provide a camming action with the channel sash guide portions **38**. Each pivot block **70** is drilled in several places to receive screws **86** by which it is held in its respective recess **68**. The latter is of the same general C shape as the pivot block **70** but is widened or flared at its lower ends to permit sidewise yielding of the arms **74** when complete removal of the sash is desired.

Removably seated in each slot **80** or constantly aligned thereby with the gap **76** is the wedge-shaped lever arm or coupling arm **88** of a pivot cam lock member **90**, which constitutes the second component of the separable pivotal locking coupling **72**. The lever arm **88** is of bulbous or wedge-shaped longitudinal section (FIGURE 5) with an enlarged lower end **89** disposed adjacent the narrower gap **76** between the pivot block ends **78**, which thus act as yieldable detents upon the lever arm or coupling arm **88**, and with a smaller opposite upper end **91**. Projecting horizontally from the upper end of the lever arm **88** and integral therewith is a pivot pin or shaft **92** which extends outwardly into a corresponding bore **94** (FIGURE 6) in a slide block or block carrier **96** and which has an integral annular cam flange **98** disposed intermediate its opposite ends. The cam flange **98** on its side facing the slide block **96** has a single bevelled radial cam hump or cam projection **100** which moves axially into and out of a corresponding radial bevelled cam notch or cam recess **102** extending downward from the bore **94** and axially inward from a counterbore **104** and having an annular abutment shoulder **105** between it and the bore **94**. The counterbore **105** is of the same size and shape as the flange **98**, so that when the pivot cam lock member **90** is rotated to permit the cam hump **100** to enter the cam notch **102** (FIGURE 4), the flange **98** lies flush with the slide block **96**. When, however, the pivot cam lock member **90** is rotated 90 degrees from the position shown in FIGURE 4, the cam hump **100** is forced out of the cam notch **102** against the annular shoulder **105** between it and the bore **94** to move axially away from the slide block **96** into the locking position of FIGURE 6, wherein the block **96** and flange **98** are forced apart from one another into frictional locking engagement with the rear and front walls **46** and **32** respectively of the spring sash balance housing **42**.

The slide block **96**, as its name indicates, is an approximately rectangular vertically-elongated block and constitutes the third component of the separable pivotal locking coupling **72**. The block **96** is also preferably of nylon and has at its upper end an integral upwardly-extending hollow spring attachment portion **106** (FIGURES 4 and 6) with a hole **108** into which the lower end hook **110** of an elongated sash balancing tension spring **112** is secured. The upper end loop **114** of the spring **112** is placed over the lower hook portion **116** of a spring anchorage member **118**, the looped upper end portion **20** of which is hooked over the upper edge of one of the

side walls **44** of the spring housing portion **42** of the channel sash guide **20**.

In the operation of the invention, let it first be assumed that the sashes **12** and **14** are detached from and are to be inserted in the window frame **22**. To insert either of the sashes **12** or **14**, for example, the lower sash **14** (FIGURE 3) is aimed at the slide blocks **96** in such a manner that the gaps **76** in the pivot blocks **70** are aligned with the smaller ends **91** of the lever arms or coupling arms **88**, whereupon a forward push upon the sash **14** causes the wedge-shaped lever arms **88** to push apart the ends **78** of the pivot blocks **70** and enter the elongated slots **80**, the ends **78** then moving inward toward one another behind the lever arms **88**, by reason of their resilience, to narrow the gaps **76** and releasably lock the enlarged ends **89** of the lever arms **88** in their respective slots **80**. The sash **14** is then swung upward into the plane of the window frame **22**, thereby rotating the lever arms **88** and the cam flanges **98**, causing the cam humps **100** to move into their respective notches **102** from the position of FIGURE 6 to that of FIGURE 4. As a result, the cam flange **98** disengages itself from locking frictional engagement with the outer wall **32** of the spring housing **42**, releasing the tension springs **112** and permitting them to resume their sash-balancing action.

To tilt either of the sashes **12** or **14**, for example the lower sash **14**, the user lowers the sash **14** to a convenient location, such as that shown in dotted lines in FIGURE 3, and tilts the sash inward around the pivot shaft **92** as pivot axes. The user can conveniently clean both sides of the pane **15**. Ordinarily, bodily removal of the sash **12** or **14** is not required, and the sash can then be swung upward into its vertical position in the plane of its particular sash guide **20**, with the beveled surfaces **82** of the pivot blocks **70** engaging the inclined cam surfaces **38** of the sash guides **18** and **20** to force the movable sash guide **20** laterally away from the fixed sash guide **18** and permit the sash **14** to enter the space between them (FIGURE 2).

During the pivoting procedure, the larger or bulbous ends **89** of the wedge-shaped lever arms **88** prevent the sash **14** from accidentally and unintentionally disengaging itself from the slots **80** by reason of the detent action of the entrance portions **78** on the opposite sides of the restricted gaps **76** through which they must otherwise pass. Should the user, however, desire to remove the sash **12** or **14** completely, such as to replace a broken pane **15**, he gives a sudden and forceful jerk or pull to the sash **12** or **14**. This action causes the enlarged ends **89** of the lever arms **88** to widen and force their way through the gaps **76** as they push apart the ends **78** of the arms **74** of the pivot blocks **70**. The sash **12** or **14**, as the case may be, can only be removed in this manner. Meanwhile, the rotation of each pivot cam lock member **90** by its lever arm **88**, in response to the tilting of the sash **12** or **14** moves the cam hump **100** out of its bevelled notch **102** and against the annular shoulder **105**, thereby in effect thickening the slide block **96** to frictionally wedge or jam it inside the spring sash balance housing **42**, as explained above.

What is claimed is:

1. A self-locking pivoting spring sash balance construction for a tiltably-removable sliding window sash adapted to be installed in a window frame, said sash balance comprising

a pair of elongated vertical sash guides adapted to be mounted on opposite sides of the window frame,

at least one of said sash guides being adapted to be resiliently mounted on one side of the window frame,

each of said sash guides including a hollow vertical sash balance housing having a rear wall and having a front wall with an elongated vertical opening therein,

a sash balancing spring mounted in each housing and anchored at one end thereto,

a slide member slidably mounted in each housing and connected to the opposite end of each said spring,

said slide member having a bore aligned with the opening in said front wall and having an abutment portion transverse to said bore,

a pivot cam lock rotatably mounted in each slide member bore and projecting through said opening and having a coupling portion thereon disposed externally of said opening,

said slide member and said pivot cam lock member having interengaging cam portions thereon responsive to the rotation of said pivot cam lock member by tilting of the sash to move said members axially relatively to one another into locking engagement with said front and rear walls,

and a coupling lock actuator adapted to be secured to each of the opposite sides of the sash in aligned separable engagement with one of said pivot cam lock members,

said coupling lock actuator being of stiffly resilient material and having an aperture therein configured to fit said coupling portion of said pivot cam lock member and a gap narrower than said aperture and said coupling portion leading outward from said aperture and having detent portions yieldable in response to the forcible insertion and withdrawal of said coupling portion from said aperture.

2. A self-locking pivoting spring sash balance construction, according to claim **1**, wherein said coupling

portion of said pivot cam lock member has an enlargement thereon exceeding the width of said gap whereby to spring apart the entrance portions of said coupling lock actuator in response to insertion or removal of said coupling portion from said aperture through said gap.

3. A self-locking pivoting spring sash balance construction, according to claim **2**, wherein said coupling portion is of tapered configuration, and wherein said enlargement constitutes the widest part of said coupling portion.

4. A self-locking pivoting spring sash balance construction, according to claim **1**, wherein said coupling lock actuator is of approximately U-shaped configuration, and wherein said aperture is of elongated outline.

5. A self-locking pivoting spring sash balance construction, according to claim **1**, wherein said resiliently-mounted sash guide has bifurcated springs thereon with attachment portions grippingly engaging said sash balance housing and with spring arms projecting obliquely therefrom.

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U.S. Cl. X.R.

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