(No Model.)

3 Sheets—Sheet 1.

S. N. GOLDY.

SASH BALANCE.

No. 457,195.

Patented Aug. 4, 1891.

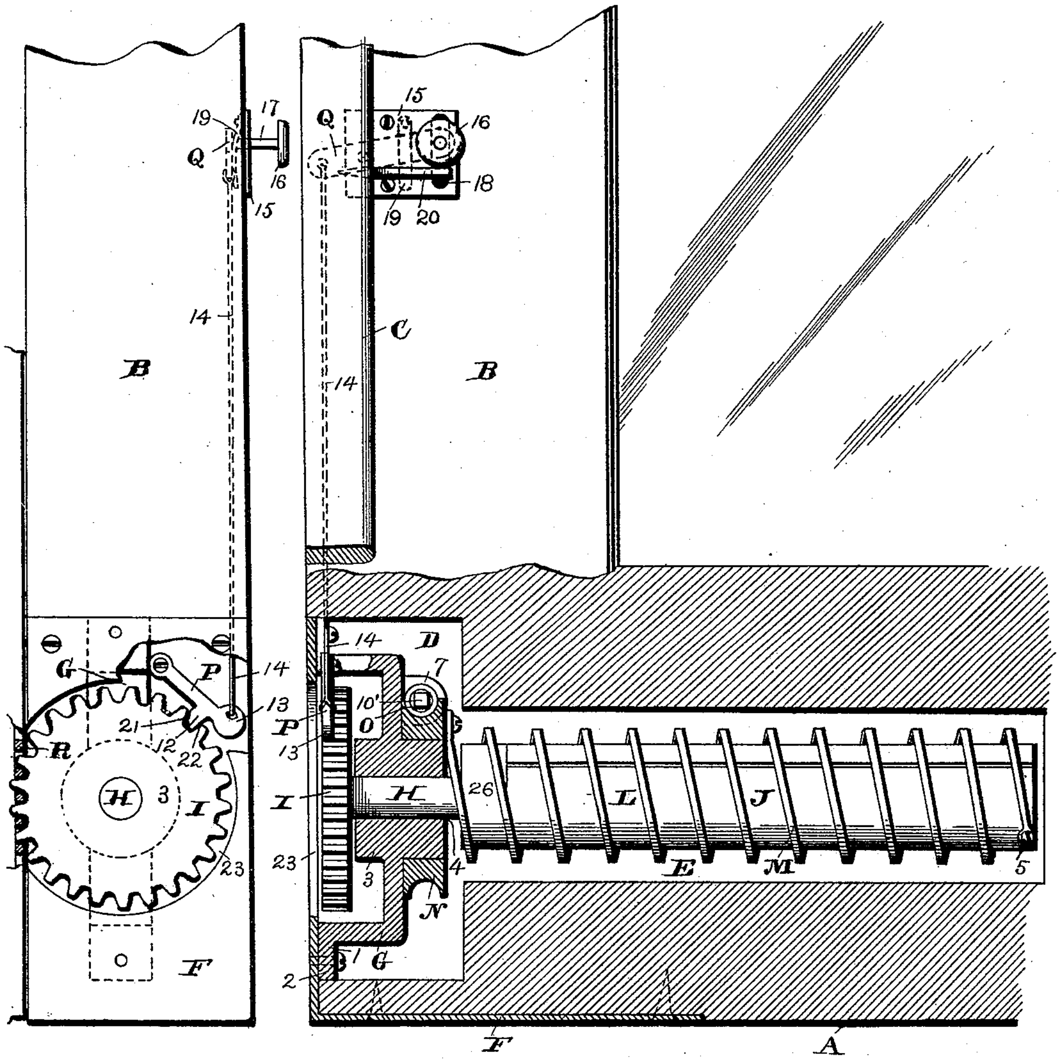

Fig. 2.

Fig. 1.

Witnesses

Albert Speiden.

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Inventor

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By his Attorney,

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THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

(No Model.) 3 Sheets—Sheet 2.

S. N. GOLDY.

SASH BALANCE.

No. 457,195. Patented Aug. 4, 1891.

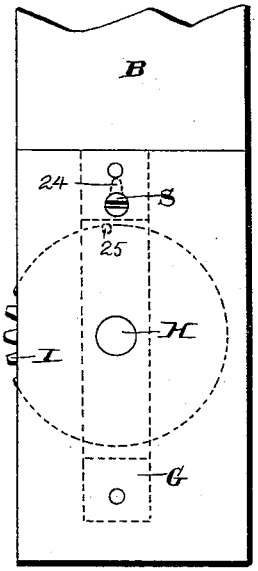

Fig. 4.

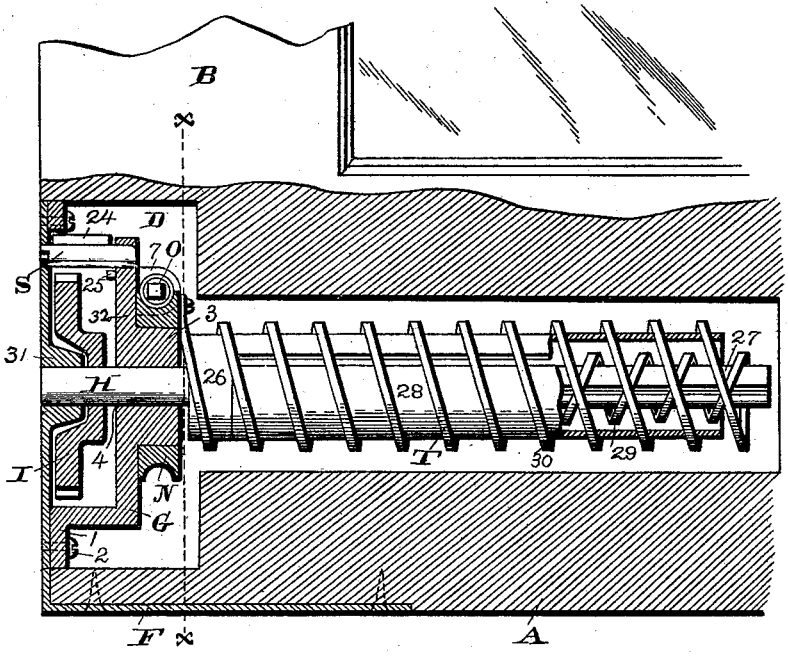

Fig. 3.

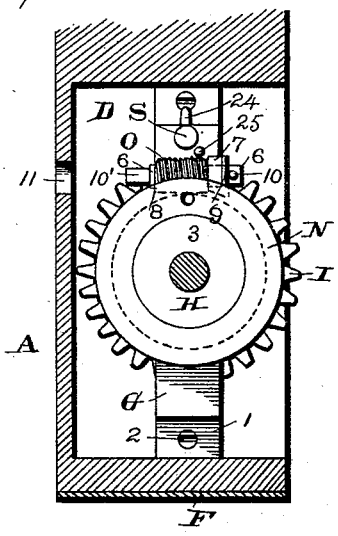

Fig. 5.

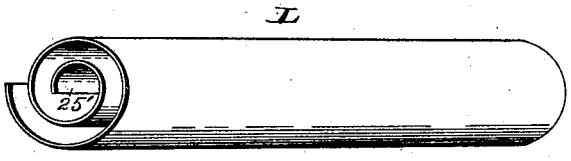

Fig. 6.

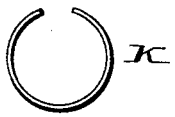

Fig. 7.

Witnesses

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(No Model.) 3 Sheets—Sheet 3.

S. N. GOLDY.

SASH BALANCE.

No. 457,195. Patented Aug. 4, 1891.

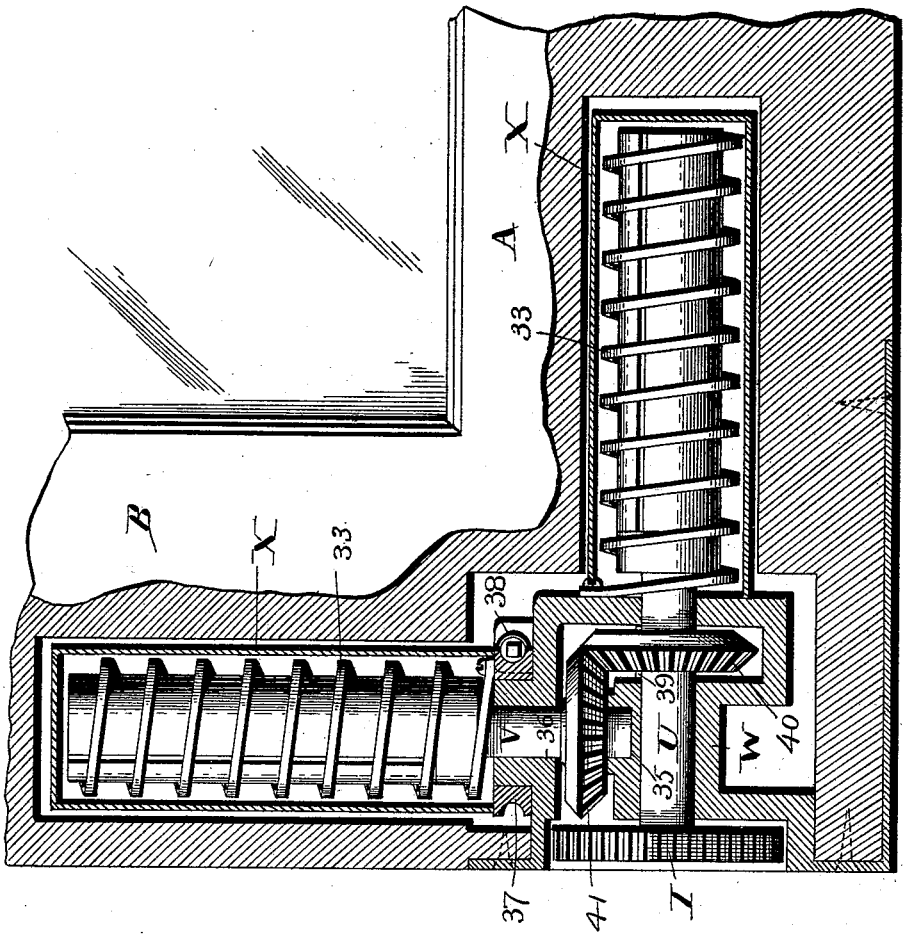

Fig. 2.

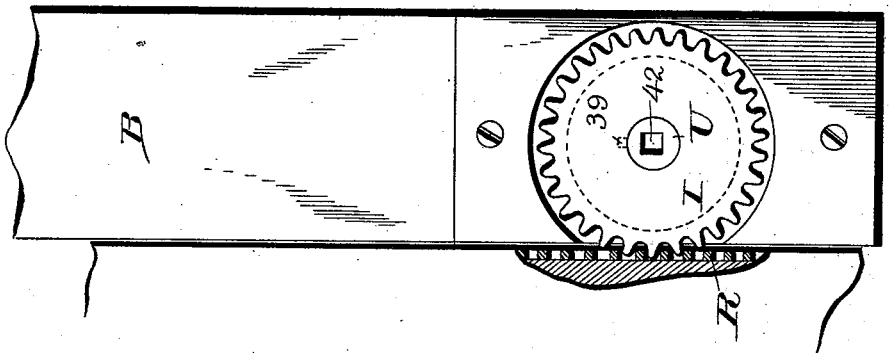

Fig. 3.

Witnesses

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By his Attorney

Wm Hunter Myers.

UNITED STATES PATENT OFFICE.

SAMUEL N. GOLDY, OF SAN FRANCISCO, CALIFORNIA.

SASH-BALANCE.

SPECIFICATION forming part of Letters Patent No. 457,195, dated August 4, 1891.

Application filed April 18, 1891. Serial No. 389,439. (No model.)

To all whom it may concern:

Be it known that I, SAMUEL N. GOLDY, a citizen of the United States, residing at San Francisco, in the county of San Francisco and State of California, have invented certain new and useful Improvements in Sash-Balances; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings and to the letters and figures of reference marked thereon, which form a part of this specification.

This invention relates to sash-balances of that class in which a spring-actuated gear-wheel suitably journaled in a bearing or in bearings secured in the window-sash meshes with a rack-plate secured to the window-frame; and it has for its objects, first, to provide an improved mechanism for balancing the sash; secondly, to provide means for preventing setting of the spring when placed under too great tension; thirdly, to provide means for increasing or diminishing the tension of the spring, whereby to admit of the same being adjusted to the weight of the sash; fourthly, to provide for a sufficient longitudinal play of the spring-carrying shaft or tube to enable it automatically to adjust itself to any irregularity of the window-frame, thus preventing any binding or undue friction of the operative parts while in operation, and finally to provide for a maximum strength or tension with a minimum length of spring and also to equalize its power.

I accomplish the above results by means of the mechanism illustrated in the accompanying drawings, in which—

Figure 1 is a front elevation of a portion of a window-sash, a part of the bottom rail and the side rail being broken away to show the position occupied by the sash-balance. Fig. 2 is an end elevation showing the main or operating gear-wheel in engagement with a rack-plate secured to the window-frame and also a locking device engaging the said wheel for preventing the raising of the window-sash. Fig. 3 is a front elevation, similar to Fig. 1, showing a modified form of spring and a spring-locking device. Fig. 4 is an end elevation showing more particularly the spring-locking device illustrated in Fig. 3. Fig. 5 is a sectional view taken on the line x x of Fig. 3 and looking toward the left, showing the worm-screw for regulating the tension of the spring. Fig. 6 is a perspective detail view of a scroll tube or cylinder to be used, if desired, in connection with that form of spring shown in Fig. 1. Fig. 7 is a sectional view of a split tube or cylinder to be used, if desired, in connection with that form of spring shown in Fig. 3. Fig. 8 is a front elevation of a modified form of sash-balance, a portion of the side rail and the bottom rail of the sash being broken away to show the position occupied by the operative parts of the sash-balance. Fig. 9 is an end elevation showing the main or operating gear-wheel in engagement with the rack-plate secured in the window-frame.

Referring to the drawings, A designates a portion of the bottom rail of the sash, B a portion of one of the side rails, and C the stop-bead. As these parts may be of any preferred construction, a detailed description of them is deemed unnecessary.

D designates a chamber formed in the side rail near its bottom, and E a bore extending from the chamber into the bottom rail, preferably parallel to its lower edge, the chamber and the bore serving as a housing or casing for the sash-balancing mechanism to conceal it from view and also to protect it from the weather.

F designates an L-shaped metallic plate secured, respectively, to the under side of the bottom rail and to the edge of the side rail, and serves, among other purposes, to strengthen and to tie the said rails together.

G designates a rectangular bracket or support, the upper and the lower ends of which are each provided with a flange 1, through which extend screws 2 to secure the bracket to the plate F, as clearly shown in Figs. 1 and 3. At a point preferably midway between the said flanges the bracket is furnished with an enlarged portion 3, which is provided with an opening 4, in which is journaled a shaft H, the outer end of which carries a gear-wheel I and the inner end a cylinder J, which may be a split tube K, Fig. 7, or a scroll cylinder

or tube L, Fig. 6, the latter, for reasons that will presently appear, being in most instances preferred.

M designates a torsional spring, which is spirally coiled about cylinder J, and is secured at one end to the said cylinder at 5 and at the opposite end to a worm-wheel N, which latter is journaled upon the enlarged portion 3 of the bracket G. The worm-wheel is held in position and is operated by means of a worm-screw O, the ends 6 of which are journaled in flanges 7 on bracket G, a shoulder 8 at one end of the screw and a washer 9 and pin 10 at the opposite end serving to keep the said screw in its operative position. The screw is also provided with a squared end 10′, designed to be engaged by a key inserted through an opening 11 in the side of the bottom rails, by means of which the screw may be turned, thus actuating the worm-wheel and through it either increasing or diminishing the tension of the spring, as desired.

P designates a pawl, which is pivoted at one end upon the inner side of the plate F, and is provided with a toe or projection 12, designed to engage with the gear-wheel I. The free end of the pawl is weighted, as at 13, and connects through a cord or wire 14 with one end of a lever Q, pivoted to the rear side of a plate 15 on the side rail. The free end of the lever carries a knob 16, the shank 17 of which extends through a slot 18 in plate 15, a leaf-spring 19, secured to the said plate and bearing against the lever, serving to hold the latter in any desired position.

The stop-bead C carries a rigid pin 20, which is of sufficient length to engage with the knob when the sash is lowered, and thus automatically throw the pawl P into engagement with gear-wheel I, thereby locking the sash in its lowered position. In order to release the pawl to raise the sash, the knob is pressed in a sufficient distance to clear the pin 20 and then down, when the pawl will be moved out of engagement with the gear-wheel I. It will be observed that one face of the toe 12 of the pawl is straight and the other face curved, as at 21. The object of this construction is to admit of the sash being lowered while the pawl is in mesh with the teeth of the gear I; but the straight face 22 will prevent raising of the sash until the pawl has been moved out of engagement with the said gear in the manner already described.

R designates a rack-plate, which may be secured either to the stop-bead C or to the parting-bead, or at any other convenient point on the window-frame. As there is always more or less play given to a window-sash in order to admit of its being raised or lowered with ease, and as it frequently occurs that the window-frame becomes warped or bulged from moisture or from the settling of the walls or the foundation of the building in which it is located, it follows that provision should be made whereby to compensate for these irregularities, so that the operative parts of the sash-balance may be kept in operative relation with each other, and more particularly the gear-wheel I and the rack-plate R, as upon the perfect co-operation of these two elements depends the successful working of the whole device. It is therefore obvious that the essential point in this connection is to provide for a positive and certain engagement under all circumstances of the gear-wheel and the rack-plate, and in order to accomplish this result the plate F is provided with an opening 23 of a size equal to the diameter of the gear I, whereby the shaft H may have sufficient lateral play to admit the gear I being in constant mesh with the rack-plate, or, in other words, for the gear to accommodate itself to any irregularity which may exist in the plate from any of the above-named causes.

S, Figs. 3 and 5, designates a stop-pin, which works in bearings formed, respectively, in the plate F and the support G, which pin carries a feather 24, designed to be turned into engagement with one of the teeth of the wheel I to prevent the spring M from unwinding previous to being placed in position in the sash, a lug 25 being provided to prevent the tension of the spring from forcing the feather out of engagement with the tooth and thus releasing the spring. It is to be understood that when the pawl P has been placed in position so as to engage the wheel I the stop-pin S is then turned out of engagement with said wheel.

In order to appreciate more fully and perfectly the function performed by the tube or cylinder L, it is pertinent to remark that where the spring is not provided with a central or interior support there is danger when inexperienced persons are fitting the sash-balances in place of putting the spring under too great tension, thus causing what is commonly known as a "setting" of the spring, or, in other words, placing it under such severe tension that the coils will not resume their normal position. By the tube or cylinder illustrated in Fig. 6 this obstacle is effectually overcome, for as the tube is preferably made of a resilient material it follows that when the spring is wound up or placed under tension by the downward movement of the sash the tube is at the same time contracted or placed under tension, and when the sash is raised the tube, coincidently with the spring, begins to expand, thus forcing the latter to resume its normal position. The same remarks will also hold good in regard to the split tube shown in Fig. 7. In securing the tube L in place the inner end 25′ of the scroll is secured to shaft H in any desired manner. In the case of tube K shaft H is provided with a drum 26, to which one end of the said tube is secured.

In that form of sash-balance shown in Fig. 3 the general construction of the parts is the same as those shown in Fig. 1, with the exception of a difference in the arrangement of

the balance-spring and the shaft-bearing. A double or return spring T is employed instead of the single spring shown in the latter figure. Two split tubes 27 28 are also employed, the inner one of which 27 is secured to the shaft H and fits within the return portion 29 of the spring, and the outer tube 28 is secured to the drum 26 and fits within the outer portion 30 of the spring. By this construction both portions of the spring are prevented from setting and less space is required in which to allow it to work, inasmuch as by the return-spring the same power and freedom of movement is obtained in one-half the space required by a single spring in accomplishing the same work. The plate F, instead of being cut away, as at 23 in Fig. 1, is provided at that point with an inward-extending apertured boss 31, which serves as a bearing for the outer end of shaft H, which boss, together with the bearing formed in the vertical wall 32 of the support G, gives the shaft H a support on each side of the wheel I, whereby cramping or binding of the shaft will be effectually prevented. The wheel I has lateral play between the said boss and the vertical wall 32 for the same purpose as that described in connection with Fig. 1.

The form of sash-balance illustrated in Fig. 8 is particularly adapted for use upon very heavy sashes, wherein the bottom rail is not long enough to contain a spring of sufficient length to raise the sash. In order to overcome this obstacle, I provide two shafts U V, which are arranged at right angles to each other, and upon each shaft is mounted a spring 33, similar to that employed in the form of balance shown in Fig. 1, although, if desired, the double or return spring shown in Fig. 3 may be employed. The shaft U is journaled in a bearing formed in a bracket W, and carries on its outer end a gear-wheel I, which meshes with a rack-plate R on the window-frame. The lower end of the vertical shaft V works in a socket 35, formed in bracket W, and is held in a vertical position by means of a second bearing 36, also formed in the said bracket. The latter shaft carries a worm-wheel 37, which is engaged by a worm-screw 38, whereby the tension of the two springs may be regulated, as will presently appear. The shaft U is provided with a spline 39, which engages a keyway cut in a miter-gear 40, mounted on the said shaft, which gear meshes with a similar gear 41 on shaft V. Each shaft carries a tube or tubes similar to those employed in the forms of sash-balances already described and for the same purpose.

In addition to the split or scroll tubes just referred to, an exterior tube X may be employed, which incases the spring and is designed to prevent moisture or frost from coming in contact therewith. I have shown this latter tube as applied to Fig. 8 only; but it is to be understood that it may be used in connection with the other forms of sash-balances illustrated.

In placing the two springs under tension a key is inserted in a recess 42 in shaft U, and the said shaft is turned until the desired tension is attained, it being of course understood that the springs exert pressure in opposite directions—that is, one is a right-hand and the other a left-hand coil. Thus by turning the shaft U motion is imparted to shaft V through miter-gears 40 41 and both springs are placed under equal tension. If after the sash has been placed in position in the window-frame it is found that the tension on the springs is too great or too little, such difference may be readily adjusted by means of the worm-screw 38.

Having thus fully described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a sash-balance, a shaft and a rack and gear for operating the same, in combination with a torsional spring having one of its ends secured to a normally-fixed surface and its other end secured to a movable portion of the said balance, and a yielding support arranged within the said spring and extending throughout its length.

2. In a sash-balance, a shaft and a rack and gear for operating the same, in combination with a torsional spring having one of its ends secured to a worm-wheel and its other end secured to a movable portion of the said balance, means for operating the worm-wheel to regulate the tension of the spring, and a yielding support with which the said spring contacts.

3. In a sash-balance, a bracket or support, a shaft journaled therein having longitudinal and rotary movement, and a rack and gear for operating the shaft, in combination with a torsional spring having one of its ends secured to a normally-fixed surface and its other end to a movable portion of the said balance, and means for increasing or decreasing the tension of the said spring.

4. In a sash-balance, a bracket or support, a shaft journaled therein having longitudinal and rotary movement, and a rack and gear for operating the shaft, in combination with a torsional spring, a worm-wheel carried by the bracket, to which one end of the spring is secured, a yielding spring-support carried by the shaft, to which the other end of the spring is secured, and means for regulating the tension of the said spring.

5. In a sash-balance, a sash carrying a shaft, one end of which bears a gear-wheel and the other end a yielding support, and a torsional spring mounted on the said support and having one end secured to a normally-fixed portion of the balance and the other end to a movable portion of the balance, in combination with a rack plate located on the window-frame and with which the said gear-wheel meshes.

6. In a sash-balance, a shaft and a rack and gear for operating the same, in combination with a torsional spring having one of its ends secured to a normally-fixed surface and its other end to a movable portion of the said balance, and a spring-tube with which the said spring contacts.

7. In a sash-balance, a shaft and a rack and gear for operating the same, in combination with a torsional spring having one of its ends secured to a normally-fixed surface and its other end to a movable portion of the said balance, and a scroll-spring tube with which the said spring contacts.

8. In a sash-balance, a sash carrying a spring-actuated gear-wheel, in combination with a pawl adapted automatically to be thrown into engagement with the said wheel to lock the sash in its lowered position.

9. In a sash-balance, a sash carrying a spring-actuated gear-wheel and a lever pivoted above the wheel, in combination with a pawl designed to engage the said wheel, and a flexible connection uniting the lever and the pawl, whereby the latter may be moved into or out of engagement with the gear-wheel by the movement of the lever.

10. In a sash-balance, a sash carrying a spring-actuated gear-wheel, a lever pivoted above the wheel and carrying a knob, a pawl designed to engage the said wheel, and a flexible connection uniting the pawl and lever, in combination with a pin carried by the window-frame with which the said knob contacts when the window is closed, whereby the pawl is thrown into engagement with the gear-wheel to lock the sash in its lowered position.

11. In a sash-balance, a sash carrying a spring-actuated gear-wheel and a lever pivoted above the wheel, in combination with a weighted pawl designed automatically to engage the said wheel, a flexible connection uniting the lever and the pawl, and a spring bearing against the lever to keep the pawl out of engagement with the gear-wheel.

12. In a sash-balance, a boxing, two gear-connected shafts journaled therein, a spring carried by each of the shafts and exerting pressure in opposite directions, and a gear-wheel carried by one of the shafts, in combination with a rack-plate adapted to be engaged by the gear-wheel.

13. In a sash-balance, a boxing, two miter-gear-connected shafts journaled therein, a torsional spring carried by each of the shafts and exerting pressure in opposite directions, means for regulating the tension of the springs, and a gear-wheel carried by one of the shafts, in combination with a rack-plate adapted to be engaged by the gear-wheel.

In testimony whereof I affix my signature in presence of two witnesses.

SAMUEL N. GOLDY.

Witnesses:

JAS. C. Q. WADSWORTH,

GEO. T. KNOX.