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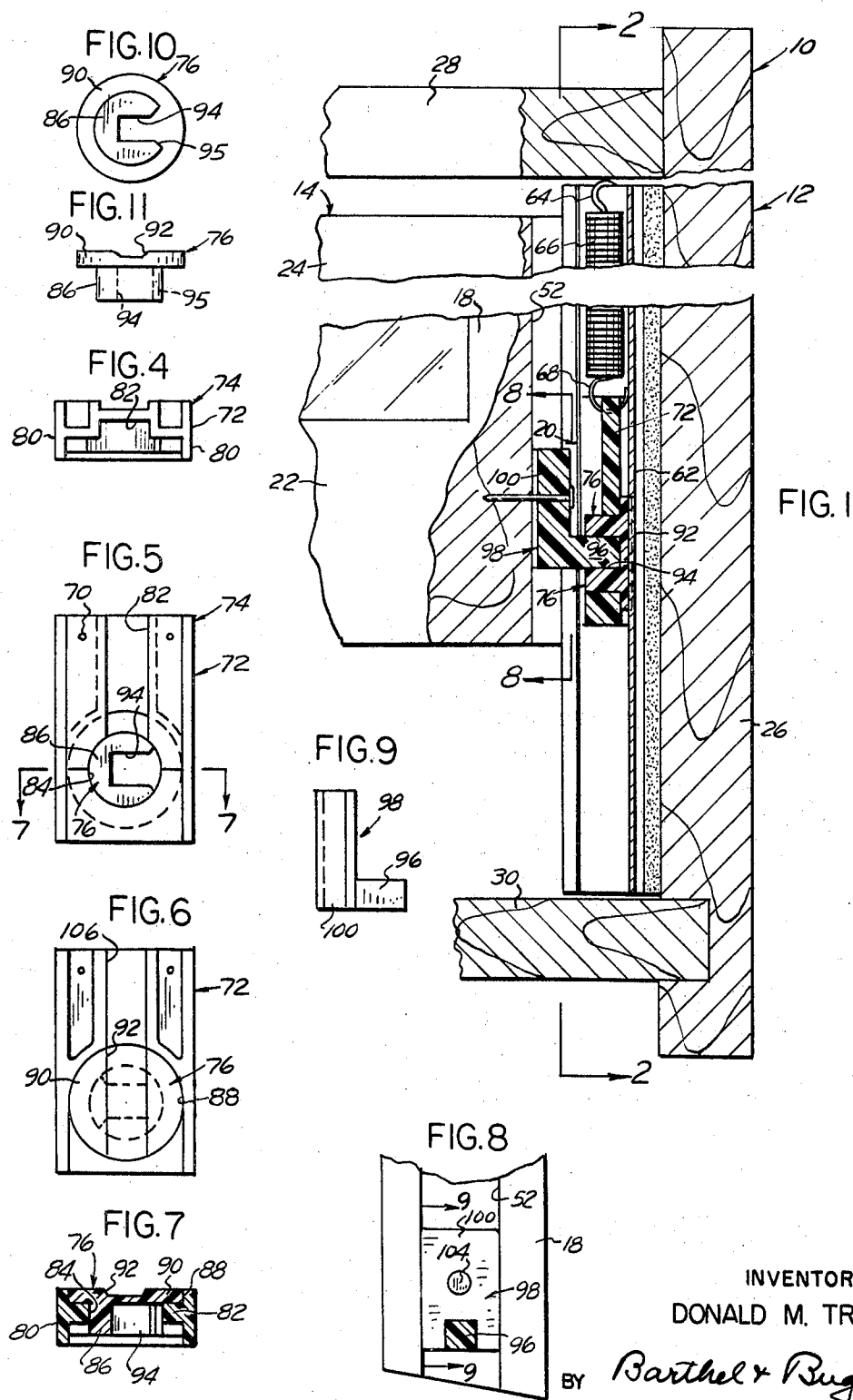
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SASH GUIDE AND BALANCING SPRING LOCK UNIT FOR
TILTABLY REMOVABLE SASH WINDOWS

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2 Sheets-Sheet 1



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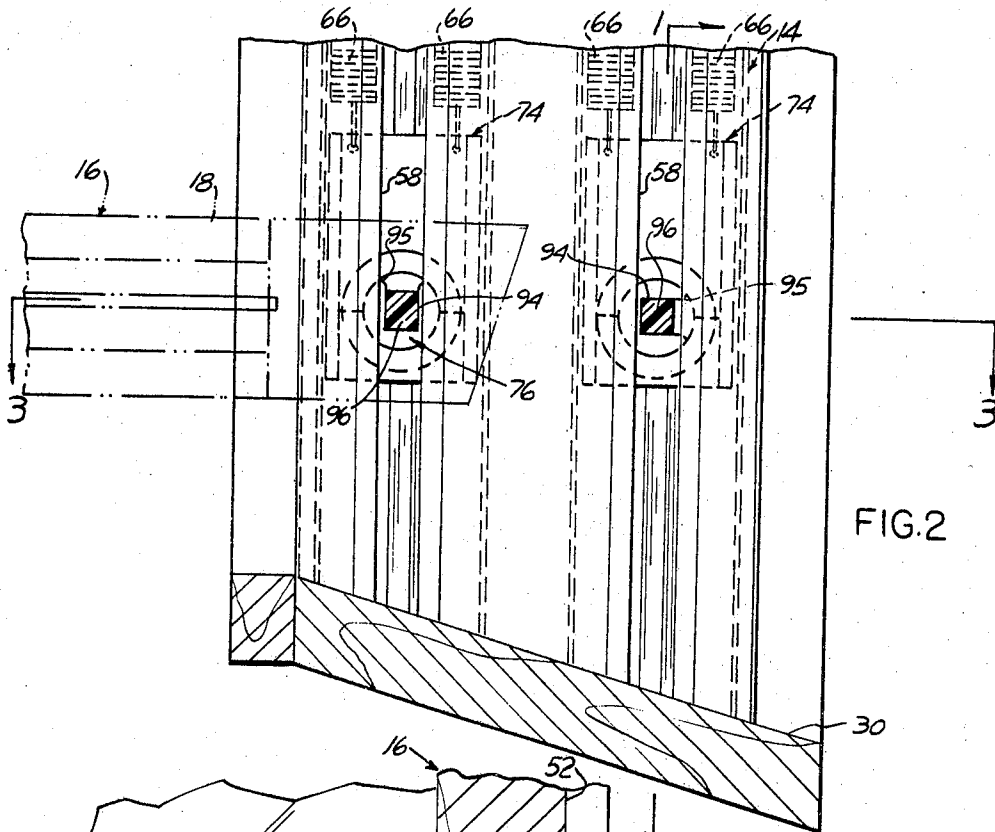


FIG.2

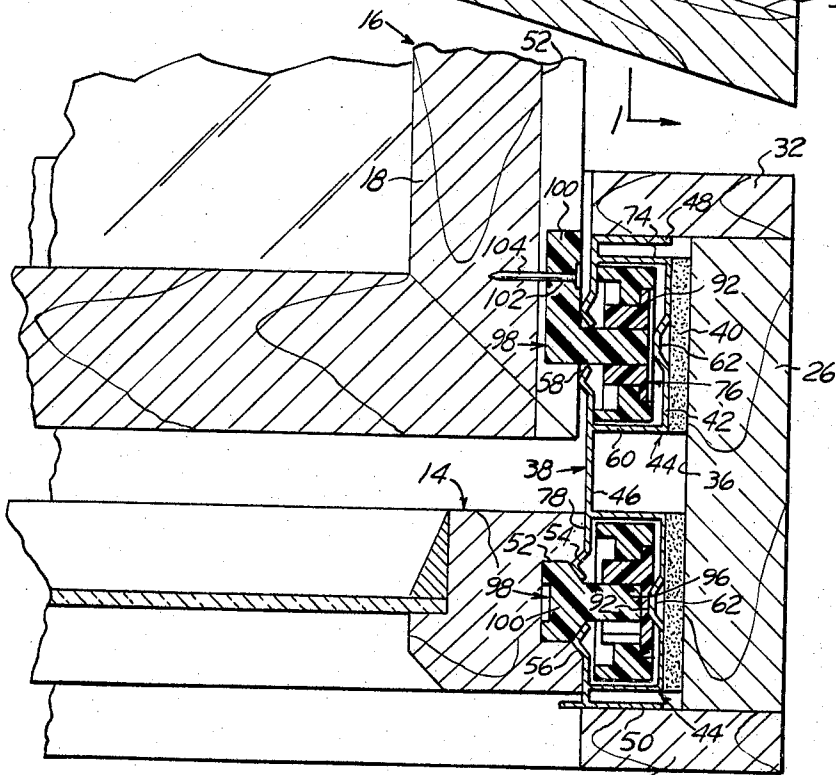


FIG.3

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SASH GUIDE AND BALANCING SPRING LOCK UNIT FOR TILTABLY REMOVABLE SASH WINDOWS

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10 Claims

ABSTRACT OF THE DISCLOSURE

Associated with an elongated sash guide adapted to be mounted on each side of a window frame is an internally-ribbed longitudinally-slotted spring casing which contains a sash balancing spring secured at one end thereto and also contains a slide block secured to the other end of said spring and provided with a transverse bore. Rotatably mounted in this bore is a rotary locking cam with a diametral groove at its inner end slidably receiving the sash guide rib, and with a radial notch at its outer end removably receiving one end of a lock-rotating trunnion of mating configuration secured to a side of the sash. Tilting of the sash inward around this trunnion rotates the locking cam so that its groove rides up to the spring casing rib, thereby jamming the slide block into locking engagement with the spring casing while the mouth of its notch rotates from a horizontal trunnion-retaining position to a vertical trunnion-releasing position, whereupon lifting the sash withdraws its trunnion from its respective notch, after which sidewise tilting of the sash enables removal of the sash from the window frame.

In the drawings:

FIGURE 1 is a vertical section through one side of a sash and window frame equipped with the sash guide and balancing spring lock unit of the present invention, showing the sash in its unlocked vertically-sliding position.

FIGURE 2 is a side elevation, partly in section, at right angles to FIGURE 1 taken along the line 2—2 in FIGURE 1;

FIGURE 3 is a horizontal section taken along the line 3—3 in FIGURE 2;

FIGURE 4 is a top plan view of the locking slide of the balancing spring lock of FIGURES 1, 2 and 3;

FIGURE 5 is a front elevation of FIGURE 4;

FIGURE 6 is a rear elevation of FIGURE 4;

FIGURE 7 is a horizontal section taken along the line 7—7 in FIGURE 5;

FIGURE 8 is a fragmentary vertical section mainly in side elevation, taken along the line 8—8 in FIGURE 1 and showing one of the sash trunnions;

FIGURE 9 is a side elevation of one of the sash trunnions looking in the direction of the line 9—9 in FIGURE 8;

FIGURE 10 is a front elevation of one of the locking cams removed from the slide block; and

FIGURE 11 is a top plan view of the locking cam shown in FIGURE 10.

Referring to the drawings in detail, FIGURES 1, 2 and 3 show a double-hung tiltably-removable window sash installation, generally designated 10, consisting of a window frame 12 within which two tiltably-removable upper and lower sliding sashes 14 and 16 are slidably mounted. Only the lower sash is shown in FIGURE 1, the upper sash being a substantial duplicate thereof. Each sash 14 or 16 has side rails 18 and is slidably, pivotally and removably mounted in a pair of combined sash guides and balancing spring lock units 20. Each sash

14 or 16, as usual, has a bottom rail 22 and top rail or meeting rail 24. The window frame 12 is provided with the usual side members 26 interconnected by top and bottom members 28 and 30 respectively, the latter being the usual slanting or outwardly-inclined window sill. The side members 26 in turn are provided with outer and inner edge members 32 and 34 respectively (FIGURE 3) providing an elongated vertical recess 36 of rectangular or channel cross-section.

Resiliently mounted in each of the recesses 36 is a sash guide 38 which forms a part of the combined sash guide and balancing spring unit 20 for each sash 14 or 16. Resilience is imparted to the sash guide 38 by elongated vertically-disposed resilient pads 40 of synthetic foam rubber or foam plastic adhesively secured to the frame side members 26 and to the rearward walls 42 of the spring casing or channel portion 44 of each sash guide 38 (FIGURE 3). The spring casings or channel portions 44 are preferably formed integral with the front plate 46 of the sash guide 38, such as by being extruded unitarily therewith. The front plate 46 at its forward and rearward edges has perpendicularly-extending guide flanges 48 and 50 respectively, which engage the inner surfaces of the window frame edge members 32 and 34 respectively. The inner guide flange 50 projects slightly beyond the edge flange 34.

Each of the sash side rails 18 is provided with a vertical longitudinal groove 52 with beveled edges 54 (FIGURE 3) which are engaged by the opposite edge portions or rib portions 56 of V-shaped cross-section integral with the front plate 46 of each sash guide 38. The rib portions 56 are separated from one another by an elongated vertical front opening or slot 58 running from top to bottom of each sash guide 38 at approximately the mid-portion of the channel portion 44 thereof. Each channel portion 44 has parallel opposite side walls 60 which connect its rearward wall 42 to the front plate 46. Formed integral with each rear wall 42 is an inwardly-extending rib 62 of truncated V-shaped cross-section.

Mounted in each spring casing channel portion 44 and having its upper loop 64 (FIGURE 1) secured to the top thereof is an elongated sash-balancing tension spring 66, the lower loop 68 of which is hooked into a hole 70 (FIGURE 5) in a slide block or body 72 forming one component of a locking slide, generally designated 74, containing a rotary locking cam 76 (FIGURES 4, 5, 6, 7, 10 and 11). The slide block of body 72 has two such spring anchorage holes 70, each adapted to accommodate either a single spring 66 or, in the case of a heavy sash, a pair of springs 66. In either case, the spring or springs 66 would be concealed behind the portion 78 of the front plate 46 forming the front wall of each channel portion 44. Each locking slide 74 is vertically slidable within its respective channel portion 44 and its locking cam 76 is rotatable to lock in its attained position or to release it for sliding motion according to whether the sash 14 or 16 is removed from or slidably mounted in the window frame 12.

The slide block 72 of each locking slide 74 is preferably molded from suitable synthetic plastic, such as that known commercially as nylon, and for ease of sliding is provided with opposite edge flanges 80 (FIGURE 4). The central portion of each slide block 72 is provided one one side with a longitudinal groove 82 and also with a transverse bore 84 directed toward the slot 58 and receiving the hub 86 of the rotary locking cam 76. The bore 84 has a counterbore 88 rotatably receiving the enlarged head 90 of the rotary locking cam 76 (FIGURE 7). The head 90 has a laterally-extending diametral groove or depression 92 therein of truncated V-shaped cross-section mating with and snugly and slidably engage-

able with the longitudinal rib 62 of each channel portion 44. On the end opposite the head 90, the hub 86 of the cam 76 is provided with a radial key notch or recess 94 of rectangular cross-section (FIGURES 5 and 10) with a flared open mouth 95 communicating with the groove 82. The notch 94 extends over the major part of the diameter of the hub 86 and serves to receive the pivot or key portion 96 of an approximately L-shaped pivot or trunnion key 98 (FIGURES 1, 8 and 9) having a rectangular base or attachment portion 100 which is of the width of the sash side rail groove 52 and has a hole 102 therethrough for receiving a fastener 104 (FIGURE 3) by which the trunnion key base 100 is secured to the sash side rail 18. The pivot or key portion 96 is of rectangular cross-section configured to fit snugly but removably into the notch 94 in the hub 86 of its respective locking cam 76. The slide block 72 has a groove 106 (FIGURE 6) co-extensive with and of the same cross-section as the groove 92 in the head 90.

In the operation of the sash guide and balancing spring lock unit 20 of the present invention, let it be assumed that the working parts are in the positions shown in FIGURE 1 with the bases 100 of the trunnion keys 108 secured in their respective sash rail grooves 52 and with their pivot or key portions 96 seated in their respective notches 94 in the locking cams 76 with the grooves 92 and 106 in the cam 76 and slide block 72 aligned with one another (FIGURE 6) and slidably engaging their respective ribs 62 in the rear walls 42 of their respective channel portions 44 of the sash guides 38. In this position, the mouth of each notch 94 is directed horizontally so that the key portion 96 cannot be disengaged (FIGURES 2 and 5). Under these conditions, the sash 14 is freely slidable vertically while guided by the ribs 56 on the front plate 46 engaging the beveled portions 54 and 56 of its grooves 52 (FIGURE 3). At this time, also, the weight of the sash 14 is counterbalanced by the spring or springs 66. If, on the other hand, the lower sash 16 is in its lowered position, as shown at the left-hand side of FIGURE 2, the springs 66 are in a tensioned condition.

To remove one of the sashes, for example, the sash 16, the operator grasps the upper rail or meeting rail 24 thereof (not shown in FIGURE 2) and swings the upper portion of the sash 16 downward around the pivot portions 96 of the trunnions 98 and locking cams 76 as pivots. As a result of this action, the mouth 95 of the notch 94 moves from a horizontally-facing position (FIGURE 5) to a vertical position (FIGURE 2) when the sash 16 reaches the horizontal position shown in dotted lines in FIGURE 2 and in FIGURE 3. The operator then tilts the sash 16 in the plane of its respective sash guide channel portion 44, such as by lifting one side rail 18 upward relatively to the other side rail 18, thus lifting one of the pivot portions 96 of one of the trunnions 98 out of its respective notch 94, whereupon the opposite pivot portion 96 may also then be moved upward out of its respective notch 94 and the sash 16 while still in its laterally-tilted position may then be removed from the window opening.

While the locking cam 76 of the sash 16 is being rotated in the above described manner, its groove 92 rides upward and over the rib 62 of its respective channel portion 44 into a transverse position as shown at the upper right-hand corner of FIGURE 3. This action, in effect, thickens the locking slide 74 so that it becomes jammed between the front and rear walls 46 and 42 of its respective channel portion 44, thus locking the balancing spring or springs 66 in a tensioned condition. The removal of the upper sash 14 follows a similar procedure in that it is first pulled downward and then swung inward to a horizontal position in the manner described above for the lower sash 16 in connection with FIGURES 2 and 3.

To replace the sash 16 in the sash guide 38 within the window opening, the operator reverses the foregoing procedure by inserting the sash 16 in a laterally-tilted con-

dition into the window opening, then swinging the sash 16 into a horizontal position while letting its pivot portions 96 of its trunnions 98 drop into the now-vertical notches 94 of its respective locking cams 76. The operator then swings the sash 16 upward into its vertical position, whereupon the consequent rotation of its locking cams 76 within their respective slide blocks 72 causes the cam grooves 92 to move into alignment with their respective channel portion rib 62, as shown in the lower right-hand corner of FIGURE 2. This action, in effect, thins the locking slides 74 so that they now slide freely within their respective channel portions 44 with their balancing spring 66 now unlocked and exerting their balancing forces.

Thus, it will be seen from the position of the mouth 95 of the notch 94 at the right-hand side of FIGURE 2 and in the middle portion of FIGURE 1 that the pivot key portions 96 of its trunnion keys 98 are effectively retained and cannot accidentally be dislodged, as is possible in certain prior removable sash window constructions, until the sash 14 or 16 is swung into a horizontal position such that the mouth 95 of each notch 94 is aligned with the slot 58 in the spring casing 44.

I claim:

1. A self-locking sash balance construction for a tiltably-removable sliding sash mounted in a window frame, said construction comprising

an elongated sash guide adapted to be secured to at least one side of the window frame and having associated therewith an elongated hollow casing having an elongated longitudinal opening therein and containing an elongated internal longitudinal projection.

a resilient sash balancing instrumentality disposed within said casing and secured at one end thereto,

a slide body slidably mounted within said casing and connected to the other end of said instrumentality and having a transverse bore therein directed toward said opening,

a rotary locking element rotatably mounted in said bore and having therein a depression extending laterally thereof,

said depression in one position of rotation of said locking element relatively to said slide body matingly and slidably engaging said projection and in another position thereof surmounting said projection to lock said slide body within said casing,

said rotary locking element having therein a key recess disposed in alignment with said opening, and a locking-element-rotating key member having an attachment portion adapted to be secured to the side of the window sash and a lock-rotating key portion extensible through said opening into operating engagement with said key recess,

said key member being responsive to tilting of the window sash relatively to the plane of the window frame for rotating said locking element into and out of locking engagement of said slide body with said casing.

2. A self-locking sash balance construction, according to claim 1, wherein said key recess is disposed radially of said rotary locking element.

3. A self-locking sash balance construction, according to claim 2, wherein said key recess comprises a notch having an open mouth at one end thereof.

4. A self-locking sash balance construction, according to claim 1, wherein said key recess and said lock-rotating key are of non-circular cross-section.

5. A self-locking sash balance construction, according to claim 1, wherein said key member is of approximately L-shaped configuration.

6. A self-locking sash balance construction, according to claim 1, wherein said rotary locking element has an enlarged head on one end thereof and wherein said depression extends diametrically of said head,

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7. A self-locking sash balance construction, according to claim 1, wherein said depression is disposed in one end of said rotary locking element and wherein said recess is disposed in the opposite end thereof.

8. A self-locking sash balance construction, according to claim 1, wherein said slide body is provided with a groove adapted to communicate with said key recess in the locking position of rotation of said rotary locking element.

9. A self-locking sash balance construction, according to claim 1, wherein said slide body is of elongated configuration and has a pair of connection portions at one end thereof spaced laterally apart from one another, and wherein said resilient sash-balancing instrumentality comprises a pair of tension springs secured to said connection portions.

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10. A self-locking sash balance construction, according to claim 1, wherein said key recess is disposed radially of opening disposed therein and has a rear wall with said internal longitudinal projection disposed thereon.

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