May 23, 1933. A. LARSON 1,910,112

WINDOW SASH BALANCE

Filed Aug. 12, 1931

Fig. 1

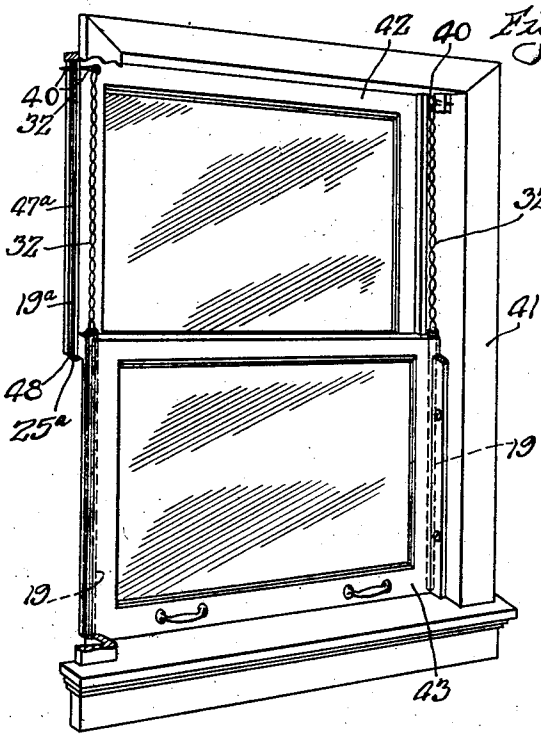


Fig. 2

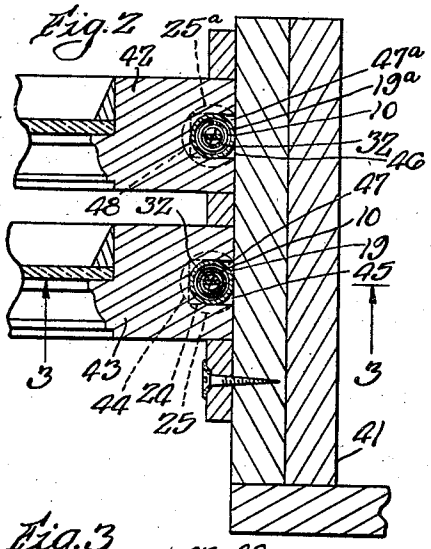


Fig. 3

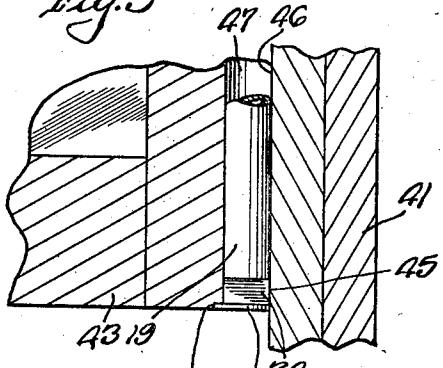


Fig. 4

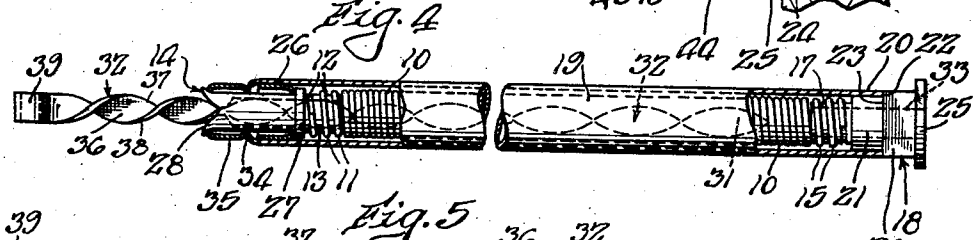


Fig. 5

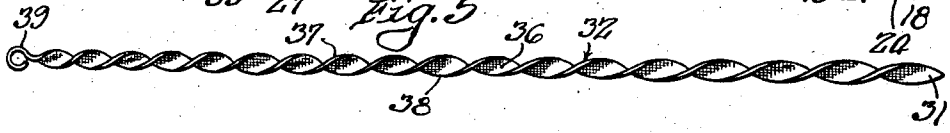


Fig. 6

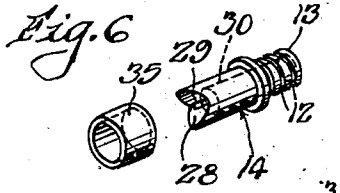
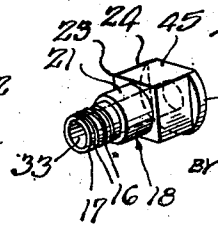


Fig. 7



Algot Larson INVENTOR:

BY Victor J. Evans & Co.

HIS ATTORNEYS.

Patented May 23, 1933

1,910,112

UNITED STATES PATENT OFFICE

ALGOT LARSON, OF ELMHURST, ILLINOIS, ASSIGNOR TO UNIQUE BALANCE CO., OF CHICAGO, ILLINOIS, A CORPORATION OF ILLINOIS

WINDOW SASH BALANCE

Application filed August 12, 1931. Serial No. 556,651.

This invention relates to certain novel improvements in window sash balances, and has for its principal object the provision of an improved construction of this character which will be highly efficient in use and economical in manufacture.

This invention is a continuation in part of my co-pending U. S. application, Ser. No. 460,493, filed June 11, 1930, and allowed September 28, 1931.

It is an object of this invention to provide an improved window sash balance which may be readily installed on any window construction without the use of boxes or housings now commonly employed with sash cords and weights.

Another object of the invention resides in providing a tube or casing for the spring element of the invention and which will protect the spring element and prevent distortion thereof during use.

A further object of the invention resides in providing means by which the spiral element of the invention may be telescoped within the spring element and both be thus enclosed by the tube for convenience in transportation.

An additional object of the invention consists in the novel construction of the tube and of the means employed for securing one end of the tube to the sash.

Another object of the invention resides in providing a sash balance that may be installed on both upper and lower sashes in the same, and in a simple, manner.

A further object resides in providing novel means by which to fix one end of the spring to the tube while allowing the other end of the spring to be free to rotate about the spiral.

Other objects will appear hereinafter.

The invention consists in the novel combination and arrangement of parts to be hereinafter described and claimed.

The invention will be best understood by reference to the accompanying drawing showing the preferred form of construction, and in which:

Fig. 1 is a perspective view of a window sash and frame showing part of the frame torn away and my invention in installed position;

Fig. 2 is a horizontal sectional view taken through Fig. 1;

Fig. 3 is a sectional view on line 3—3 in Fig. 2;

Fig. 4 is a view, partly in section and partly in plan, of the parts of the invention assembled in the tube;

Fig. 5 is an elevational view of the spiral element of the invention; and

Figs. 6 and 7 are perspective views of parts of the invention.

Referring to the drawing, wherein a preferred and practical embodiment of the invention is illustrated, 10 indicates a coil spring, one end of which has convolutions 11 that are wound about and secured in annular grooves 12 of the stem 13 of a member 14, while the other end of the spring 10 has convolutions 15 that are disposed in annular grooves 16 of the stem 17 of a member 18, the spring 10 and stem portions 13 and 17 being disposed within a cylindrical tube or casing 19.

When the stem 17 of member 18 is arranged within the tube 19 a portion 20 of the tube 19 has frictionally fitted therein portion 21 of the member 18 and the end 22 of the tube abuts the shoulder 23 provided on a squared head 24 of member 18, this head 24 being then located outside the tube 19 and having a projection or flange 25 at one end, for reasons to be explained hereinafter. One end of the spring is thus secured to the tube.

Secured to the inner surface of the tube 13, in any suitable manner, or formed as an integral part thereof if desired, is a bearing 26 which abuts a shoulder 27 on the member 13 and prevents the spring 10 and member 13 from being slid past the bearing 26 when the spring is inserted into the tube through the end 22 thereof.

One end of the member 14 is splayed, as at 28, and between the splayed parts 28 a slotted mouth 29 opens into the bore 30 which extends through the member 14. It will now be evident that the flat pointed end 31 of the spiral member 32 may be inserted,

through the mouth 29, passed through the bore 30 and spring 10 and then through the bore 33 in the member 18, thus, in effect, telescoping the spiral member 32 into the spring and tube.

To assemble the parts the member 14 may be inserted, with the spring 10, through the end 22 of the tube until the splayed end 28 of the member 14 projects out of the end 34 of the tube, this action tensioning the spring 10 to a certain extent, axially, and a female member 35 may then be frictionally fitted over the splayed end of the member 14 to secure the spring in the tube. At this time the end 22 of the tube will abut the shoulder 23. The end 31 of the spiral member may then be advanced successively through the mouth 29, bore 30, spring 10, and bore 33.

The convoluted groove 36 of the spiral member 32 provides ridges 37 and 38 which define the pitch of the spiral.

In use, I attach the looped end 39 of the spiral to a screw or the like 40 that is fastened at the upper end of the window frame 41, in the case of the lower sash, and I am then enabled to use the groove 47, customarily provided in window sashes such as the upper sash 42 and lower sash 43, for the reception of the tube 19. The flange or heel 25 is then snubbed into a recess 44 in the lower end of the sash, this heel or flange 25 extending around three of the four sides of squared portion 24 so that the fourth side 45 thereof may fit against the inner side 46 of the frame 41. Since the manner of attaching the balance to the upper and lower sashes is the same, and also the operation of the balance, the operation of the balance as applied to a lower sash 43 will now be described, it being understood that the tube 19*a* of the balance on the upper sash is disposed in the groove 47*a* in the upper sash and that the heel 25*a* thereof may be arranged in a recess such as 44 in the bottom edge 48 of the upper sash while the looped end of the spiral of the upper sash balance is attached to an element such as 40 on the frame 41 near the top of the latter.

In attaching the device for use on the lower sash 43, for example, the heel 25 is placed in a recess 44 in the sash or may be projected under the edge of the same, and the tube 19 is placed in the sash groove 47, with the spiral in the spring. The sash 43 is then raised into opened position and the looped end 39 of the spiral is attached to the element 40 on the window frame, while the spiral is still disposed in the spring. Therefore, as the sash 43 is lowered into closed position the spiral is retracted out of the spring and the free end of the spring together with member 14 revolves around the spiral, which places the spring under tension, so that when the sash 43 is brought down into, and allowed to remain in, closed position the spring remains under tension. When, therefore, the sash 43 is raised the free end of the spring will revolve around the spiral in the opposite direction and unwind or relieve itself of tension, and at the same time quickening the movement of the free end of the spring around the spiral, and in this manner facilitating the upward or opening movement of the sash. The tension exerted by the spring, however, may be adapted to the various sizes and weights of sashes and is not sufficient, in any case, of itself, to raise the sash when closed, nor to close the same when open.

As shown in Fig. 5, the pitch of the spiral increases gradually from the looped end 39 to the end 31. It will be seen therefore, that since when the sash is in closed position the spiral is retracted out of the spring and the spring is under tension, the free end of the spring will revolve relatively slow, at first, as the sash is opened, and the speed with which the free end of the spring revolves around the spiral will gradually increase as the sash reaches fully opened position. The increased or greater pitch provided in the spiral toward the end 31 prevents the tension of the spring from withdrawing the sash into open position when the spiral is in extended position out of the spring, the increased pitch making it more difficult for the free end of the spring together with member 14 to revolve around the spiral. The gradually decreasing pitch provided in the spiral toward the looped end 39 facilitates the rotative movement of the free end of the spring as the sash is moved into open position and the tension on the spring accordingly decreased due to the movement of the spiral into the spring and the consequent unwinding of the spring. Conversely, the rotative movement of the free end of the spring about the spiral is relatively fast at first as the sash is moved from open to closed position, and the movement of the free end of the spring is relatively slow as the spiral reaches extended position. It is apparent therefore that this arrangement of the graduated pitch in the spiral prevents the spring from pulling the lower sash into opened position when closed and likewise prevents the lower sash from falling into closed position when open, the converse being the case with the upper sash, since in the latter case the gradual pitch of the spiral prevents the upper sash from falling when closed and facilitates closing of the upper sash when open. Likewise, the gradual pitch of the spiral prevents slamming of the lower sash when the latter is open since the increased pitch toward the end 31 slows up the motion of the sash as the same is being moved into closed position.

In case the spring loses some of its tension

due to standing under tension, the looped end of the spiral may be detached and the spring given a few turns by hand to secure the desired tension therein, after which the looped end may be reattached.

It will be noted that since the spring is always housed within the tube when in use the spring is prevented from becoming distorted or twisted laterally with respect to its long axis which prolongs the period of usefulness of the spring. The tube also provides a protective housing for the spring to prevent rusting thereof, while when the parts are assembled, as in Fig. 4, they present a neat, compact, package that is readily and conveniently transportable. The use of the heel 25 to secure the tube, and the fixed end of the spring, to the sash eliminates the use of a screw, nail or other object in the sash itself for securing the fixed or non-rotative end of the spring thereto, it being apparent that the heel 25 may be disposed under the bottom edge of the lower or upper sash, if desired, and the sash recess 44 eliminated.

While I have illustrated and described the preferred form of construction for carrying my invention into effect, this is capable of variation and modification without departing from the spirit of the invention. I, therefore, do not wish to be limited to the precise details of construction set forth, but desire to avail myself of such variations and modifications as come within the scope of the appended claims.

Having thus described my invention, what I claim as new and desire to protect by Letters Patent is:

1. In combination with a window frame and a sash movable therein, a spiral member adapted to have one end attached to the frame and the other end relatively free, a coil spring into which the spiral member is adapted to penetrate, a tubular casing for the spring, and to one end of which one end of the spring is attached, an element projecting from the said end of the casing and adapted to engage the sash so as to be movable therewith, the other end of the spring being free to revolve about the spiral member within the casing as the sash and said tubular casing are moved together.

2. In combination with a window frame and a sash movable therein provided with a groove in the side thereof, a spiral member adapted to have one end attached to the frame and the other end relatively free, a coil spring into which the spiral member is adapted to penetrate, a tubular casing for the spring receivable in the groove, and to one end of which one end of the spring is attached, an element projecting from the said end of the casing and adapted to engage the sash so as to be movable therewith, the other end of the spring being free to revolve about the spiral member within the casing as the sash and said tubular casing are moved together.

3. In combination with a window frame and a sash movable therein provided with a groove in the side thereof, a spiral member adapted to have one end attached to the frame and the other end relatively free, a coil spring into which the spiral member is adapted to penetrate, a tubular casing for the spring receivable in the groove, and to one end of which one end of the spring is attached, an element projecting from the said end of the casing and adapted to engage the sash so as to be movable therewith, the other end of the spring being free to revolve about the spiral member within the casing as the sash and casing are moved together, the pitch of said spiral member being graduated from a minimum at the attached end thereof to a maximum at its free end so that the free end of the spring will revolve around the spiral with increasing speed as the attached end of the spring approaches said spiral member and conversely thereof, and means attached to the free end of the spring for guiding the spiral member into and out of the spring.

4. In combination with a window frame, a sash movable in the frame having a recess formed therein, a spiral member adapted to have one end attached to the frame and having its other end relatively free, a coil spring into which the spiral member is adapted to penetrate, a tubular casing for said spring, and an element including a portion fitted into one end of the casing and fast thereto, said portion having one end of the spring attached thereto, said element including a portion disposed externally of the casing having a flange projecting therefrom beyond the periphery of the casing for insertion into said sash recess, the other end of the spring being free to revolve about the spiral member within said tubular casing as the sash and said tubular casing are moved together.

In testimony whereof I affix my signature.

ALGOT LARSON.