July 29, 1952 E. PEREMI 2,604,655

SPRING BALANCER

Filed June 4, 1948

Fig. 1.

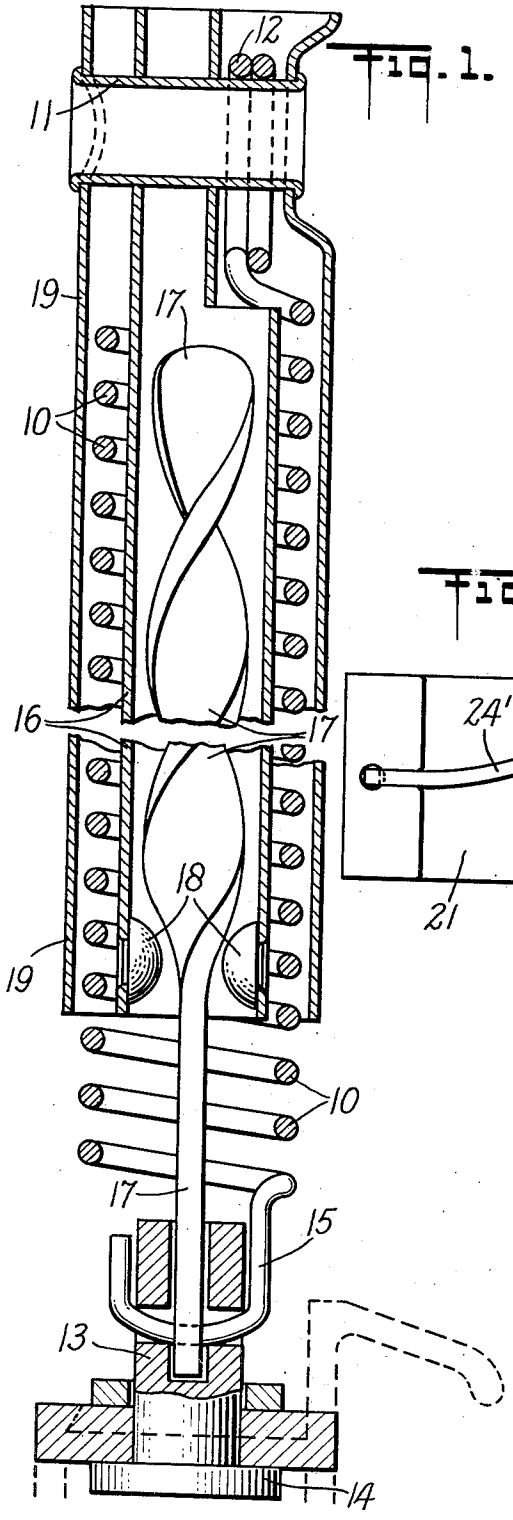


Fig. 2.

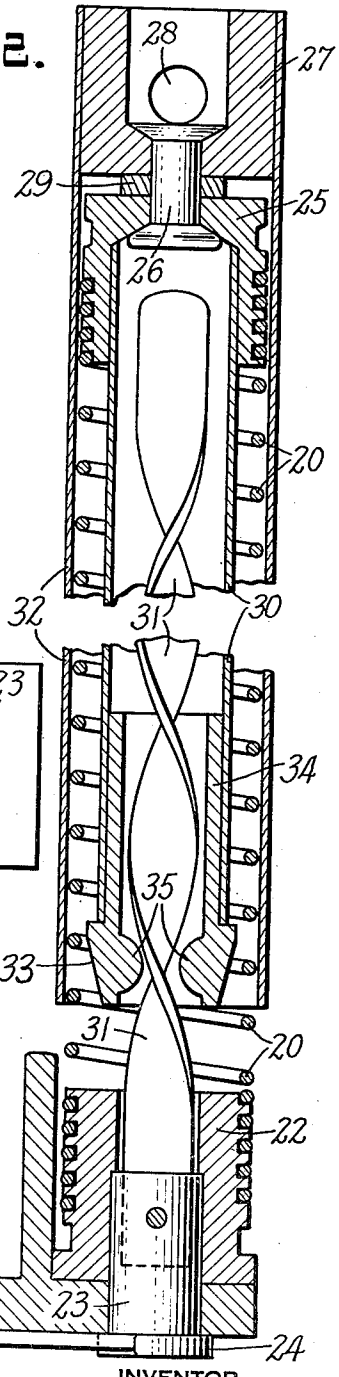
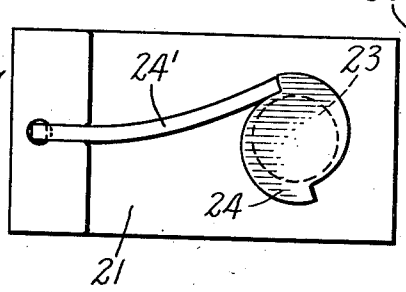


Fig. 3.



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Patented July 29, 1952

2,604,655

UNITED STATES PATENT OFFICE

2,604,655

SPRING BALANCER

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Application June 4, 1948, Serial No. 31,180

3 Claims. (Cl. 16—197)

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This invention relates to a spring balancer which is particularly adapted to act as a balancer for slidable window sash.

An object of the invention resides in the provision of a spring balancer which will effectively balance a given weight in various positions of its movements and particularly in the provision of such a balancer which comprises but one spring that exerts interrelated torsional and tensional force influences upon the weight and which, when used as a window balancer, will sustain the weight of a slidable sash in the various positions of vertical adjustment of the sash.

Other objects of the invention will be disclosed as the description of the herein disclosed embodiments progresses.

In the drawings:

Figure 1 is a vertical sectional view of the balancer;

Figure 2 is a similar view of another form of the balancer; and

Figure 3 is an end view of the latter form.

In the embodiment shown in Figure 1 there is provided a coil spring 10 that is preferably substantially helical and of substantially uniform characteristics throughout substantially its length, and is capable of being placed and maintained under both torsional and tensional stresses.

This spring is adapted to be secured to a window frame, when the balancer is used as a window balancer, by means of a suitable fastener such as a screw which passes through a hollow rivet 11, the end of the spring being looped at 12 to embrace the rivet.

The opposite end of the spring is adapted to be secured to a sash, as, for example, in the following manner:

A swivel pin 13, having a head 14, is rotatably mounted on the sash, as illustrated, and with this pin the hooked end 15 of the spring is engaged.

Thus when the sash is moved vertically, for instance, the spring will extend and contract according to the direction of movement of the sash and the spring is, of course, free to wind and unwind axially.

This action of the spring is accomplished by the following:

A tube 16 is stationary with the rivet 11 and with the window frame and is arranged within the spring. A spiral actuator 17 is movable longitudinally within the tube 16 and is attached to the swivel pin 13 at its lower end. The end

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15 of the spring may serve to secure the spiral actuator to the swivel pin, as illustrated.

The lower or open end of the tube 16 is provided with a key guide 18 which is complemental to the cross section of the spiral actuator so that, as the actuator is moved inwardly and outwardly in relation to the tube 16 the spiral, being rotatable, will be rotated with the result that the tensioning and torsioning of the spring will be simultaneously effected.

This key guide may be formed of oppositely disposed, headed rivets, the heads of which lie in the grooves of the actuator and move relative thereto when the actuator is moved in relation to the tube 16.

The spring is so mounted and the movement of the spiral actuator 17 is such that as the actuator is withdrawn from the tube 16 the spring will be unwound, i. e., its torsional effect will be decreased and this is accomplished while the tension of the spring is being increased. Of course the converse is true.

The pitch of the actuator is the minimum at its free end and the maximum at its attached end 15, that is to say, the angle that the edge of the spiral forms with the longitudinal axis is less at the attached end 15 than it is at the free or opposite end, with the result that, as the actuator is withdrawn from the tube 16, the speed of rotation and the unwinding of the spring will transpire progressively more rapidly.

The device may be provided with an outer tube or cover 19 to protect the spring during the use of the device.

In assembling the balancer the spring is put under an initial tension and an initial torsion which, combined, are substantially equal to the weight of the sash to be balanced and, as the spring is extended, upon the movement of the sash, the tension of the spring will be increased and the torsion of the spring will substantially proportionally be decreased.

In the form of the invention illustrated in Figure 2 the principal difference lies in the fact that the tube revolves and the spiral actuator remains stationary.

In this form the spring 20 is attached to a bracket 21 that is adapted to be secured to a window sash or other movable object. The attachment is as follows:

A spring adapter 22, which is provided with a groove for the reception of the coils of the spring and to which the spring is secured, is secured to a ratchet pin 23 which is rotatably mounted in the bracket 21 and the head 24 of

which is provided with notches for the reception of a spring pawl **24'** mounted on the bracket.

The opposite end of the spring is similarly attached to an adapter **25** which is rotatably mounted by means of a shaft extension **26** on a swivel bracket **27** which is adapted to be secured to the window frame by means of a fastener, such as a screw which passes through the opening **28**.

Between the bracket **27** and the adapter **25** a washer **29** is located.

A tube **30** surrounds the spring **20** and is rigid with the adapter **25** but is free of the adapter **22**.

A spiral actuator **31** of a form similar to that of the spiral actuator disclosed in Figure 1 is secured to the adapter **22** and has a free end extending into the tube **31** within the spring **20**. This actuator and the actuator disclosed in Figure 1 may, instead of having a spiral edge or edges, have a helical edge or edges and when the edge or edges are spiral maximum or minimum pitch may be at either end, if found desirable for a particular use.

An outer tube **32** similar to the tube **19** in the form disclosed in Figure 1 is provided for the protection of the spring and is secured to the bracket **27** but is free of the bracket **21**.

As in the form disclosed in Figure 1 the spring is placed under initial tension and torsion and, after installation as the sash is moved, the tube **30** and the bracket **21** move relatively, as the corresponding tube and bracket move in the form shown in Figure 1. As they move the tension of the spring is increased or decreased, as the case may be, and the torsion of the spring substantially correspondingly decreases and increases, due to the fact that the coaction between the key guide **33**, which is complemental to the spiral actuator, causes the tube to rotate while the actuator remains non-rotative.

This key guide **33** comprises a tubular portion **34** secured within the tube **30** at its lower end and provided with protrusions **35** that ride within the grooves in the actuator **31** when the latter is moved relative to the key guide **33**.

The adjustment of the spring may be accomplished after installation by means of the ratchet pin head **24** and adjustment will be maintained by the ratchet spring pawl **24'**. By means of this adjustment the initial torsion of the spring may be correlated with the sash weight and this adjustment may be accomplished during or after installation.

While particular embodiments of the invention have been illustrated, it is to be understood that details of construction may be varied within the scope of the appended claims.

I claim:

1. In a balancer for slidable window sash which includes a tube having a key guide at its lower end, a coil spring secured to said tube at one of its ends and surrounding said tube, means for securing the other end of said spring to a window sash, and a spiral actuator attached to said sash and extending into said tube, the improvement which comprises a pin adapted to be rotatably secured to the window sash having a longitudinal opening for the reception of an end of said actuator and a transverse opening aligned with a similar opening in said actuator through which latter openings the adjacent end of the spring extends to secure the spring, the actuator and the pin together.

2. A balancer for a window sash slidable in a window frame comprising, in combination, a tube adapted to be mounted on said window frame and having a key guide at its lower end, a coiled spring secured to said tube at one of its ends and surrounding said tube, a bracket adapted to be secured to said window sash, a pin rotatably mounted in said bracket and having a longitudinal slot therein, a spiral actuator fixed at one end in said slot and extending through said key guide into said tube, said pin being provided with a transverse opening aligned with a similar opening in the end of said actuator through which openings the other end of said coiled spring extends to secure the spring, actuator and pin together.

3. A balancer according to claim 2 and wherein the pin extends through a hole in the bracket and is provided with a head of greater diameter than the hole, the head of the pin being held resiliently against the bracket by the tension of the coiled spring.

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