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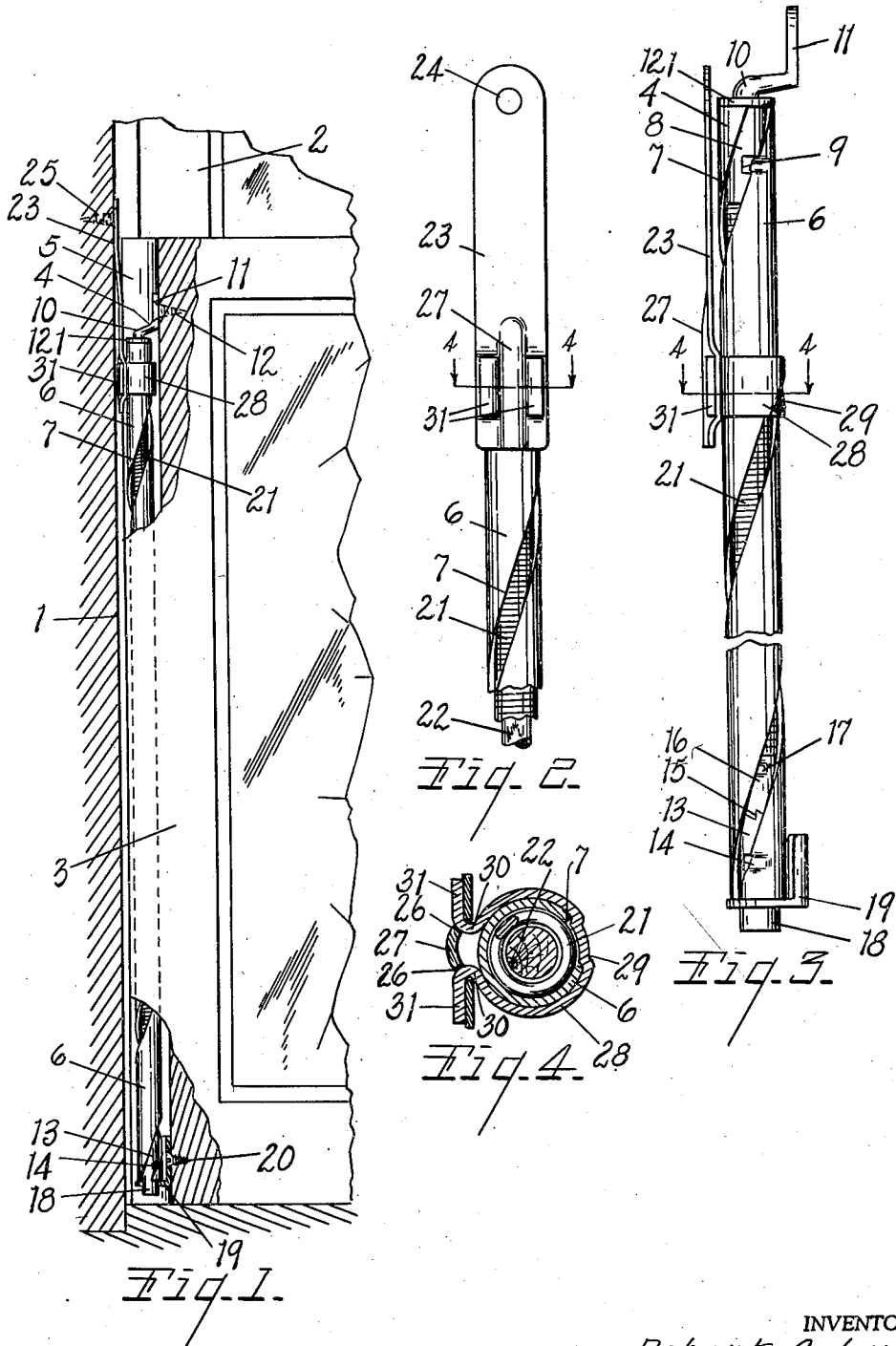
R. C. LUCE

2,370,867

SASH BALANCE

Filed May 7, 1942

2 Sheets-Sheet 1



INVENTOR.
Robert C. Luce
BY *Carl F. Chappell*
ATTORNEYS.

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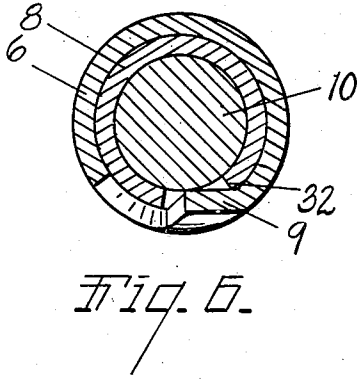
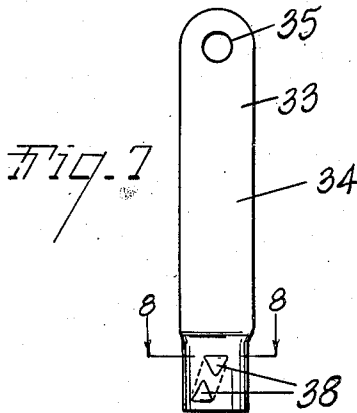
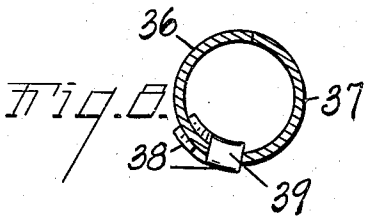
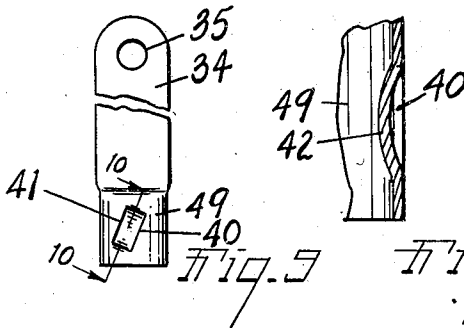
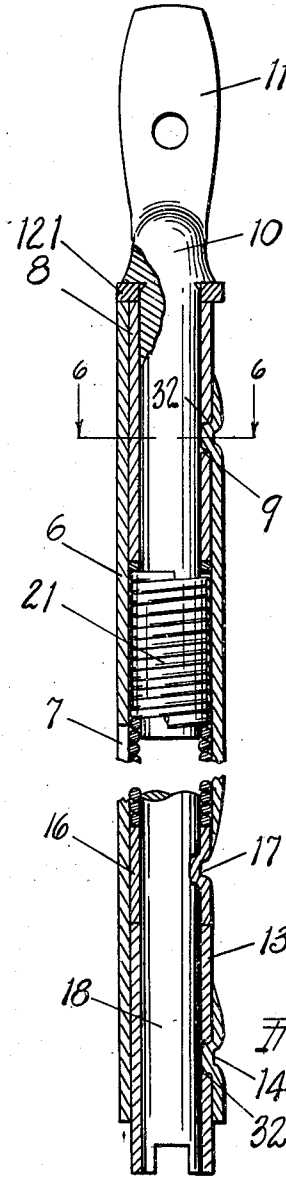
R. C. LUCE

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SASH BALANCE

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2 Sheets-Sheet 2



INVENTOR.

Robert C. Luce

BY

Earl Chappell

ATTORNEYS.

UNITED STATES PATENT OFFICE

2,370,867

SASH BALANCE

Robert C. Luce, Grand Rapids, Mich.

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13 Claims. (Cl. 16—197)

This invention relates to improvements in sash balances.

The main objects of this invention are:

First, to provide an improved sash balance including a rotatable element having a spiral track and a torsion member of improved simplified construction slidably engageable in said track, the said member having improved means for connecting the same to a window frame.

Second, to provide an improved sash balance construction including a rotating tubular member having a spiral track, and a relatively fixed element coacting therewith, and means for operatively associating said element with a window sash and frame.

Third, to provide an improved sash balance of simplified, compact and inexpensive structure.

Objects relating to details and economies of the invention will appear from the description to follow. The invention is defined in the claims.

A preferred embodiment of the invention is illustrated in the accompanying drawings, in which:

Fig. 1 is a fragmentary view partially broken away and in vertical section illustrating the balance of the invention operatively associated with a window sash and its frame.

Fig. 2 is a fragmentary view in rear elevation, particularly illustrating the torsion member and the securing or mounting means included in the invention.

Fig. 3 is a view in side elevation of the sash balance per se, and

Fig. 4 is an enlarged view in section on a line corresponding to line 4—4 of Figs. 2 and 3, further illustrating details of the balance structure, particularly the torsion member mounting.

Fig. 5 is an enlarged view in vertical section illustrating in greater detail certain structural features characterizing the balance shown in Figs. 1—4.

Fig. 6 is a view in section on a line corresponding to line 6—6 of Fig. 5.

Fig. 7 is a rear view of a modified form of torsion member contemplated by my invention.

Fig. 8 is an enlarged view in section on lines 8—8 of Fig. 7 further illustrating details of the torsion member of that figure.

Fig. 9 is a rear view illustrating a still further modified form of torsion member, and

Fig. 10 is an enlarged fragmentary view in section on a line corresponding to line 10—10 of Fig. 9.

Referring to the drawings, the reference numeral 1 designates a window frame in which up-

per and lower sashes 2, 3 are slidably mounted. I have illustrated the lower sash only as equipped with a balance embodying the invention generally designated 4. However, it is to be understood that if desired both sashes may be correspondingly equipped, at either one or both sides thereof.

As illustrated in Fig. 1, the sash 3 is provided with a vertical groove 5 intermediate its front and rear sides extending the length of the sash and receiving the balance 4. This balance consists of an elongated sheet or strip of relatively rigid metal spirally twisted to provide an elongated tube 6, with the edges of the strip spaced substantially from one another to provide a spiral slot-like track 7. At its upper end the tube is provided with an internal sleeve 8 to which the tube is secured by indenting the same at 9. The sleeve 8 serves as a journal for rotatably mounting the tube on a downturned trunnion pin 10, this pin having a lateral ear 11 adapted to receive a securing screw 12. A thrust washer or collar 121 is positioned at the upper end of sleeve 8.

At its lower end, tube 6 is affixed to a further sleeve member 13 by indentation 14. This sleeve 13 has ratchet teeth 15 on its upper edge which coact with similar teeth on a tension adjusting ratchet 16 secured by indentation 17 to a vertical adjusting pin 18. This pin is journaled in a bracket 19 adapted to be secured by screw 20 to the adjacent lower end of the sash. The pins 10, 18 extend substantially inwardly of the tubes 6 beyond the sleeves 8, 16, respectively, and at their inner extremity have frictionally engaged therewith an elongated coil torsion spring 21. A non-metallic silencing rod 22 is disposed internally of spring 21 between the extremities of pins 10, 18 to prevent lateral instability of the spring and to silence the operation of the latter.

I provide a torsion member of improved and simplified structure to coact with the tube 6. This torsion member consists of a resilient, downwardly extending spring attaching arm 23 apertured at 24 adjacent its upper end for the reception of a screw 25 which secures the same to the window frame 1 adjacent the top of sash 3. Adjacent its lower end the spring attaching arm 23 is provided with two laterally-spaced vertically-extending slots 26 and is offset rearwardly at 27 between these slots, thereby resulting in provision of openings which communicate rearwardly and laterally with the rear or outer side of the attaching arm.

The reference numeral 28 indicates an annu-

lar, torsion member formed of a relatively rigid strip of metal which is conformed medially of the bight thereof to provide an inclined, inwardly offset follower portion 29 slidably engageable in the spiral groove 7 in tube 6, whereby vertical movement of the tube relative to the torsion member 28 results in rotation of the tube and torsioning of spring 21. The torsion member 28 has terminal legs 30 offset radially therefrom for insertion through the slots or passages 26, 26, and following insertion in this manner the legs 30 are crimped or bent away from one another at 31 into clamping engagement with the rear of the attaching spring arm 23, thereby securely connecting torsion member 28 to the latter and constituting the members 23 and 28 in effect an integral, highly simplified and compact torsion structure.

In operation, with the parts installed as illustrated in Fig. 1, vertical shifting of the sash results in tensioning of the torsion spring 21. In installing the balance, with the attaching ear 11 of pin 10 and bracket 19 secured to the sash and the attaching arm 23 for the fixed torsion member 28 secured to the frame by screw 25 at a point immediately above the sash, the opposite spring anchoring pin 18 of the balance is rotated by means of a suitable tool applied to the lower end of the tool to regulate the initial torsion of spring 21. Tube 6 is restrained from rotation by torsion member 28 and the coacting ratchet teeth of lowermost sleeves 13, 15 enable rotation of pin 18 for this purpose. When the torsion is properly adjusted the balance is ready for operation.

The foregoing balance is characterized primarily by its simplicity and economy of production. The method of fabricating the torsion member and attaching spring arm 23 therefor I regard as entirely novel with me. This provides a spiral groove follower 29 which has a substantial positive engagement in track 7 and is very effective for its purpose, notwithstanding its inexpensiveness. The method of clampingly securing the torsion member 28 to the spring arm 23 supporting the same is exceedingly simple and very effective in its function of connecting these members together in a substantially integral manner. Resilient arm 23 is readily yieldable laterally toward or from the sash in order to enable proper engagement of the torsion member 28 with the tube, hence no special care need be taken in properly aligning these parts. As stated above, the present construction dispenses with the need for a pivoted tube journaling pin at the upper end of the tube, and in this respect, the construction is further simplified and reduced in cost. It may be readily and quickly installed by comparatively inexperienced persons.

In Figs. 5 and 6 details of the tubular structure including the spirally twisted tube 6, the journal sleeves 8, 13, and the torsion spring 21 are shown in greater detail, as well as the indented engagement of the tube 6 with the sleeves 8, 13 at 9, 14, respectively, it being noted that said sleeves are provided with openings 32 for the reception of the indentations. This constitutes a very simple, quick, inexpensive, yet highly effective means for effecting said connection.

In Figs. 7 and 8 I illustrate an alternative form of torsion member, designated 33, which may be substituted for the composite torsion member 23, 28 of Figs. 1-4 if desired. Member 33 has the advantage that it provides a separate track follower element engageable in the

spiral groove or track of the tube 6, which follower element may be fabricated of brass for its desirable wearing quality, without entailing the use of an excessive amount of this metal. As illustrated, the member 33 comprises a sheet metal stamping, for example, of steel, formed to provide an elongated flexible arm 34 having an aperture 35 for the reception of a securing screw by which it is attached to the window frame, and at its opposite end provided with lateral arms 36, 37 which are bent to annular form with the ends of said arms in meeting relation. They may be secured to one another in this relation by a dovetail joint. The so conformed arms 36, 37 embrace the tube 6 and, to furnish a track engaging element engageable in spiral groove 7, are provided with axially spaced, laterally offset, horizontal slots into which the ends 38 of the strip-like brass bearing insert or track follower 39 are inserted. This element is disposed interiorly of the annular portion of the torsion member and the ends 38 thereof are clamped over on the exterior of said member into rigid securing relation thereto. The brass follower disposed interiorly of the torsion member is inclined relative to the axis of the torsion member, as clearly illustrated in Fig. 7, so as to slide in the spiral track 7 with a minimum of friction. This structure provides a torsion member having the desired bearing and wearing qualities of brass while utilizing a minimum amount of that metal.

In Figs. 9 and 10 I illustrate a further modified form of torsion member, generally similar to that of Figs. 7 and 8, save for the fact that the track follower is integral with the remainder of the torsion member, being provided by slitting the annular portion 43 at the inclined horizontal spaced slits 40, 41 and inwardly offsetting the metal between these slits to constitute a sufficiently large, inwardly concaved track engaging element 42 as illustrated in Fig. 10. Other parts of the torsion member bear the same designating numerals as in Figs. 7 and 8.

Embodiments of the invention which incorporate the principles of the invention in a highly desirable manner have been illustrated and described, though I am aware that other embodiments within the intent of the invention will suggest themselves to those skilled in the art. It should be understood that the foregoing terminology is used only descriptively rather than in a limiting sense, and with full intention to include equivalents of the features shown and described, within the scope of the following claims.

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

1. In a sash balance, the combination of a rotatable tubular member having a spiral groove, a journal member projecting into said tube and having an integral laterally offset attaching ear, a journal member for the lower end of said tube rotatable therewith, a torsion spring disposed within said tube and secured at its ends to said journal members, an annular torsion member embracing and slidably receiving said tube and having an integral offset portion engaging said groove, and a spring attaching arm for said torsion member, said attaching arm being provided with laterally spaced slots adjacent the free end thereof, said torsion member having the ends thereof disposed through said slots and folded upon the rear side of said attaching arm, said arm being disposed to flex laterally to and from said tubular member to permit of a yielding resili-

ient connection between the tubular member and a window frame.

2. In a sash balance, the combination of a rotatable tubular member having a spiral track, a journal member projecting into one end of said tubular member and provided with a laterally offset attaching ear rigid with said journal member, a journal member for the other end of said tubular member rotatable therewith, a torsion spring disposed within said tubular member and secured at its ends to said journal members, an annular torsion member embracing and slidably receiving said tubular member and having an integral portion engaging said track, and a resilient attaching arm for said torsion member, said arm being disposed to flex laterally to and from said tubular member to permit of a yielding resilient connection between the tubular member and a window frame.

3. In a sash balance, the combination of a rotatable tubular member having a spiral track, a journal member projecting into one end of said tubular member and provided with an integral laterally offset attaching ear, a journal member for the other end of said tubular member rotatable therewith, a torsion spring disposed within said tubular member and secured at its ends to said journal members, a torsion member coaxing with said track and slidably receiving said tubular member, and a resilient attaching arm for said torsion member, said arm being substantially parallel to said tubular member and disposed to flex laterally to and from said tubular member to permit of a yielding resilient connection between the tubular member and a window frame.

4. In combination with a window sash slidable relative to a window frame, of a tube having a spiral track, means for rotatably journaling the tube on said sash, spring means connected to the tube to resiliently bias the same rotatively, a torsion member of an integral piece of sheet metal in surrounding sliding relation to said tube and engaging said track, said torsion member having radially extending free ends, and a vertically elongated spring attaching strip secured at one end to said window frame and provided at the other end with spaced slots extending lengthwise of said spring strip and in which the radially extending free ends of said torsion member are receivable to bindingly engage the said torsion member to the strip, said spring attaching strip being disposed to flex laterally to and from said tube to permit of a yielding resilient connection between said tube and said window frame.

5. In combination with a rotatable tubular balance member adapted to be rotatably mounted on a window sash at its ends and provided with a spiral track, a relatively fixed torsion member comprising a bight-like strip of sheet metal having an integral element bendably offset therefrom for sliding engagement with said track, and an elongated resilient attaching arm adapted to be secured at one end to a window frame and adjacent the other end provided with spaced slots lockingly receiving the ends of said bight-like strip to thereby secure the latter on the attaching arm, said attaching arm flexing as desired for proper alignment of the torsion member thereon with said tubular balance member, said arm being disposed to flex laterally to and from said tubular balance member to permit of yielding resilient connection between said tubular balance member and a window frame.

6. In combination with a rotatable tubular balance member adapted to be rotatably mounted on

a window sash at its ends and provided with a spiral track, a relatively fixed torsion member comprising a bight-like strip of sheet metal having an integral element for sliding engagement with said track, and an elongated resilient attaching arm adapted to be secured at one end to a window frame and adjacent the other end provided with spaced slots lockingly receiving the ends of said bight-like strip to thereby secure the latter on the attaching arm, said attaching arm flexing as desired for proper alignment of the torsion member thereon with said tubular balance member, said arm being disposed to flex laterally to and from said tubular balance member to permit of yielding resilient connection between said tubular balance member and a window frame.

7. In a sash balance, in combination with a rotatable tube having a spiral groove, means for rotatably journaling said tube at its ends and for securing the same in rotatably mounted position on a window sash to extend longitudinally thereof, a torsion spring operatively connected with said tube to resiliently bias the same relatively, and means coaxing with the tube for torsioning said spring as the sash is moved vertically, comprising an elongated vertically extending spring arm of resilient material adapted to be secured at one end thereof to a window frame adjacent the same, said arm having laterally spaced perforations therein adjacent the other end thereof, and an annular bight-like torsion member surrounding said tube in vertically sliding relation thereto and provided with an integral inwardly offset follower element adjacent the tube engaging in the helical groove of the latter, said last named member having radially projecting arms extending through the perforations in said resilient member and offset oppositely into clamping engagement with the latter whereby said torsion means is resiliently mounted in alignment with the tube, said arm being disposed substantially parallel to said tube and disposed to flex laterally to and from said tube to permit of a resilient connection between said tube and a window frame.

8. In a sash balance, in combination with a rotatable tube having a spiral groove, means for rotatably journaling said tube at its ends and for securing the same in rotatably mounted position on a window sash to extend longitudinally thereof, said means including a journal member projecting longitudinally into one end of said tube and provided with an integral laterally offset attaching ear, a torsion spring operatively connected with said tube to resiliently bias the same relatively, and means coaxing with the tube for torsioning said spring as the sash is moved vertically, comprising an elongated vertically extending spring arm disposed lengthwise of said tube and of resilient material adapted to be secured at one end thereof to a window frame adjacent the sash, and a groove-engaging torsion member embracing said tube and secured to the other end of said arm, said arm being disposed substantially parallel to said tube and disposed to flex laterally to and from said tube to permit of a resilient connection between said tube and a window frame.

9. In combination with a rotatable tubular sash balance member having means for mounting the same for rotative movement and provided with a spiral track extending longitudinally thereof, a torsion member relative to which said balance member moves axially, comprising an elongated flexible attaching arm adapted to be

fixedly secured to a support and a track follower member separate from and attached to said arm in spaced relation to its point of securement to said support, said arm being provided with openings receiving said track follower member, the latter being disposed through said openings in rigid clamping relation to the arm and being slidably engageable with said track to effect rotation of said balance member upon axial movement of the same relative to the torsion member.

10. In combination with a rotatable tubular sash balance member having means for mounting the same for rotative movement and provided with a spiral track extending longitudinally thereof, a torsion member relative to which said balance member moves axially, comprising an elongated flexible attaching arm adapted to be fixedly secured to a support and a track follower member separate from and attached to said arm in spaced relation to its point of securement to said support, said track follower member being secured in rigid clamping relation to the arm and being slidably engageable with said track to effect rotation of said balance member upon axial movement of the same relative to the torsion member.

11. In combination with a rotatable tubular sash balance member having means for mounting the same for rotative movement and provided with a spiral track extending longitudinally thereof, a torsion member relative to which said balance member moves axially, comprising an attaching member adapted to be fixedly secured to a support and a track follower member separate from and attached to said attaching member, said member being provided with openings receiving said track follower member, the latter being disposed through said openings in rigid

clamping relation to the member and being slidably engageable with said track to effect rotation of said balance member upon axial movement of the same relative to the torsion member.

12. A torsion member for an elongated tubular sash balance member slidable relative to said torsion member and provided with a spiral groove-like track for sliding engagement by said torsion member, the latter comprising an elongated flexible attaching arm adapted to be secured at one end to a support and at the other end being provided with an annular sleeve-like element embracing said tubular member, said last named element being provided with spaced inclined slits and being inwardly offset between said slits to define an axially elongated, inclined track follower extending inwardly of said tubular element and engageable in said track to effect rotation of the tubular member upon axial movement of the same relative to the torsion member.

13. In combination with an elongated tubular sash balance member provided with a spiral groove-like track, a torsion member having an annular portion surrounding said tubular element and an elongated resilient attaching arm extending therefrom axially relative to said tubular member and attachable at a point remote from said element to a support, said annular portion being provided with spaced slots and having a separate track engaging member inserted through said slots and disposed on the inner surface of said element for sliding engagement in the track of said tubular member, whereby relative axial movement of said tubular and torsion member is accomplished by rotation of the tubular member.

ROBERT C. LUCE.