

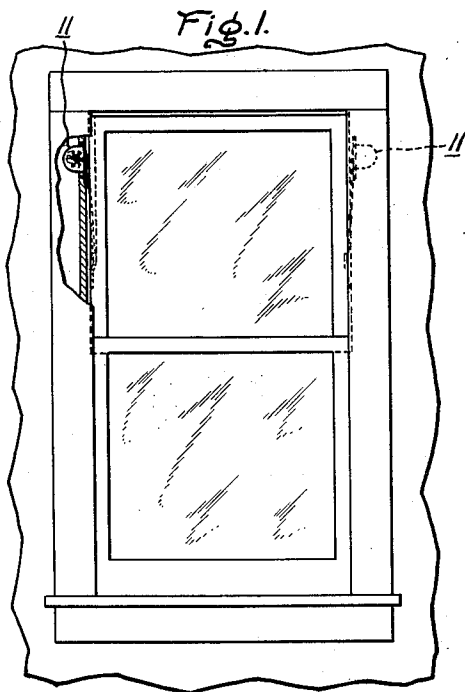
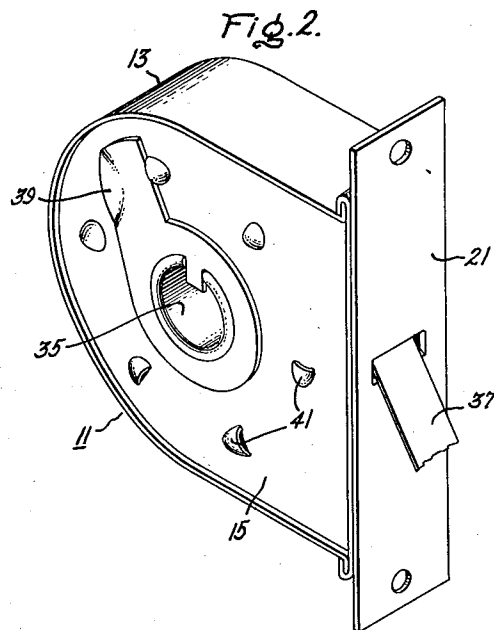
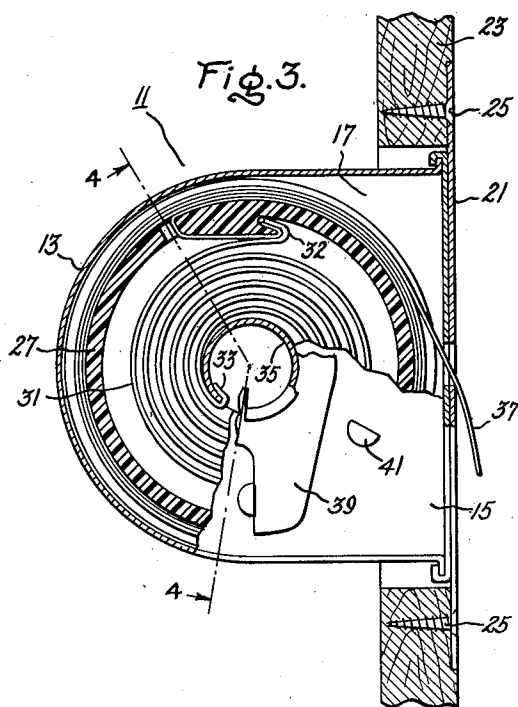
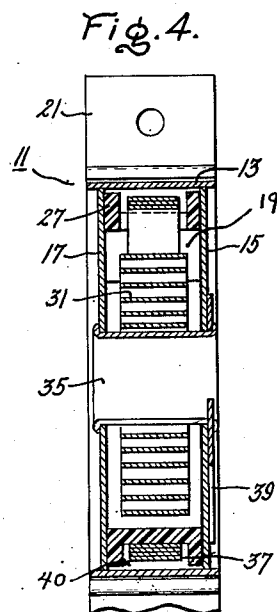
July 2, 1957

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2,797,435

WINDOW SASH BALANCE

Filed Jan. 18, 1954



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WINDOW SASH BALANCE

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Application January 18, 1954, Serial No. 404,575

3 Claims. (Cl. 16—198)

The present invention relates to counterbalancing devices, and more particularly, to such devices utilized in conjunction with window sashes.

In window-sash balances, it is desirable to counterbalance, as closely as possible, the weight of the window at all positions thereof. This is desirable in order that the same amount of force is required to move the window at the beginning of its travel as at the end of its travel. In most spring-operated sash balances, an equal counterbalancing effect is difficult to obtain because, as the spring is compressed, a greater force is exerted on the window. This occasions difficulty in the counterbalancing of a window, since, if the window is exactly counterbalanced at the beginning of its travel it is over-compensated at the end of its travel, and hence is difficult to move. While, if the window is counterbalanced for the end of its travel, it moves up too readily at the beginning of its travel and under some conditions, may not stay closed.

Accordingly, it is a principal object of the present invention to provide a window-sash balance wherein the counterbalancing effect is of approximately equal value at both the beginning and end of the window travel.

Another object of the present invention is to provide a spring-operated sash balance wherein the varying force exerted by the spring is counteracted by a variation of friction within the sash balance.

A further object of the present invention is to provide an improved window sash balance which is simplified, economical, and compact in construction.

The features of this invention which are believed to be novel are set forth with particularity in the appended claims. The invention itself, however, both as to its organization and method of operations, together with further objects and advantages thereof, may best be understood by reference to the following description when taken in connection with the accompanying drawings wherein:

Fig. 1 is a front view, partly cut away, of a device embodying the principles of the present invention when mounted for use;

Fig. 2 is a perspective view of a device embodying the principles of the present invention;

Fig. 3 is a cross-sectional view of the devices illustrated in Fig. 2, and

Fig. 4 is a view taken along line 4—4 of Fig. 3.

In the drawings, a sash balance embodying the principles of the present invention is therein designated by the general reference numeral 11. The sash balance 11 comprises a casing 13 made of any suitable material, such as metal. The casing 13 is generally cylindrical in shape and includes a back plate 15 and a removable front plate 17 (Fig. 4). The casing 13 together with the front plate 15 and the back plate 17 form an aperture 19. The casing 11 is fastened to a window frame 23 by any suitable means, here shown as base plate 21 mounted on the window frame 23 by screws 25.

A spool 27 is slidably positioned within the aperture 19, that is, the spool 27 floats in the aperture 19 and is

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not mounted on a fixed center of rotation such as a shaft or an axle. The spool 27 is preferably constructed of a material having a relatively high coefficient of friction, such as plastic or suitable types of glass.

5 A center post 35 is rotatably mounted on the back plate 15 and extends into the aperture 19. A coil spring 31 is positioned within the spool 27 and is concentric with the post 35. End 32 of the spring 31 is attached to the spool 27 and end 33 of the spring 31 is attached to the center post 35. The spring 31 urges the spool 27 in one direction, here shown as counterclockwise.

10 A flexible band 37 of suitable material, such as metal, is wound around a groove 40 (Fig. 4) in the outer edge of the spool 27. The band 37 is wound around the spool 27 in a direction so that the spool 27 is turned against the force of the spring 31 when band 37 is unrolled from the spool 27. As shown, the band 37 is wound to turn the spool 27 in a clockwise direction when unrolled therefrom because of the aforementioned normal counterclockwise urging of the spool 27 by the spring 31.

15 A tensioning arm 39 is attached to the center post 35 for adjusting the force exerted by the spring 35. As mentioned above, the post 35 is rotatably mounted on the plate 15. Therefore, when the arm 39 is rotated, the post 35 also rotates. For example, if it is desired to increase the force exerted by spring 31 the arm 39 moves counterclockwise, thus, tightening the spring 31. The arm 39 is held in place by stops 41.

20 In operation, the band 37 is attached to one side of a window sash and a similar band is attached to the other side of the sash, thereby to support the weight of the window between them. When the window is in a closed position, the band 37 is unwound from the spool 27 and the spring 31 is tightly coiled and a relatively large counterbalancing force is exerted by the spring 31. When the window is open, the spring 31 is loosely coiled and a smaller force is exerted thereby. However, as mentioned above, the spool 27 floats in the aperture 19. Therefore, when the window is down and the spring 31 is uncoiled, the rim of the spool 27 is forced into frictional engagement with the casing 13, thus making the rotation of the spool 27 more difficult and increasing the total counterbalancing force exerted on the window. When the window is raised and the spring 31 is coiled, the spool 27 is retracted by the coiling of the spring 31 and is not in frictional engagement with casing 13. Hence, there is no increase in the total counterbalancing force exerted on the window as there is when the window is closed. However, as mentioned above, when the spring 31 is tightly coiled, a greater counterbalancing force is exerted by the spring than when the spring 31 is loosely coiled. Therefore, because of the increased force when the window is lowered caused by the frictional engagement of the spool 27 with the casing 13, the total counterbalancing force exerted at the beginning of window travel is equal to the total counterbalancing force at the end of window travel. This equality of counterbalancing forces enables the window to be smoothly and easily raised and lowered.

25 While a specific embodiment of the present invention has been shown and described, it will of course be understood that various modifications may be devised by those skilled in the art which will embody the principles of the present invention and found within the true spirit and scope thereof.

30 What is claimed is:

1. A counterbalance for window sashes comprising a cylindrical casing having a back plate and a removable front plate, said plates and said casing forming a cylindrical aperture, a spool slidably and rotatably positioned within said aperture, said spool being of substantially the same diameter as said aperture, a center post extending into said aperture, a coil spring positioned within said

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spool and concentric with said center post, one end of said spring being attached to said center post and the other end of said spring being attached to said spool thereby normally urging said spool in one direction, means for adjusting the tension of said spring, and a flexible band wound on said spool in a direction so that when said band is unwound from said reel the force of said spring opposes the rotation of said spool.

2. A counterbalance for window sashes comprising a cylindrical casing having a back plate and a removable front plate, means for attaching said casing to a window sash support, a center post rotatably attached to said back plate and extending into said aperture, a spool rotatably and slidably positioned within said casing, said spool being of substantially the same diameter as said casing, a coil spring concentric with said center post and positioned between said center post and said spool to normally urge said spool in one direction of rotation, one end of said coil spring being attached to said center post, the other end of said spring being attached to said spool thereby to force said spool into frictional engagement with said casing when said spring is uncoiled and to retract said spool from said frictional engagement when said spring is tightly coiled, said spool having a groove in the edge thereof, and a flexible band wound in said groove in said spool and extending external to said casing for supporting a window sash, said flexible band being wound on said spool in a direction so that said band is unwound therefrom against said normally urging of said spring.

3. A counterbalance for window sashes comprising a cylindrical casing having a back plate and a removable frontplate, means for attaching said casing to a window

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sash support, a center post rotatably attached to said back plate and extending into said aperture, a spool rotatably and slidably positioned within said casing, said spool being of substantially the same diameter as said casing, a coil spring concentric with said center post and positioned between said center post and said spool to normally urge said spool in one direction of rotation, one end of said coil spring being attached to said center post, the other end of said spring being attached to said spool thereby to force said spool into frictional engagement with said casing when said spring is uncoiled and to retract said spool from said frictional engagement when said spring is tightly coiled, said spool having a groove in the edge thereof, a flexible band wound in said groove in said spool and extending external to said casing for supporting a window sash, said flexible band being wound on said spool in a direction so that said band is unwound therefrom against said normally urging of said spring, a tensioning arm external to said casing and attached to said center post for adjusting the force exerted by said spring, and stops for retaining said tensioning arm in selected positions.

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