Jan. 1, 1952 D. TAPPAN 2,580,705

SASH BALANCE

Filed Sept. 25, 1948 2 SHEETS—SHEET 1

FIG. 1

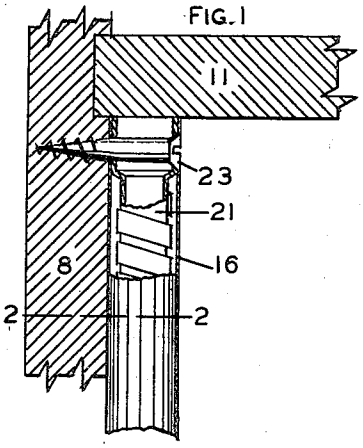


FIG. 2

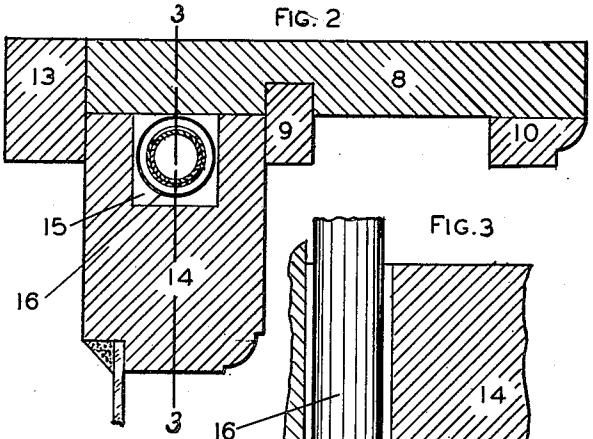
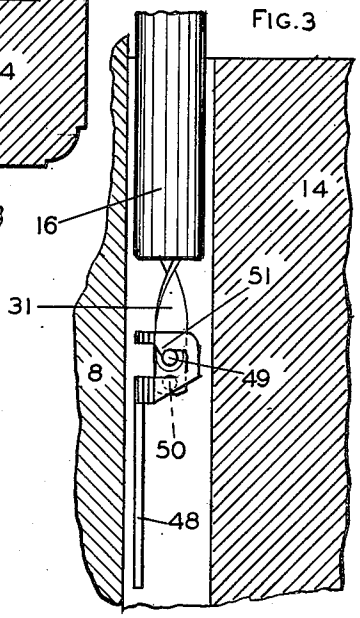


FIG. 3



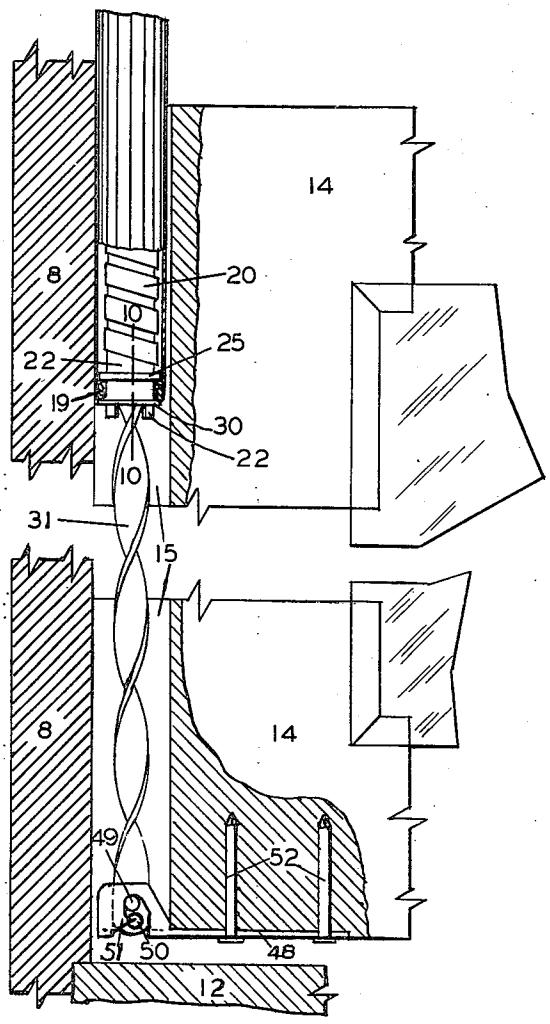


FIG. 4

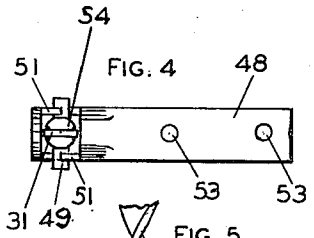
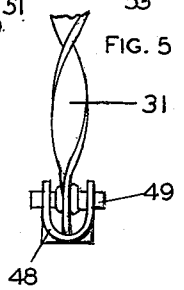


FIG. 5



INVENTOR.

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SASH BALANCE

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FIG. 6

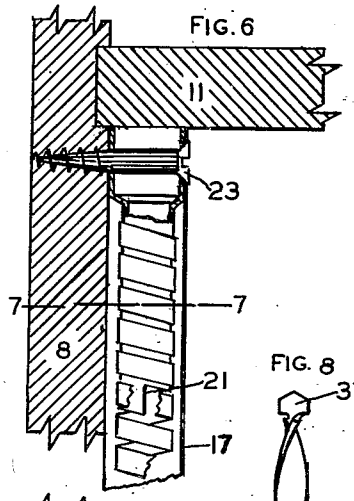


FIG. 7

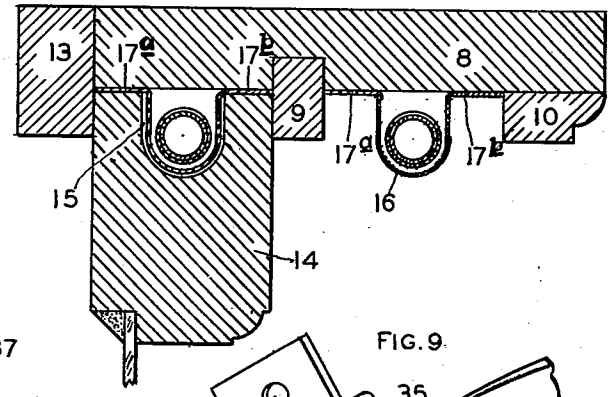


FIG. 8

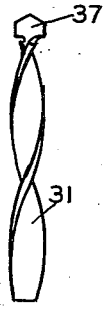


FIG. 9

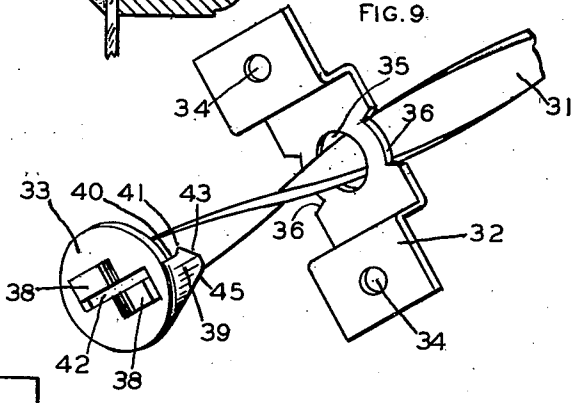


FIG. 10

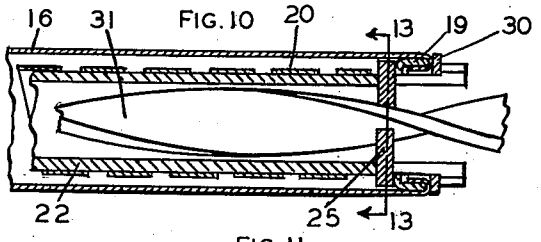


FIG. 11

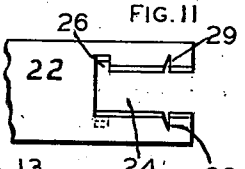


FIG. 12

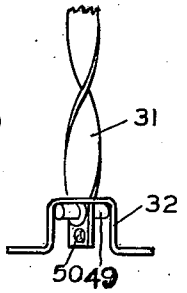


FIG. 13

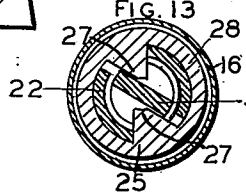
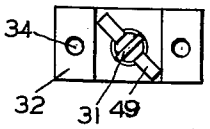


FIG. 14



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Patented Jan. 1, 1952 2,580,705

UNITED STATES PATENT OFFICE

2,580,705

SASH BALANCE

Dewitt Tappan, Irondequoit, N. Y.; Ada I. Tappan and Harold S. Wynn executors of said Dewitt Tappan, deceased

Application September 25, 1948, Serial No. 51,171

18 Claims. (Cl. 16—197)

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This invention relates to window sash balances and it more particularly pertains to sash balances of the spiral type wherein the longitudinal movement of a spiral rod through a nut in accordance with the raising and lowering of a window sash respectively decreases and increases torsional force in a spiral spring tending to hold the window sash in its last operated position and to assist in lifting the sash.

An object of the present invention is to provide an improved and relatively inexpensive means for adjusting the torsional force of the spring of a sash balance of this character so that the spring can have its torsional force readily changed while the balance is operatively connected to a window sash.

Another object of the present invention is to adjustably rotate the spiral rod of a sash balance with respect to the fixed end of the spring while the spring is secured at its fixed end to a window frame and while the spiral rod is disposed in its anchorage to the window sash. This adjustment is made upon disengaging radial locking means which normally anchors the spiral rod to the window sash by use of a simple hand tool.

Another object of the present invention is to provide means actuated by the torsional force of the spring to positively lock the spiral rod adjustment means against disengagement by force applied longitudinally thereto in the operation of the window.

Another object of the present invention is to provide a means of adjustment of the torsional force of the helical spring wherein leading and trailing edges of the teeth of a ratchet are so formed as to permit the release of the torsional force of the spring. This release is accomplished by first rotating the ratchet with a suitable hand tool in a direction to increase the torsional force of the spring until the ratchet teeth are disengaged from their locking positions, and then causing the release of the torsional force of the spring by the quick release of the hand tool.

Another object of the present invention is to suspend the weight of the window sash from an independent fixed bearing point employing a helical type of spring wherein there is no friction between the coils of the spring and maximum operating efficiency is accomplished.

A still further object of the present invention is to incorporate the above described objects into a sash balance of the spiral type that can be readily secured in its operating position to both a window frame and a window sash without removing the sash.

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Other objects, purposes and characteristic features of the present invention will be in part obvious from the accompanying drawings, and in part pointed out as the description progresses.

In considering the present invention in detail reference will be made to the accompanying drawings in which like reference characters are used to designate corresponding parts in the various figures, and in which:

Fig. 1 is a front elevational view, partially in section, showing, as one embodiment of the present invention, a sash balance mounted between a vertical edge of a window frame and a window sash;

Fig. 2 is a sectional plan view of the sash balance of Fig. 1 taken along the line 2—2;

Fig. 3 is a partial elevational sectional view of the balance of Fig. 1 taken along the line 3—3 in Fig. 2 illustrating a step in the installation of the balance;

Fig. 4 is a bottom view of the sash balance of Fig. 1 illustrating an adjusting mechanism;

Fig. 5 is a side view of the adjusting mechanism shown in Fig. 4;

Fig. 6 is a front elevational view, partially in section, showing a sash balance having a modified form of supporting member and adjusting mechanism;

Fig. 7 is a sectional view of the sash balance of Fig. 6 taken along the line 7—7;

Fig. 8 is a side view of the upper end of the spiral rod;

Fig. 9 is a perspective showing of an optional type of adjusting mechanism;

Fig. 10 is a sectional view taken along the line 10—10 in Fig. 2 or in Fig. 6 showing the means for rotating the helical spring of the sash balance by the relative longitudinal movement of the spiral rod;

Fig. 11 is a side view of a tubular adapter and nut seat;

Fig. 12 is a side view of another optional type of adjusting mechanism;

Fig. 13 is a sectional view of means for driving the spring taken along the line 13—13 in Fig. 10; and

Fig. 14 is a bottom view of the adjusting mechanism shown in Fig. 12.

With reference to Fig. 1, a sash balance according to one embodiment of the present invention is illustrated as being secured in its operating position along a vertical side of a jamb 8 of a window frame. The window frame is of a conventional frame construction, having a vertical parting strip 9 (see Fig. 2) for separating the upper and

lower sashes of a double hung window, a lintel 11 extending across the top of the frame, a sill 12 extending across the bottom of the frame, and vertical stop and facing strips 10 and 13 respectively secured to the jamb 8 for cooperating with the parting strip 9 to form channels in which respective upper and lower sashes of the window may be operated.

A lower sash 14 is illustrated as having a vertical channel 15 formed in its edge adjoining the jamb 8 for receiving the sash balance. Although Fig. 1 shows only the balance associated with the left-hand side of a window sash, it is to be understood that this balance can be similarly applied to the frame and sash at the right-hand side of the window, and that similar balances are employed in practice for the respective sides of the upper sash (not shown). It is to be understood, however, that a single balance according to the present invention is suitable under certain conditions to operate a window sash, provided of course that a spring of suitable tension is employed.

The balance according to Fig. 1 has a tubular housing and supporting member 16 that is preferably of a length for use with a lower sash slightly greater than the height of the upper sash. The balance for the upper sash (not shown), however, should have a tubular support slightly less in length than the height of the upper sash. Secured within the lower edge of the supporting member 16 is a tubular bearing 19 (see Figs. 1 and 10) which is preferably fixed in position by spinning the end of the tube 16 inwardly around the lower edge of the bearing 19, thus also securing the seam of the tube 16 from spreading.

A helical spring 20 extends within the tube 16 substantially throughout its entire length and is secured at its respective upper and lower ends by a spring anchor 21 and a tubular adapter 22. The spring 20 is of flat spring stock having a width substantially greater than its thickness and formed with spaced helical convolutions so that the greater cross-sectional dimension of the spring material is parallel to the axis of the spring. A spring of this nature, as is more fully described in my prior Patent No. 2,415,614, dated February 11, 1947, is preferred because it retains straight axial alignment when torsional force is applied, with no friction between the respective turns of the spring, and thus requires no additional support such as bearing against the tube 16 so as to cause noise and uneven operation of the balance because of friction with a supporting member. It is to be understood, however, that many of the objects of the present invention can be used in sash balances employing the conventional wire wound springs if the conditions of practice of the invention warrant the use of such springs.

The spring 20 is suitably secured to the outside of the spring anchor 21 by its own tension grasping the tubular portion of the anchor in a manner fully described in my above mentioned prior patent. The tube 16 and the anchor 21, and thus the upper end of the spring 20 are secure against rotation by the screw 23 which extends through the tube 16 and the spring anchor 21 and into the jamb 8 near the top of the window frame within the channel formed for passage of the lower sash 14.

The lower spring anchor and adapter 22 (see Figs. 10 and 11) is of a tubular form and is inserted in the lower end of the spring 20. The anchor 22 is of a diameter to cause the spring 20 to be secured to its outer surface by reason of the spring tension as described for the upper spring anchor 21. The lower end of the anchor 22 is formed as an adapter for receiving a nut 25 by being bifurcated and formed as a bayonet type of receptacle having detent receiving openings 24 and locking notches 26.

The nut is circular in shape and is of a diameter to fit within the tube 16 and bear against the bearing 19. This nut 25 has an inner circular opening, except for the inwardly protruding and oppositely disposed detents 27 so that it is receivable over the bifurcated end of the anchor 22 to an extent where the detents 27 pass through the openings 24 and into the notches 26 where they are locked by reason of the torsional force of the spring 20 when the balance is assembled. In assembly of the balance the anchor 22 is inserted in the spring 20, the nut is assembled on the lower end of the anchor 22, and this subassembly is inserted within the tube 16 to an extent wherein the nut 25 bears against the bearing 19 at the lower end of the tube 16. A washer 30 is then inserted over the lower end of the anchor 22, and portions of the anchor 22 are formed outwardly from notches 29 that are formed in the anchor so as to lock the spring anchor 22, nut 25, and spring 20 in their assembled positions at the lower end of the tube 16.

A spiral rod 31 is formed of rod material having a cross-sectional size and shape to fit diagonally within the center opening of the nut 25 and bear against the respective back sides of the oppositely disposed detents or lugs 27 as illustrated in Fig. 13, the front sides of these detents being effective as has been described for locking the nut 25 within the notch 26 in the anchor 22. The rod 31 is formed with spiral convolutions by being twisted about its axis so as to provide a driving force through its cooperation with the nut 25 by which it is effective to increase the torsional force of the spring 20 as the window sash 14 is lowered, and thus store potential energy in the spring 20 to aid in the raising of the window the next time the window is operated. Although the pitch of the convolutions is illustrated as being uniform throughout the length of the rod 31, it is to be understood that the pitch can be graduated if desired so as to taper off the torsional force applied by the spring 20 as the torsional force of the spring is increased.

The rod 31 at its upper end has a sharply deformed tip 37 which is so formed as to permit the upper end of the rod 31 to be inserted through the nut 25 when the rod is in a counter-clockwise rotated position as compared to the normal operating position as shown in Fig. 13. When the spring 20 is put under tension, the rod 31 assumes the position between the detents 27 as shown in Fig. 13, and the deformed tip 37 is effective as a positive stop acting against the upper side of the detents 27 so as to prevent the inadvertent withdrawal of the rod 31 completely from the balance, but yet permit the rod 31 to be readily removed when the spring tension is relieved and the rod 31 is turned counter-clockwise with respect to the nut 25 and the spring 20.

The lower end of the rod 31 is anchored by a bracket 48 which is suitably secured to the lower edge of the window sash 14 as by the nails 52 extending through the nail holes 53 (see Fig. 4), the size of the bracket being such as to permit its insertion through the chanel 15 in the edge of the window sash 14 as illustrated in Fig. 3

and as will be hereinafter more specifically considered.

The left-hand portion of the bracket 48 is formed as a U-shaped bayonet receiving receptacle extending into the channel 15 so as not to protrude below the lower edge of the window sash. Such receptacle is for receiving a bayonet cross-pin 49 which extends transversely through the lower end of the rod 31. The pin 49 is of a length slightly greater than the breadth of the U-shaped portion of the bracket 48, and it is secured in the rod 31 after the insertion of the rod 31 through the U-shaped portion of the bracket 48. The pin 49 is illustrated in Figs. 4 and 5 as being preferably secured in the rod 31 by employing a cross-pin that is longer than its finished length, and compressing its length while loosely assembled through a hole in the rod 31, thus causing the pin 49 to bulge at the points 54 on the opposite sides of the rod and thus securely lock the cross-pin 49 on center at the lower end of the rod 31.

With reference to Fig. 1, it will be noted that the bayonet receptacle in the bracket 48 is provided with diagonally oppositely disposed detents 51 at one side of the slot that receives the cross-pin 49. These detents 51 are for locking the cross-pin 49 against the possibility of the cross-pin being kicked out of its receptacle as a result of abrupt movement of the window sash 14. These detents 51 also serve to retain the cross-pin 49 in its engaging position with its receptacle while the lower end of the balance is being inserted through the channel 15 in the side of the window sash during installation of the balance as is illustrated in Fig. 3. It will be noted with reference to Figs. 1 and 3 that a hole 50 is formed in the rod 31 just below the bayonet cross-pin 49. This hole is for the insertion of a simple hand tool, such as a hook, when adjustment of the torsional force of the spring 20 is to be made after installation of the balance in a manner to be hereinafter described.

Having considered the structural details of the balance according to the embodiment shown in Fig. 1, consideration will now be given to the manner in which the balance is installed and adjusted and its mode of operation in balancing the weight of the window.

It is preferable that the rod 31 be inserted through the nut 25 before the balance is shipped, and also that the cross-pin 49 be inserted within its bayonet notch in the receptacle 48 so that there is no assembly to be done at the time of the installation. This being accomplished the mode of operation of the installation of the balance is simple and obvious from the drawing. The window is first lowered, the lower end of the balance is inserted through the channel 15 from the top of the window sash as illustrated in Fig. 4, and then the screw 23 is driven into the jamb 8 to secure the upper end of the balance to the upper end of the window frame. The window is then raised so that the bracket 48 and the lower end of the rod 31 extend to the bottom of the window where the bracket 48 is then secured by the nails 52 as shown in Fig. 1. It will be noted that the bracket 48 is of a size and shape to permit it to be inserted through the channel 15, the bayonet receptacle in its end being so formed as to permit the bracket 48 to pivot about the cross-pin 49 to the extent of substantially 90° from its normal operating position.

A suitable hand tool having a hook formed on the end thereof is inserted through the hole 50 in the rod 31, and the tool is rotated slightly in a clockwise direction to permit the cross-pin 49 to be withdrawn from its normally locked position downwardly so as to permit the initial torsional force to be applied to the spring 20 by rotating the hand tool in a clockwise direction while holding the cross-pin 49 extended downwardly in disengaging relationship with respect to the bayonet receptacle of the bracket 48. When it is thought that the torsional force is sufficient, the spring is permitted to attract the cross-pin 49 within the bayonet receptacle and thus lock the spring adjustment. Then if it is found by operation of the window that more or less torsional force is required to balance the weight of the sash, the hook can again be inserted, and adjustment made in a manner similar to that which has been heretofore described, the tool being turned clockwise or counter-clockwise as required to respectively increase or decrease the torsional force of the spring. It will be noted that this adjustment is all effected while the balance is operatively connected at its upper and lower ends to the jamb 8 and the window sash 14 respectively, there being no reason for removing the fastenings once they are attached, and the attachment of the fastenings being facilitating by permitting their attachment before the spring 20 is put under tension.

Another embodiment of the present invention is shown in Fig. 6 wherein parts identical to those which have been described are designated by like reference characters so that the specific description as has been set forth with respect to these parts and their modes of operation can be readily applied to the corresponding parts of the embodiment shown in Fig. 6, and thus the description of the balance according to Fig. 6 will be more particularly directed to its structure and mode of operation that differs from the embodiment that has been described.

The supporting member 17 of the balance according to Fig. 6, rather than being a closed tube such as the tube 16 of Fig. 1, is illustrated as a U-shaped supporting member with its open side facing the jamb 8 as shown in Fig. 7, and with flanges 17*a* and 17*b* extending outwardly to the respectively left-hand and right-hand sides from the respective ends of the U-formed portion to form a metallic run for the side of the sash 14, and to automatically center the balance within channel formed between the parting strip 9 and the facing strip 13.

The lower portion 18 of the supporting member 17 (see Fig. 6), however, is formed as a closed tube so that the bearing 19 and the nut 25 are secured at the lower end of this tubular portion 18 in a manner comparable to that illustrated in Figs. 10, 11, and 13 for the attachment of these parts to the tube 16 which has been described when considering the specific structure of the balance according to Fig. 1. The balance according to Fig. 6 is adapted to employ a spring 20 and spring anchorages 22 and 23 and a nut 25 corresponding to similar parts of the balance according to Fig. 1.

The anchorage of the spiral rod 31 is somewhat different in the balance according to Fig. 6 in that it is so organized as to permit the adjustment of the torsional force of the spring 20 with a common screw driver, rather than requiring the use of a hook type of tool as has been described. In general, the rod 31, as employed in the balance according to Fig. 6, is anchored to a ratchet disk 33 which in turn has oppositely dis-

posed ratchet teeth 39 which engage cooperating notches 36 in a bracket that is secured to the bottom of the window sash 14.

More specifically, the ratchet disk 33 is formed with radial slots 42 at 90° angles to each other of a width comparable to the thickness of the material of the rod 31. The lower end of the rod 31 of the balance according to Fig. 6 is bifurcated to form ears 38 that are inserted through radial slots 42 in the disk 33 and folded oppositely as shown in Fig. 9 to secure the ratchet disk 33 to the lower end of the rod 31. When the ratchet disk 33 is secured to the rod 31 in this manner, a screw slot is formed between the bifurcated ends, together with the radial slots 42 in which a screw driver may engage the ratchet disk 33 for the adjustment of the torsional force of the spring 20.

The bracket 32 has a hole 35 which serves as a bearing for the rod 31, such bearing being recessed from the mounting surface of the bracket 32 to permit the adjusting means to be contained within the channel 15 in the edge of the window sash 14. The bracket 32 is secured across the lower edge of the channel 15 of the window sash 14 by nails passing through the holes 34. Circular notches 36 concentric with the hole 35 are formed in the opposite sides of the bracket 32 (see Fig. 9) for engagement of the ratchet teeth 39 of the ratchet disk 33.

Each of the two oppositely disposed teeth 39 of the ratchet disk 33 is formed laterally from the disk 33 along the periphery of the disk so as to be adapted to engage within the notches 36 of the bracket 32. Each of the ratchet teeth 39 has a vertical edge 40 that normally bears against one side of a notch 36 to retain the last adjusted relative torsional force of the spring 20. Associated with each of the edges 40 is a locking detent 41 which normally locks behind the bracket 32 so as to prevent disengagement of the ratchet teeth 39 by reason of a longitudinal thrust of the rod 31 as by the quick movement of the window sash 14.

Each of the teeth 39 is formed with leading and trailing edges 45 and 43 respectively which recede from the end of the tooth so as to form cam surfaces governing the disengagement of the tooth from its cooperating notch 36. The leading edge 45 is effective when the rod 31 is rotated by a screw driven in a clockwise direction to govern the escapement of the tooth and permit its movement from notch to notch as the relative torsional force of the spring 20 is increased. The trailing edge 43 is effective when the ratchet disk 33 is permitted to be turned in a counter-clockwise direction by reason of the torsional force of the spring 20 in a manner to be hereinafter more specifically considered.

It is preferable in shipment of the balance according to Fig. 6, that the rod 31 be not assembled through the nut 25 as the installation of the balance is somewhat different from that of the balance that has been described with reference to Fig. 1. The installation of the balance according to Fig. 6 is made by first lowering the window sash with which it is to be associated, and then inserting the lower end of the balance within the channel 15 of the window sash sufficiently to permit the upper end of the balance to be secured by the screw 23 to the upper end of the jamb 8. The window is then raised, and the rod 31 is inserted through the bracket 32 as is illustrated in Fig. 9, and then through the channel 15 in the edge of the window sash from the bottom and thus through the nut 25. The deformed tip 37 is effective once the spring 20 is put under tension to prevent the rod 31 from dropping out of the nut 25. The bracket 32 is secured across the lower end of the channel 15 of the window sash by nails through the holes 34.

The adjustment of the balance according to Fig. 6 is made by the insertion of a screw driver, or other suitable tool, within the slot 42 of the ratchet disk 33 between the ears 38 of the rod 31 with the window raised. The rod 31 is then rotated clockwise to set up the desired torsional force in the spring 20, the cam surfaces 45 of the ratchet teeth 39 being effective to lower the rod 31 sufficiently to permit escapement of the teeth from their engaging notches 36 as the screw driver is rotated in a clockwise direction. When sufficient torsional force has been established in the spring 20, the ratchet teeth are permitted to be drawn into engagement with the notches 36 by the force of the spring 20 so that their vertical edges 40 are in engagement with edges of the notches 36, and the locking detents 41 are engaged back of the bracket 32 to prevent the disengagement of the ratchet teeth 39 by a quick movement of the window sash.

If it is found that the torsional force that has been applied to the spring 20 of the balance according to Fig. 6 is more than is required for balancing the weight of its associated window sash the spring 20 can be relieved of its tension and readjusted according to the procedure about to be described. The window is first raised and then the screw driver or other adjustment tool is inserted in the slot 42 and the ratchet disk 33 is rotated in a clockwise direction sufficiently to disengage the ratchet teeth 39 from their respective notches 36 by reason of the leading edges 45 of the teeth 39. The adjustment tool is then quickly removed, and although the torsional force of the spring 20 biases the teeth 39 toward their engaging positions within the notches 36, the speed of rotation counter-clockwise of the rod 31 because the torsional force of the spring 20 is such as to permit the teeth 39 to drop into the notches 36 only to an extent whereby the trailing receding edges 43 strike the edges of the notches and thus bounce the teeth 39 out of the notches 36 before they can become inserted deep enough to be locked by the detents 41 behind the bracket 32. After the spring tension is thus relieved, the above described procedure for setting up torsional force in the spring 20 can be repeated.

A still further modified means of adjustment of the torsional force of the spring 20 is illustrated in Figs. 12 and 14 wherein the bracket 32 is required to be recessed slightly deeper into the channel 15 of the window sash and a cross-pin 49 is secured in the lower end of the rod 31 after its insertion through the opening in the bracket 32, such cross-pin being of a length to restrict rotation of the rod 31 when the cross-pin is held by the torsional force of the spring 20 within the recess of the bracket 32.

The adjustment of a balance having an adjusting means such as is shown in Figs. 12 and 14 is made as has been described with respect to the adjustment of the balance according to Fig. 1, a hook type of adjustment tool being inserted in the hole 50 at the end of the rod 31 as a means for pulling the rod downwardly to disengage the cross-pin 49 from the recess of the bracket 32.

Having thus described specific embodiments of the present invention as illustrative of forms

which the invention may assume, it is desired to be understood that these forms are selected to facilitate the disclosure of the invention rather than to limit the number of forms the invention may assume, and it is to be further understood that various adaptations, alterations, and modifications may be applied to the specific forms shown to meet the requirements of practice without in any manner departing from the spirit or scope of the present invention except as limited by the appending claims.

What I claim is:

1. A sash balance comprising, an elongated rod having opposed spiral convolutions and adapted to be secured to a window sash, a helical spring in which torsional force may be stored having one end secured against rotation, a tubular adapter one end of which is secured to the opposite end of said spring, said adapter having opposed openings extending inward from the end opposite said spring, each of said openings having a notch formed in one side thereof, a nut receivable in said openings of said tubular adapter, said nut having opposed bearing surfaces engaging the opposed spiral convolutions of said rod to cause rotation of said nut in accordance with the longitudinal movement of said rod, and said nut having portions adapted to be biased into engagement with the notches in the sides of said openings in said tubular adapter by the torsional force of said spring.

2. In a sash balance of the spiral type, in combination an elongated spring wherein torsional force may be stored for transmitting rotary motion adapted to be secured at one end against rotation, a nut secured to the opposite end of said spring having opposed bearing surfaces formed therein, a rod adapted at one end to be secured to a window sash and having its other end entered into said spring through said nut, said rod having opposed spiral convolutions about its axis engaging the opposed bearing surfaces of said nut whereby longitudinal movement of said rod with respect to said nut causes rotation of said nut and that end of said spring to which said nut is secured, wherein the torsional force of said spring is increased on longitudinal movement of said rod in one direction and is decreased on movement of said rod in the opposite direction, and said rod having opposed detents near said entered end engaging said nut by reason of the torsional force of said spring to prevent said rod from being fully withdrawn from said nut while under influence of the torsional force of said spring.

3. A sash balance for use with a window sash and its frame comprising, an elongated supporting member having a bearing in one end thereof, a bracket adapted to be secured to a window sash, a rod having opposed spiral convolutions one end of said rod being secured to said bracket, an adapter of tubular form having opposed openings in the wall of one end, a nut secured in said openings of said adapter said nut being formed with a portion surrounding said adapter and disposed to act as a thrust bearing in co-operation with the bearing in said supporting member and said nut having opposed portions extending inward through said openings in the wall of said adapter in co-operative engagement with the spiral convolutions of said rod whereby said nut is rotated on longitudinal movement of said rod with respect to said supporting member, and a helical spring having one end secured against rotation and the opposite end secured to said adapter to rotate therewith.

4. A sash balance comprising, a helical spring in which torsional force may be stored secured at one end against rotation, a supporting member having a bearing formed therein, a bracket adapted to be secured to a window sash, a nut having opposed bearing surfaces and locking portions formed therein, a rod having opposed spiral convolutions, said rod being secured at one end to said bracket and having said spiral convolutions in operative engagement with the bearing surfaces of said nut to cause rotation of said nut on longitudinal movement of said rod with respect to said nut, and an adapter of tubular form rotatable in said bearing having one end secured to the opposite end of said spring, said adapter having openings formed in the other end, each of said openings being provided with a notch into which said locking portions of said nut are biased by the torsional force of said spring.

5. A sash balance for use with a window sash and a window frame comprising, an elongated supporting member having a bearing in one end thereof and having its opposite end adapted to be secured to a window frame, a bracket adapted to be secured to a window sash, a rod having spiral convolutions secured to said bracket, an adapter of tubular form rotatable in and having one end extending through said bearing and having openings formed in its wall at the extending end, a nut receivable in said openings said nut having a portion surrounding said adapter and abutting said bearing to support the weight of the window sash, said nut having opposed portions extending inward through the openings in the wall of said adapter for co-operative engagement with the spiral convolutions of said rod whereby said nut and said adapter are rotated on longitudinal movement of said rod with respect to said nut, a helical spring having one end secured against rotation and the opposite end secured to said adapter to rotate therewith, and means for securing said adapter and said nut in said bearing against longitudinal movement with respect to said supporting member comprising a washer assembled on the extending end of said adapter and secured in place by deforming the extending portions of the wall of said adapter.

6. In a sash balance of the spiral type, a spring adapted to be secured at one end to the top of a window frame and having a nut secured to the other end thereof, a spiral rod operative from one end longitudinally through said nut and having a cross-pin secured in its other end, a bracket adapted to be secured to the lower edge of a window sash having a bayonet receptacle for detachably securing said rod by said cross-pin against rotative movement, said bracket being adapted to pivot about said cross-pin so as to permit said bracket to extend longitudinally along the axis of said rod for the purpose of facilitating installation of the bracket within a window sash.

7. In a sash balance of the spiral type for securing to a window frame and window sash for balancing the weight of a window, a spiral spring adapted to be secured at one end to the top of a window frame, a spring anchor and a nut secured to the other end of the spring, a spiral rod operable longitudinally through said nut and influenced by the torsional force of said spring, said rod having a cross-pin near its lower end, and a bracket adapted to be secured to the

lower edge of a window sash, said bracket having a bayonet type receiving socket adapted to receive said cross-pin in detachable engagement so that said cross-pin can be readily disengaged from said bracket after the bracket is secured to a window sash for adjusting the torsional force of said spring.

8. In a sash balance having a helical spring secured at one end to a window frame and provided with a nut secured at its other end, a spiral rod having one end receivable in said nut and having a cross-pin secured in the other end, a bracket adapted to be secured to the lower edge of a window sash having a U-shaped receptacle and an opening through said U-shaped receptacle for passage of said rod, the U-shaped portion of said bracket forming radial pockets adapted to receive said cross-pin, and said spiral rod being adapted for the engagement of an adjusting tool whereby said cross-pin can be readily disengaged from its engaging position with said bracket for adjustment of the torsional force of said spring.

9. A sash balance of the spiral type comprising in combination a helical spring adapted to be secured at one end to a window frame and having a nut secured to the other end thereof, a spiral rod having one end receivable in said nut and having the other end provided with a cross-pin and an opening for engagement of an adjusting tool, a bracket adapted to be secured to a window sash having a U-shaped receptacle at one end thereof with an opening through the receptacle for passage of the spiral rod, said U-shaped portion being effective to form a detachable anchorage for receiving said cross-pin by providing openings for receiving the cross-pin at both sides of the spiral rod, said openings having detents formed therein whereby said rod can be locked by the torsional force of said spring against being disengaged from said bracket because of longitudinal force applied to the spiral rod during the operation of a window, said rod being quickly detachable from its anchorage by the insertion of an adjusting tool through said opening in said rod upon pulling said rod outwardly from said spring and from said bracket after rotating said rod slightly so as to disengage said cross-pin from said detents.

10. A sash balance comprising a supporting member having a nut rotatable therein, a helical spring having one end secured against rotation and the opposite end secured to said nut to rotate therewith, a spiral rod secured against rotation engaging said nut and disposed to rotate same in accordance with its longitudinal movement with respect to said supporting member, a bracket adapted to be secured to a window sash comprising a bearing supporting one end of said rod and having notches formed in opposite sides thereof, and a ratchet disk secured to said rod having oppositely disposed ratchet teeth formed laterally from the periphery thereof engaging said notches of said bracket.

11. In a sash balance, the combination with a supporting member having a nut rotatable therein, a helical spring in which torsional force may be stored having one end secured against rotation and the opposite end secured to said nut to rotate therewith, and a spiral rod engaging said nut and disposed to rotate same in accordance with its longitudinal movement with respect to said supporting member, of means for adjusting the torsional force of said spring comprising, a bracket adapted to be secured to a window sash supporting one end of said rod, said bracket having teeth engaging surfaces formed therein, a disk having ratchet teeth formed laterally from the periphery thereof secured to said rod, said teeth being biased by the torsional force of said spring into engagement with said engaging surfaces to normally maintain the adjustment of said spring, and said teeth being formed so as to permit rotation of said rod with respect to said bracket in one direction for increasing the torsional force of said spring.

12. In a sash balance of the spiral type, the combination with a helical spring disposed within an elongated supporting member and having one end secured thereto and a nut secured to said spring with respect to rotation at the other end of said supporting member, of a spiral rod engaging said nut and disposed to rotate said nut by longitudinal movement thereof, said rod having a bifurcated anchorage at one end, a bracket adapted to be secured to a window sash comprising a bearing supporting one end of said rod, said bracket having notches formed in opposite sides thereof, and a ratchet disk having openings therein for receiving said bifurcated anchorage of said rod, said disk having oppositely disposed ratchet teeth engaging said notches of said bracket, and said ratchet disk having a slot formed therein between the bifurcations of said anchorage for engagement of a tool whereby said ratchet can be rotated.

13. In a sash balance, the combination with an elongated supporting member having a nut rotatable in one end thereof and a helical spring wherein torsional force may be stored disposed within said supporting member having one end secured thereto and the opposite end secured to said nut to rotate therewith, of a spiral rod engaging said nut to rotate same in accordance with the longitudinal movement of said rod with respect to said supporting member, a bracket adapted to be secured to a window sash and support one end of said rod, said bracket having a plurality of notches formed therein, and a ratchet disk secured to one end of said rod, said disk having a plurality of ratchet teeth for engagement with the notches of said bracket formed laterally from the periphery thereof, each of said teeth having a projection locking said ratchet disk in engagement with said notches of said bracket in accordance with the torsional force applied to said rod by said spring.

14. In a sash balance, the combination with an elongated supporting member having a nut rotatable in one end thereof, a helical spring wherein torsional force may be stored disposed within said supporting member having one end secured thereto and the opposite end secured to said nut to rotate therewith, and a spiral rod engaging said nut and disposed to rotate same in accordance with the longitudinal movement of said rod with respect to said supporting member, of a bracket adapted to be secured to a window sash and to support one end of said rod, said bracket having a plurality of teeth engaging surfaces formed therein, a ratchet disk secured to one end of said rod said disk having a plurality of ratchet teeth formed laterally from the periphery thereof, each of said teeth being formed with an edge receding from the end thereof causing disengagement with said teeth engaging surfaces when said ratchet disk is rotated in one direction for increasing the torsional force of said spring, and each of said ratchet teeth being formed with another edge receding from said end for resist-

ing engagement when said ratchet disk is rotated in the opposite direction at a high rate of speed by the torsional force of said spring after said ratchet teeth have first been raised out of engagement with said teeth engaging surfaces of said bracket.

15. In a sash balance, the combination with an elongated spiral member, a nut in co-operative engagement with said spiral member to promote rotative movement of said nut on longitudinal movement of said spiral member with respect to said nut, an elongated spring wherein torsional force may be stored having one end secured against rotation and the opposite end secured to said nut to rotate therewith, said spring being constructed of resilient material substantially greater in width than thickness and coiled in a helical form with the greater cross section dimension parallel to the axis of the spring, the difference between the width and the thickness of said material being sufficient to cause lines of flexure parallel to the axis of the spring, whereby said spring retains a straight axial line when torsional force is applied to it, of means for adjusting the torsional force of said spring comprising, a bracket adapted to be secured to a window sash and to support one end of said spiral member, said bracket having teeth engaging surfaces formed therein, a disk having ratchet teeth formed to cooperatively engage the teeth engaging surfaces of said bracket, said disk being secured to said rod and said teeth being biased by the torsional force of said spring in engagement with said teeth engaging surfaces to normally maintain the adjustment of said spring, and said teeth being formed so as to permit rotation of said rod with respect to said bracket in one direction for increasing the torsional force of said spring.

16. In a sash balance, the combination with an elongated spiral member, a nut in co-operative engagement with said spiral member to promote rotative movement of said nut on longitudinal movement of said spiral member with respect to said nut, an elongated spring wherein torsional force may be stored having one end secured against rotation and the opposite end secured to said nut to rotate therewith, said spring being constructed of resilient material substantially greater in width than thickness and coiled in a helical form with the greater cross section dimension parallel to the axis of the spring, the difference between the width and the thickness of said material being sufficient to cause lines of flexure parallel to the axis of the spring, whereby said spring retains a straight axial line when torsional force is applied to it, of a bracket adapted to be secured to a window sash and to support one end of said elongated spiral member, said bracket having a plurality of teeth engaging surfaces formed therein, and a ratchet disk secured to one end of said elongated spiral member, said ratchet disk having a plurality of ratchet teeth formed laterally from the periphery thereof, each of said teeth being formed with an edge receding from the end thereof causing disengagement with said teeth engaging surfaces when said ratchet disk is rotated in one direction for increasing the torsional force of said spring, and each of said teeth being formed with another edge receding from said end for resisting engagement when said ratchet disk is rotated in the opposite direction at a high rate of speed by the torsional force of said spring after said ratchet teeth have first disengaged from said teeth engaging surfaces of said bracket.

17. In a sash balance for use with a window sash and its frame the combination with a spiral spring secured at one end to said window frame and having a nut secured to the other end thereof, a bracket adapted to be secured to said window sash, a spiral rod one end of which is secured to said bracket and the opposite end in association with said nut to cause rotation thereof on longitudinal movement of said rod through said nut, of an elongated member in the form of a tube having a longitudinal butted seam and securable at its upper end to a window frame, and a cup shaped member having a rim portion and an opening concentric with such rim portion, such cup shaped member being secured in the lower end of said elongated member by having the wall of such elongated member turned inward and upward over the rim of said cup shaped member thereby providing supporting means for said nut and said sash and preventing the seam of said elongated member from opening.

18. In a sash balance for use with a window sash and its frame the combination with a spiral spring secured at one end to said window frame and having a nut secured to the other end thereof, a bracket adapted to be secured to said window sash, a spiral rod one end of which is secured to said bracket and the opposite end in association with said nut to cause rotation thereof on longitudinal movement of said rod through said nut, of an elongated sheet metal member secured to the window frame and having the major portion of its length of U shaped cross section with flanges extending outward from the ends of the U disposed between the window sash and its frame and having a short portion at its lower end of tubular cross section, and a cup shaped member having a rim portion and an opening concentric with such rim portion secured in said short portion by having the wall of such short portion turned inward and upward inside the rim of said cup shaped member, thereby providing supporting means for said nut and preventing the seam of said short tubular portion from opening.

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