April 26, 1960 R. V. ALMENDINGER 2,933,757

SELF-LOCKING AUTOMATICALLY-RELEASING SASH BALANCE

Filed Dec. 11, 1957 2 Sheets-Sheet 1

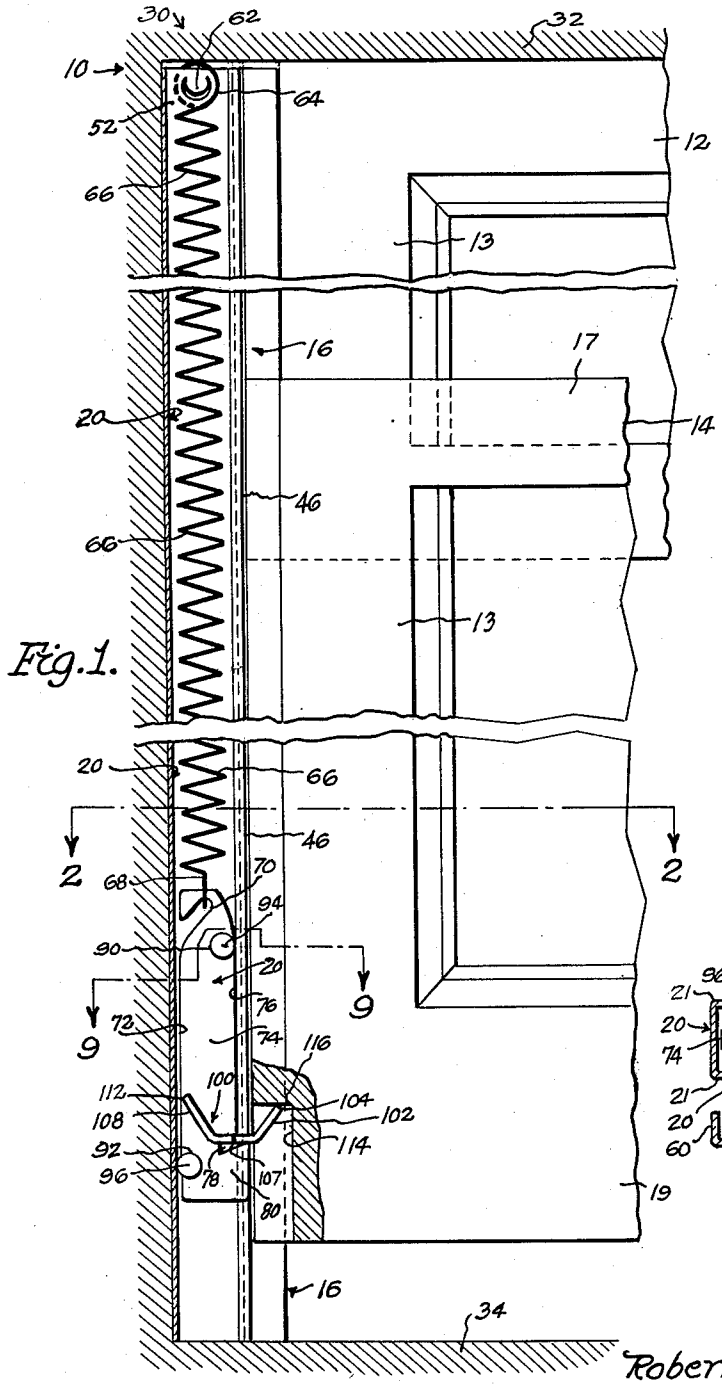


Fig. 1.

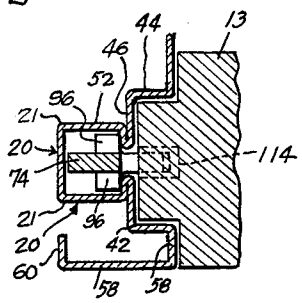


Fig. 9.

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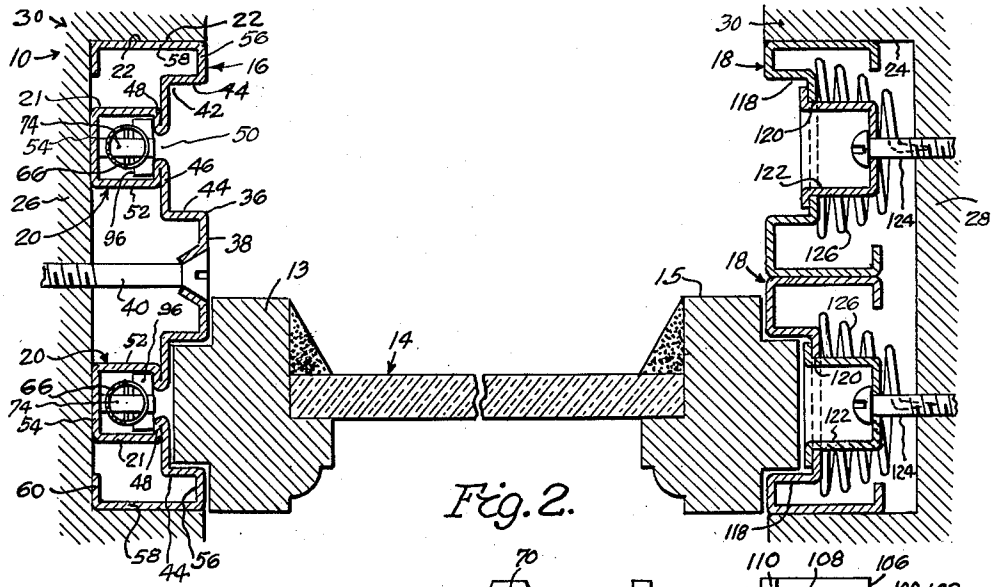


Fig. 2.

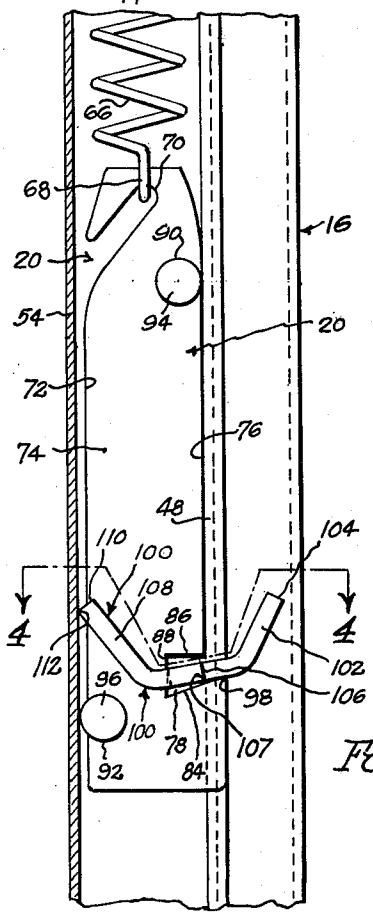


Fig. 3.

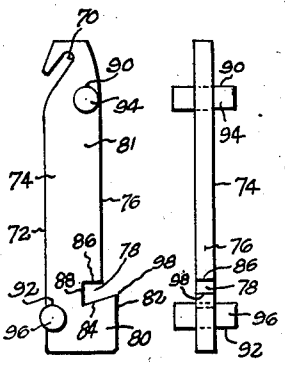


Fig. 5.

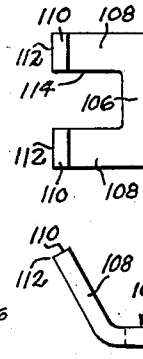


Fig. 6.

Fig. 7.

Fig. 8.

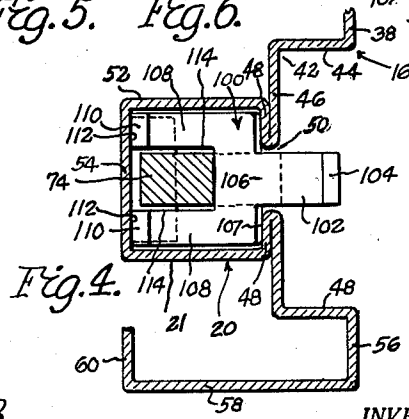


Fig. 4.

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United States Patent Office 2,933,757
Patented Apr. 26, 1960

2,933,757

SELF-LOCKING AUTOMATICALLY-RELEASING SASH BALANCE

Robert V. Almendinger, Rocky Ridge, Ohio, assignor to Formetal, Inc., Oak Harbor, Ohio, a corporation of Ohio

Application December 11, 1957, Serial No. 702,022

4 Claims. (Cl. 16—197)

This invention relates to sash balances and, in particular, to self-locking but automatically-releasing sash balances used with removable sliding sash windows.

One object of this invention is to provide a self-locking automatically-releasing sash balance for removable sliding sash windows which remains in its attained position upon removal of the sash, notwithstanding the location in the window frame where the sash is removed, with the result that the sash, after removal, may be replaced in the window frame in its original location without having to move the sash balance, but wherein the sash, upon replacement, automatically releases the sash balance for resumption of its balancing action.

Another object is to provide a self-locking automatically-releasing sash balance of the foregoing character wherein the locking of the sash balance is brought about by the tilting of a pivoted locking member, the end of which moves automatically into gripping engagement with the invisible inner surface of the wall of the sash balance housing the instant the sash is removed from the window frame, thereby avoiding denting or scarring of the visible external portions of the sash balance casing.

Another object is to provide a self-locking automatically-releasing sash balance of the foregoing character wherein the sash balance casing is integral with and forms the rearward portion of a channel-shaped hollow metallic sash guide member with a vertical slot between the sash guide and the sash balance housing through which the tilting locking member projects into engagement with the sash.

Other objects and advantages of the invention will become apparent during the course of the following description of the accompanying drawing, wherein:

Figure 1 is a fragmentary vertical section through a lateral edge portion of a removable double-hung sliding sash window installation, including the adjacent portion of the window frame and equipped with a self-locking automatically-releasing sash balance according to one form of the invention, with the sash installed and the sash balance automatically unlocked;

Figure 2 is a horizontal section taken along the line 2—2 in Figure 1, additionally showing the construction at the opposite lateral side of the window installation;

Figure 3 is a fragmentary vertical section similar to Figure 1, but showing the sash balance automatically locked with the sash removed;

Figure 4 is a horizontal section taken along the line 4—4 in Figure 3;

Figure 5 is a side elevation of the locking lever carrier shown in Figures 1 and 3;

Figure 6 is a front elevation of the locking lever carrier shown in Figure 5;

Figure 7 is a top plan view of the locking lever shown in Figures 1 and 3;

Figure 8 is a side elevation of the locking lever shown in Figure 7; and

Figure 9 is a horizontal section taken along the line 9—9 in Figure 1, showing the relative positions of the parts with the sash installed and the sash balance automatically unlocked.

The recent introduction of removable double-hung sliding sash windows into the building industry for the purpose of facilitating the easy cleaning of such windows has required the provision of means for engaging or disengaging the sash balance from the sash upon insertion or removal respectively of the sash. Prior sash balances which have required the attaching and detaching of the sash balance cord, cable, chain or tape upon insertion or removal of the sash respectively have been accepted with reluctance by the public because of the nuisance of performing these operations every time the sash was inserted or removed. This defect of such prior sash balances was further complicated by the fact that each time the sash was removed and the cord, cable, chain or tape unhooked or otherwise detached, the latter flew upward under the influence of the sash balancing weight or spring and had to be pulled down and reconnected before the sash could be reinserted in its sash guide.

An improvement upon these prior sash balances and avoiding the above-mentioned defects thereof was disclosed and claimed in the Haas Patent 2,747,219 issued May 29, 1956 for Self-Locking Sash Balance. In this sash balance, when the sash was removed it automatically caused a locking device to come into operation, locking the sash balance in its attained position and causing the locking member to indent and thus tightly grip the portion of the sash guide between the sash guide channel and the sash balance casing. This indentation, while effective to lock the sash balance in its attained position upon removal of the sash and to re-engage and release it automatically upon reinsertion of the sash, resulted in the formation of disfiguring dents or grooves which were visible to the user.

The present invention provides an improvement upon the self-locking sash balance of the above-identified Haas patent, in that it utilizes a tilting or rocking sash balance locking lever, the inner end of which indents and grips the inner surface of the rearward wall of the sash balance casing at a location where such indentations or grooves are not visible, hence avoids the objections raised against the Haas sash balance mentioned above.

Referring to the drawings in detail, Figures 1 to 9 inclusive show a double-hung removable sliding sash installation, generally designated **10**, according to one form of the invention as including upper and lower sliding sash windows **12** and **14** having vertical opposite side rails **13** and **15** slidably and removably mounted on one side in a double channel-shaped combination sash guide and sash balance **16** and on the other side in two single yieldingly-urged movable channel sash guides **18**. The sash guide **16** includes a self-locking removable sash balance unit **20** mounted in a sash balance housing portion **21**, forming an integral part of the sash guide **16**. The sash guides **16** and **18** are mounted in vertical recesses **22** and **24** (Figure 2) in the opposite side members **26** and **28** of a conventional window frame, generally designated **30**, provided at the top with a top member **32** and at the bottom with a window sill **34**. The construction of the window frame **30** is shown diagrammatically in order to simplify the disclosure. Each sash **12** or **14** also has top and bottom rails **17** and **19** respectively.

The combination sash guide and sash balance **16** which is stationarily mounted in the window frame side member **26** is preferably rolled in its channeled shape from aluminum strip or sheet metal and includes a pair of approximately E-shaped sash guide portions **36** interconnected by a bridging wall **38** which is bored to receive attachment screws **40** by which the member **16** is secured in its recess **22**. Each sash guide portion **36**, one of which is provided for the upper sash **12** and the other for the

lower sash 14, consists of an outer guide channel portion 42 integral with the sash balance housing portion 21 and having side walls 44 and spaced rear walls 46 connected to the front walls 48 of the sash balance housing portion 21 and separated from one another by a vertically-elongated slot or passageway 50. The sash balance housing portion 21 has its front wall 48 integral with the rear wall 46 of the channel portion 42 and reversely bent relatively thereto (Figure 2). The sash balance housing portion 21 has parallel opposite side walls 52 interconnected by a rear wall 54, thus causing the sash balance housing portion 21 to be of approximately rectangular cross-section. The channel portion 42 has one of its side walls 44 connected by a front wall 56 (Figure 2) to an outer side wall 58 engageable with the side surface of the recess 22 in the window frame 30, and the outer side wall 58 in turn has a rearward edge flange 60 engaging the rearward surface of the window frame recess 22.

One of the side walls 52 of the sash balance housing portion 21 is provided with an outwardly-struck tab 62 (Figure 1) which serves to retain in position the ring-shaped upper end portion 64 of an elongated helical tension spring 66 which forms the sash-balancing spring. The ring-shaped portion is hooked over the upper edge of the side wall 52 and snapped over the obliquely-projecting tab 62 after the spring 66 has been inserted in the housing portion 21. The hooked lower end portion 68 of the spring 66 is hooked into an upwardly-inclined notch 70 in the upper end portion of the rearward edge 72 of a vertically-elongated locking lever carrier 74 (Figures 1, 3, 5 and 6) in the form of an elongated plate having in the lower end portion of its forward edge 76 a notch 78 facing in the opposite direction from the notch 70. The lower end or fulcrum portion 80 of the locking lever carrier 74 projects forwardly beyond the upper portion 81 thereof so that the forward edge 82 of the former projects forwardly beyond the forward edge 76 of the latter (Figure 5). The notch 78 has a lower edge 84 which is inclined upwardly and forwardly at an acute angle to the lower portion forward edge 82, whereas its upper edge 86 is substantially perpendicular to the upper portion forward edge 76, the rearward edge 88 being parallel to the forward edges 76 and 82, which are parallel to each other. The forward edge 76 near its upper end and the rearward edge 72 near its lower end are provided with holes 90 and 92 respectively drilled or otherwise formed in the carrier 74 and receiving transversely-disposed upper and lower pins 94 and 96 respectively of any suitable material, such as the synthetic polyamide plastic known commercially as nylon.

Pivotally mounted upon the tip or fulcrum 98 of the lower edge 84 of the notch 78 is a locking lever, generally designated 100 (Figures 7 and 8) having a single upwardly and forwardly bent trigger arm 102 (Figures 3 and 4) terminating in an upper forward end 104 and connected at its rearward end to a pair of laterally-spaced upwardly-bent rearward locking arms 108 having forward ends 106 with sharp wall-gripping lower forward edges 107, the arms 108 terminating in upper rear ends 110 having sharp wall-gripping lower rearward edges 112. The rearward arms 108 are of such lengths that the distance between their forward and rearward lower sharp edges 107 and 112 exceeds the distance between the forward and rearward walls 48 and 54 so as to jam therebetween, as explained below in connection with the operation of the invention. Thus, the locking lever 100 in top plan view is approximately Y-shaped (Figures 4 and 7) with a cut-out portion 114 separating the two rearward arms 108 and receiving the carrier 74 between the arms 108. The single forward lever arm 102 is upwardly and forwardly bent and the double rearward lever arms 108 are upwardly and rearwardly bent (Figures 3 and 8) so as to present a truncated V-shaped appearance in side elevation.

In order to actuate the locking lever 102, the bottom rail 19 of the frame or border of the sash 14 is provided with a recess 114 extending upward from the bottom thereof parallel to its lateral edge and terminating in an abutment shoulder or end wall 116 engageable with the outer end 104 of the locking lever 100, which projects through the slot 50 beyond the rearward walls 46 of the channel 42 (Figure 4) into the path of the sash 14 (Figure 9), which it avoids by entering the recess 114 until it engages the shoulder 116 (Figure 1).

The yielding sash guides 18 (Figure 2) which urge the sashes 12 and 14 into the double stationary sash guide 16 are conventional and their details are beyond the scope of the present invention. Two yielding sash guides 18 are disposed side by side in the recess 24 in the window frame side portion 28. Each sash guide 18 consists of a metal channel member of approximately E-shaped cross-section having a central guide channel portion 118, the bottom wall of which is provided with longitudinally-spaced holes 120 in which peripherally-flanged fastener cups 122 are relatively slidably inserted. The bottom of each fastener cup 122 is drilled to receive a fastener 124, such as a wood screw, seated in the window frame side portion 28. Disposed adjacent and between the fastener cups 32 are longitudinally-spaced coil springs 126 which engage the side portion 28 of the window frame 30 as an abutment and urge the sash guides 18 out of the window frame recess 24 toward the opposite sash guide 16, thereby urging the window sash 12 or 14 into one of the channel portions 42 of the opposite sash guide 16.

In the operation of the invention, let it be assumed that the lower sash 14 of a double-hung sliding sash installation has been raised a short distance above the window sill 34 (Figure 1) but with its abutment shoulder or end wall 116 of the recess 114 tilting the locking lever 100 around its fulcrum 98 in a clockwise direction, disengaging the sharp edges 112 at the ends 110 of the inner arms 108 from indenting and locking engagement with the rear wall 54 of the sash balance housing portion 21 (Figures 1 and 9).

Under these conditions, the locking lever carrier 74 is released to slide freely in a vertical direction either upward or downward, but is of course urged upwardly by the force of the stretched tension spring 66 in performing its counterbalancing function of counteracting the weight of the sash 14. As a consequence, the operator of the window sash is able to raise or lower the window sash 14 freely while its weight is being counterbalanced by the force of the tension spring 66. Free sliding of the locking lever carrier 74 upward or downward is assisted by the pins 94 and 96 at the upper and lower ends thereof. To remove the sash 14 from its position of Figure 1 for cleaning or other purposes, the operator grasps the sash 14 in his hands and pushes it sidewise to the right (Figures 1 and 2), so as to push its respective yielding sash guide 18 to the right, compressing the springs 126. This action enables the side rail 13 of the sash 14 to be withdrawn from the channel portion 42 of the stationary sash guide 16, so that the left-hand side of the sash 14 including the left-hand sash rail 13 may be swung outward past the edge of the window frame 30, thereby permitting the sash 14 to be completely removed from the window frame 30.

At the instant the abutment shoulder 116 of the recess 114 is disengaged from the upper forward end 104 of the forward arm 102 of the locking lever 100 by this action, the locking lever carrier 74 is jerked upward by the counterbalancing tension spring 66, causing the upwardly and forwardly-inclined lower edge 84 of the forward notch 78 to engage and tilt the rearward arms 108 of the locking lever 100 in a counterclockwise direction so as to jam the sharp lower edges 107 and 112 thereof into biting and indenting engagement with the forward and rearward walls 48 and 54 respectively of the sash balance casing portion 21 (Figures 3 and 4) because of the fact, as stated above, that the distance between these edges 107 and 112 exceeds the distance between the for-

ward and rearward walls 48 and 54. This biting action is facilitated by the fact that the sash guide 16 is made of relatively soft metal, such as aluminum. Due to the fact, however, that the engagement of the sharp edges 107 and 112 is made with the inner surfaces of the forward and rearward walls 48 and 54, the slight indentations made therein are not visible to an onlooker and hence do not disfigure the visible exterior surfaces of the sash guide.

To replace the sash 14 after it has been cleaned or otherwise treated, the operator inserts its right-hand side rail 15 (Figure 2) in the channel portion 118 of its respective yielding sash guide 18, pushing the sash 14 sufficiently to the right to compress the springs 126 enough to displace the yieldable sash guide 18 an adequate distance to permit the left-hand side rail 13 to be swung back into the window frame 30 so as to re-enter the sash guide channel 42 (Figure 2) at a location immediately above the locked location of the locking lever 100 (Figure 3) thereby avoiding collision with its outwardly and upwardly projecting forward arm 102. The operator then permits the sash 14 to drop of its own weight and pushes it downward until the arm 102 of the locking lever 100 re-enters the recess 114 in the bottom rail 19 of the sash 14 and collides with the abutment shoulder 116 forming the upper end thereof (Figure 1). When this occurs, the locking lever 100 is rocked about its fulcrum 107 in a clockwise direction upon the locking lever carrier 74 so as to swing the rearward arms 108 and their forward and rearward sharp lower edges 107 and 112 out of indenting and therefore locking engagement with the forward and rearward walls 48 and 54 of the sash balance casing portion 21 of the sash guide 16. With the locking lever 100 thus disengaged and unlocked, the counterbalancing spring 66 resumes its counterbalancing function upon the sash 14 and permits the latter to be slid freely upward or downward in its respective sash guides 16 and 18.

What I claim is:

1. A resilient sash balance for removable sliding sash windows which is automatically locked in its tensioned condition in response to sash removal at a given location and automatically released in response to sash replacement and returned to said given location, said sash balance comprising an elongated structure including an elongated spring housing adapted to be secured to the window frame adjacent the sash and having a front wall with an elongated opening therein and a rear wall disposed opposite said front wall, an elongated resilient element disposed in said housing and anchored at its upper end, a locking lever carrier connected to the lower end of said resilient element and having a fulcrum portion with a fulcrum thereon projecting toward said opening, and a locking lever tiltably mounted on said fulcrum intermediate the opposite ends of said locking lever, said locking lever having a trigger arm projecting forwardly beyond said fulcrum into the path of travel of said sash for engagement thereby, said locking lever having a locking arm disposed within said spring housing rearwardly of said fulcrum and having housing wall gripping means thereon, said locking lever being adapted to tilt forwardly on said fulcrum to move said gripping means out of engagement with said housing in response to the engagement of said trigger arm by said sash and adapted to tilt rearwardly on said fulcrum and move said gripping means into gripping engagement with the inner surface of said housing in response to the disengagement of said sash from said trigger arm, said gripping means including oppositely-disposed front and rear wall gripping portions arranged in longitudinally-spaced relationship on said locking arm adjacent the inner surfaces of said front and rear walls of said housing and movable into and out of gripping engagement with said front and rear housing walls.

2. A resilient sash balance, according to claim 1, wherein the front and rear wall gripping portions are spaced apart from one another a distance exceeding the perpendicular distance between the inner surfaces of said front and rear housing walls.

3. A resilient sash balance, according to claim 1, wherein said locking arm is bifurcated with laterally-spaced portions disposed on opposite sides of said carrier and wherein each of said laterally-spaced portions has rear wall gripping means thereon.

4. A resilient sash balance, according to claim 3, wherein each of said arm portions has oppositely-disposed front and rear wall gripping portions thereon arranged in spaced relationship at opposite ends of said arm portions adjacent the inner surfaces of said front and rear walls of said housing and movable into and out of gripping engagement with said inner surfaces of said front and rear walls.

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