

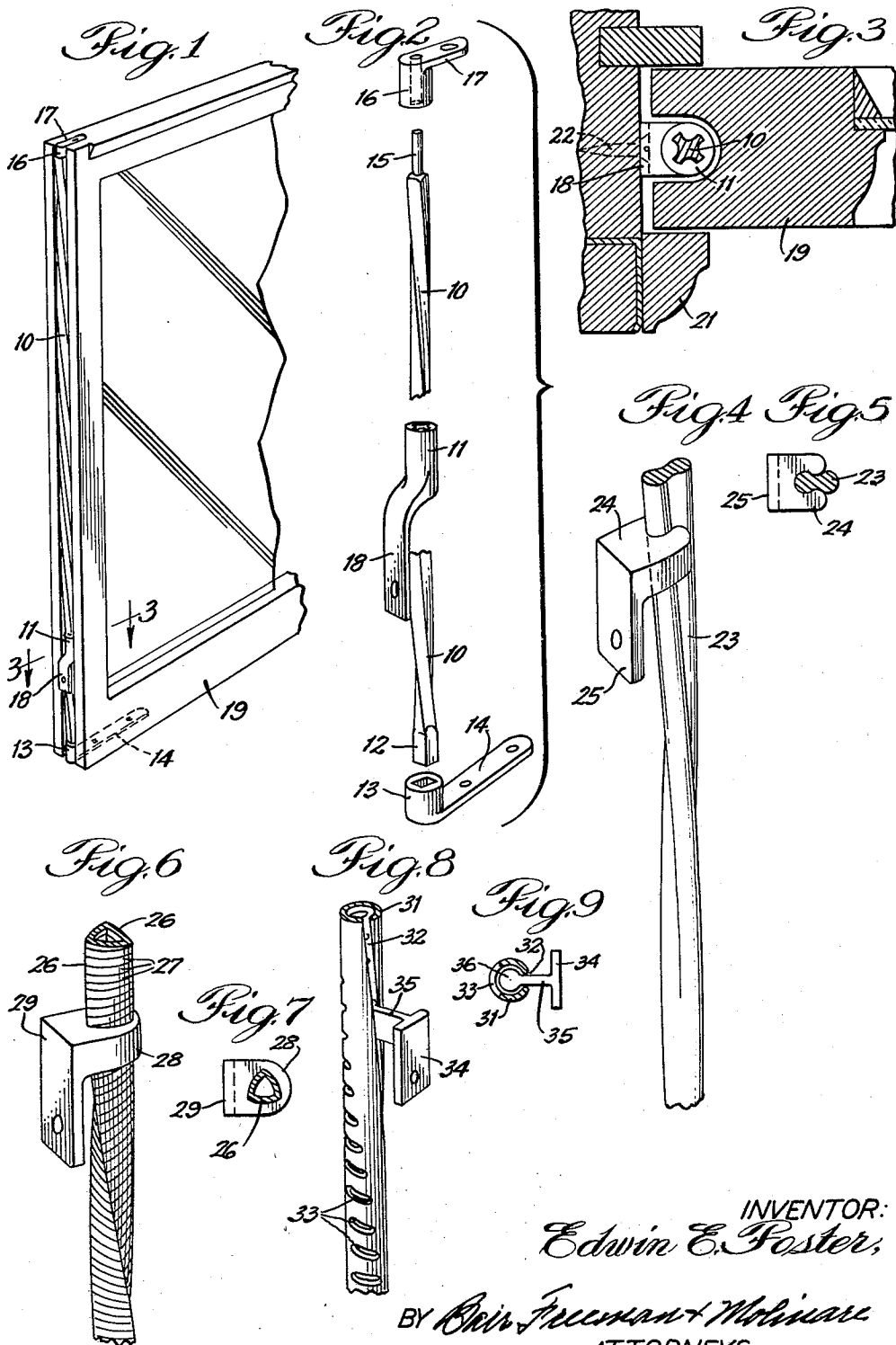
April 9, 1963

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3,084,377

SASH BALANCE

Filed Oct. 26, 1959



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3,084,377

SASH BALANCE

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Filed Oct. 26, 1959, Ser. No. 848,581

3 Claims. (Cl. 16—197)

This invention relates to a sash balance for use in combination with a window sash which is slidable in a frame.

Many different types of sash balance springs have been used but have generally been subject to the objection that they are difficult to mount in a window structure and are space consuming, or are complicated and expensive to construct, or fail to provide proper spring characteristics for balancing the sash.

It is one of the objects of the present invention to provide a sash balance particularly for a window which is extremely simple and inexpensive to construct, which is compact and easily mounted in a conventional window construction, and which provides desirable spring characteristics.

According to a feature of the invention, the sash balance is formed by an elongated helically twisted resilient strip and a follower engageable with the strip to twist it upon relative movement therebetween. For use as a sash balance the strip may conveniently be mounted along the edge of the window sash with one end thereof secured to the window sash while the remainder of the strip is free to rotate and with the follower secured to the frame. The strip may take any one of several different forms.

The above and other objects and features of the invention will be more readily apparent from the following description when read in connection with the accompanying drawing, in which:

FIGURE 1 is a partial perspective view of a window sash equipped with a sash balance embodying the invention;

FIGURE 2 is a perspective view of the sash balance itself with parts broken away;

FIGURE 3 is an enlarged partial section substantially on the line 3—3 of FIGURE 1 showing the sash mounted in a frame;

FIGURE 4 is a partial perspective view of an alternative form of sash balance;

FIGURE 5 is a section of FIGURE 4;

FIGURE 6 is a partial perspective view of still another form of sash balance;

FIGURE 7 is a section of the balance of FIGURE 6;

FIGURE 8 is a partial perspective view of still another form of sash balance embodying the invention; and

FIGURE 9 is a section of FIGURE 8.

Referring first to FIGURE 2, the sash balance of the present invention comprises an elongated strip 10 of flexible material which is of noncircular section and which is helically twisted between its ends, and a follower 11 engageable with the strip and movable lengthwise thereof to twist the strip upon relative movement therebetween. In the form shown in FIGURE 2, the strip 10 is a solid piece of metal of cruciform section and the follower 11 consists of a sleeve or collar having an opening therethrough complementary in section to the strip 10. The strip 10 is secured against rotation at one end as by providing a rectangular portion 12 therein to fit into a rectangular socket 13 which is carried by an anchor bar 14 and is free to twist throughout the remainder of its length. Preferably the strip is supported against lateral movement by a cylindrical tip 15 at its opposite end fitting rotatably in to a cylindrically bored sleeve 16 carried by an anchor bar 17. The follower may be mounted by means of a mounting flange 18 thereon which may be fastened by

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screws or the like to a member relative to which the strip is movable.

An application of the sash balance as described above to a window installation is shown in FIGURES 1 and 3.

As illustrated the anchor bar 14 may be secured to one end of a window sash indicated generally at 19 with the strip 10 lying in a recess at the edge of the sash. The anchor bar 17 may be secured to the sash adjacent to the opposite end thereof to support the strip in the recess at the end of the sash without interfering with rotation thereof.

The follower 11 may be secured to a window frame partially indicated at 21 in FIGURE 3 by means of a screw 22 passing through the mounting flange 18 on the follower and screwed into the sash.

With the sash balance installed as shown and described, when the sash is in its normal position in the frame the follower 11 will lie closely adjacent to the socket 13 and the strip will be helically twisted above the follower as shown in the drawing. As illustrated in FIGURE 1 the sash 19 would be an upper sash which is closed in its upper position and which is moved down to open it. As the sash is moved down the follower will tend to straighten out the strip, that is, to twist it helically in a direction opposite to the helical twist in its sectional configuration. Torsional resistance to twisting in the strip itself will create a spring effect tending to pull the sash back up and to resist lowering thereof. By properly proportioning the spring relative to the weight of the sash, the sash may be accurately balanced so that it can be moved easily in either direction with a minimum of effort.

It will be noted that in this installation the spring comprises a relatively small diameter strip which can easily be housed in a groove or recess in the sash or in the frame if preferred and that the only other part comprises the follower which occupies a minimum of space and which can easily be secured to the sash. The arrangement is therefore an extremely compact one which can be installed in existing windows, either wood or metal, without requiring modification of the window structure. Furthermore, because the strip is relatively long and can be made quite flexible it can be produced to provide an extremely low spring rate approximating a constant rate. This characteristic is highly desirable for use in window sashes enabling the window to be moved with the same degree of effort in any position and to be retained in any position to which it is moved.

FIGURES 4 and 5 illustrate an alternative construction of the sash balance in which the spring motor comprises an elongated resilient metal strip 23 of generally hour-glass section and the follower is a generally U-shaped member 24 whose arms partially span the section of the strip. The follower may also carry a mounting plate 25 by which it may be secured to a window sash or frame. This construction functions in the same manner as that of FIGURES 1 to 3.

The sash balance shown in FIGURE 6 comprises an elongated strip 26 which is formed by a spring wire 27 wound into a tight helix of noncircular section. In the construction as illustrated the spring wire is itself rectangular in section so that when it is wound into a tight helix it will provide a smooth outer surface and the helix is generally triangular in section, although other noncircular shapes could be used. The follower comprises a plate 28 having an opening therein complementary to the cross-sectional shape of the helical strip and with a mounting flange 29 by which it may be mounted on a window structure or the like. This construction will provide an extremely low spring rate which may be very nearly constant throughout the full movement of the window but

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otherwise functions in the same manner as the sash balances of FIGURES 1 to 5.

FIGURES 8 and 9 show still another form of sash balance in which the resilient strip 31 is tubular in section with a helically extending groove 32 therein. Preferably the strip is slotted opposite to the helical groove as indicated at 33 to minimize lengthwise bending thereof as it is twisted. The follower comprises a mounting plate 34 from which a relatively thin web 35 extends through the slot 32 and carries a slightly enlarged head 36 within the tubular strip. With this construction the follower and strip can slide freely relative to each other and relative movement thereof due to the helical slot 32 will twist the strip in the same manner as in the preceding figures.

While several embodiments of the invention have been shown and described in detail, it will be understood that these are illustrative only and are not to be taken as a definition of the scope of the invention, reference being had for this purpose to the appended claims.

What is claimed is:

1. A sash balance comprising, in combination with a window having a frame and a sash slidable in the frame, an elongated torsionally resilient and helically twisted strip of noncircular cross section, a follower movable longitudinally of the strip and having parts complementary in

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shape to the strip to be nonrotatable but longitudinally slidable relative thereto, and means securing the follower and one end of the strip rigidly to the sash and frame respectively, the strip being free to turn through torsional twisting except adjacent to said one end so that the strip will be torsionally twisted as the sash is moved in the frame.

2. The construction of claim 1 in which the strip lies along one edge of the sash parallel to its direction of movement in the frame and the follower is secured to the frame.

3. The construction of claim 1 in which the strip is a solid metal piece.

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