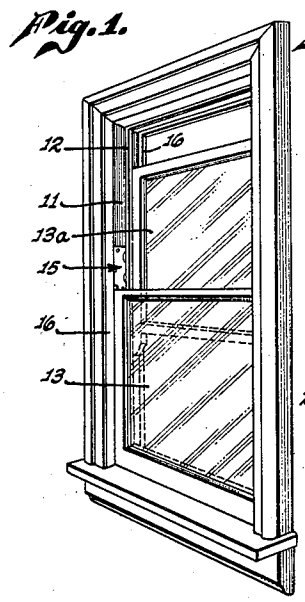
Dec. 8, 1942. J. B. JESSUP 2,304,175

ADJUSTABLE SPRING SASH BALANCE

Filed Jan. 15, 1941

Fig. 1.



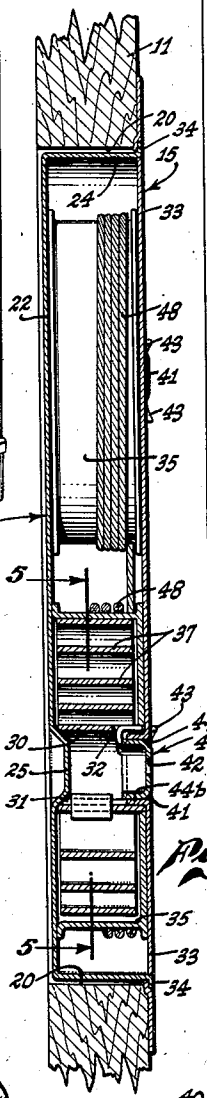


Fig. 2.

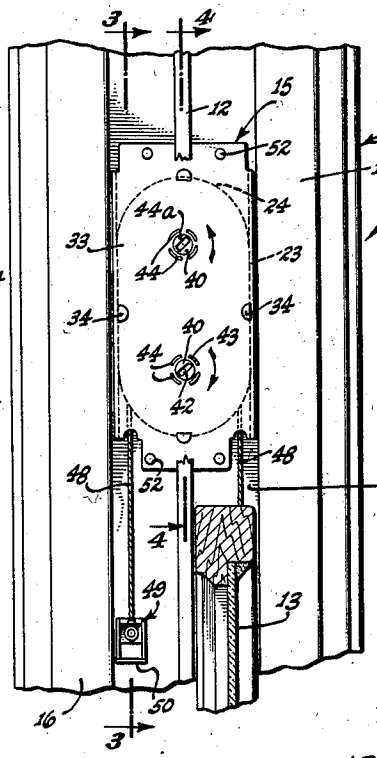


Fig. 3.

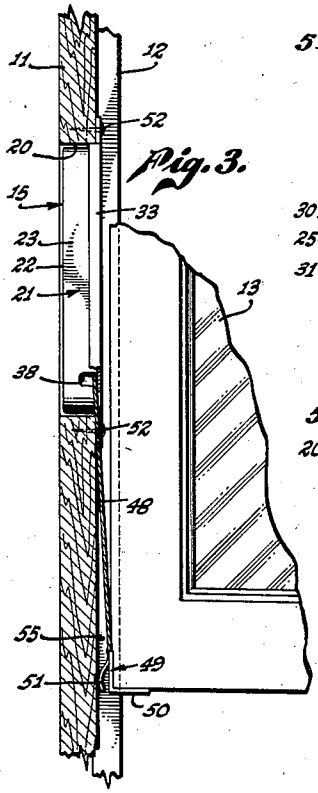


Fig. 4.

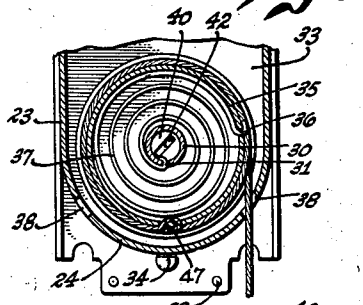


Fig. 5.

Fig. 6.

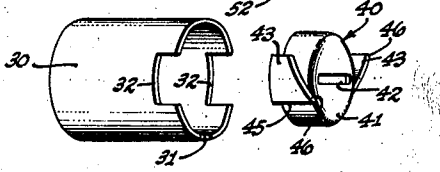
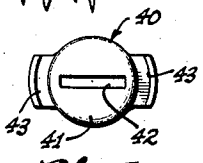


Fig. 7.



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Patented Dec. 8, 1942

2,304,175

UNITED STATES PATENT OFFICE

2,304,175

ADJUSTABLE SPRING SASH BALANCE

James B. Jessup, Burbank, Calif., assignor to Duplex, Inc., West Hollywood, Calif., a corporation of California

Application January 15, 1941, Serial No. 374,483

6 Claims. (Cl. 16—198)

This present application is a continuation in part of my pending application, Serial No. 327,156, filed April 1, 1940, for Adjustable spring sash balance.

This invention relates to spring sash balances and is particularly directed to an adjustable balance of this character, which is an improvement over previous balances of the same type.

Spring sash balances are already known which incorporate a cable drum rotatable on an axle within a housing to be installed in a pulley stile. A spiral spring is secured at its inner end to the axle and at its outer end to the drum. A flexible wire, tape or cable is secured to the periphery of the drum and provided at its free end with a device for attachment to a sash. With the outer end of the cable held from entering the housing the spring is wound up and the axle set by a ratchet or some other form of locking device.

In some of the forms of prior devices of this character the tension is permanently adjusted at the factory. In others there have been forms of ratchet adjustments provided whereby the axle may be rotated and reset relative to the cable drum to increase or decrease the spring tension.

My present invention relates primarily to improvements in a device of the character described in which adjustability of the spring tension may be accomplished to increase the tension, but not to decrease it. This is a distinct advantage because it has been found that if the device may be manipulated at the place of installation to decrease the tension it is sometimes put so far out of adjustment that it will not work satisfactorily, and workmen fail to properly reset it.

A further object of the present invention is to provide a device of the character described incorporating the feature of adjustability, as mentioned, with a simplification of the various parts combining to make up the device, thus achieving ease in manufacture as well as a decreased cost of the article.

More specifically it is an object of my invention to provide in a device of the character described a relatively simple axle and ratchet assembly made in two parts so that each may be fabricated in a single stamping operation and assembled readily for incorporation in the completed device.

A further specific object is to provide in a device of the character described an axle adjustable by means of a ratchet accessible from the front of the spring sash balance and cooperating with slots formed in the front plate of the device, the latter yielding by reason of its spring characteristics during movement of the adjusting ratchet. The construction described enables me to employ a relatively soft light gauge steel for the box or housing which is preferably a drawn body. It is thus only necessary to employ a tempered cold rolled steel in the face plate.

Another object is to provide in a device of the character described means for preventing the lateral displacement of the axle and associated ratchet member.

A further specific object is to provide a device of the character described which as a whole is thinner than previous devices or which, if having the same total thickness, enables the use of a relatively wider spring. Thinness of the device as a whole is important because of the limitations on space in conventional window frame assemblies. In most of them no more than the thickness of the stile is available.

Other objects and advantages will become apparent from a further description of the invention and reference to the drawing.

In the drawing:

Figure 1 is a perspective view of a window frame assembly with my adjustable spring sash balance installed.

Figure 2 is an enlarged front elevation of the adjustable spring sash balance as installed.

Figure 3 is a vertical section taken on the line **3—3** of Figure 2.

Figure 4 is a similar view taken on the line **4—4** of Figure 2 and illustrating the upper pulley in vertical elevation.

Figure 5 is a fragmentary sectional view of one unit of a duplex type of adjustable spring sash balance embodying my invention and taken on the line **5—5** of Figure 4.

Figure 6 is an enlarged perspective view of the axle and associated ratchet member of my invention.

Figure 7 is a top plan view of the ratchet member.

A window frame assembly **10** of conventional construction includes a pulley stile **11** and a parting bead **12**, a lower sash **13**, an upper sash **13*a***, and oppositely disposed blind stops **16**.

My adjustable spring sash balance **15** is mounted in the pulley stile, as shown in detail in Figures 2, 3 and 4.

For the purpose of installing the sash balance, a rectangular cut through the pulley stile is indicated at **20**. It is preferable to make this cut before the frames are assembled.

The preferred form of my adjustable spring

sash balance comprises a housing which includes a shallow box 21 preferably formed by a die stamping operation, having a back plate 22, sides 23, and curved ends 24. The box is formed with cables holes 38, the purpose of which will appear. The housing is completed by a face plate 33 later described.

Spaced equi-distant from the ends of the back plate are two circular bosses 25 upon which axles, later described, are mounted.

I prefer to make the device in duplex form, that is two units which are twins, one for balancing the upper sash and the other for the lower sash. It is only necessary to describe in detail the design and structure of one of the operating units.

An axle 30 has its inner end mounted on the boss 25. This axle comprises a small cylindrical member formed with a longitudinal slot 31, and with diametrically positioned end recesses 32 at the outer end. The length of the axle 30 is such that it is flush with the inner surface of the front face plate 33 when the plate is secured to the box 21 after the operating parts have been installed.

The face plate should be made of tempered cold rolled steel having some spring characteristics. For the purpose of securing the face plate to the box I may employ lugs 34 on the box which project through slots in the face plate and are bent over. Opposite the boss 25 an annular hole 44*a* is formed in the face plate with the edges bounding it turned inwardly to constitute a shallow flange 44*b* on the inner surface of the face plate. Surrounding the hole a plurality of arcuate slots 44 are formed in the said plate.

Mounted for rotation on the axle 30 is a cable drum 35 which is in the form of a cylindrical shallow cup formed with a slot 36 at one point on its periphery. A flat spiral coil spring 37 is enclosed within the cable drum, having its inner end secured in the slot 31 of the axle and its outer end secured in the slot 36 of the cable drum.

For tensioning the spring 37 and in effect mounting the forward end of the axle on the face plate is a ratchet member 40 which comprises a small circular cup shaped hub 41 formed with a slot 42 and with up-turned ratchet teeth 43. The bases of the teeth 43 are adapted to seat in the recesses 32 of the axle, and the pointed ends of the ratchet teeth are adapted normally to project through the arcuate slots 44 in the face plate 33.

The forward end or nose of the ratchet member 40 extends through the circular hole 44*a* and flange 44*b* formed in the face plate, so that same is substantially flush with the outer surface of said face plate. That feature maintains the axle and ratchet member in correct aligned position with respect to the face plate, and the hole 44*a* formed therein, and will prevent any lateral displacement thereof even when the ratchet teeth are disengaged or unlocked from the arcuate slots. The said construction in effect constitutes a bearing relationship between the nose or forward end of the ratchet body and the inside periphery of the flange 44*b* in the face plate 33 which is maintained at all times and whether or not the teeth on the ratchet member are locked in the arcuate slots.

These ratchet teeth are tapered as illustrated in Figure 6 so that when the member 40 is rotated in a clockwise direction as viewed in Figure 6 they will slide over the inner surface of the face plate 33 intermediate the slots 44 and project through the next succeeding diametrically disposed pair of slots 44. They can be turned in a clockwise direction by means of a screw driver inserted in the slot 42 but cannot be rotated in an anti-clockwise direction due to the vertical edges 45 extending from the base of the hub to the peak of the incline 46.

When the ends of the teeth project through said slots the forward or outer end of the axle surrounds and bears against the outer periphery of the flange in the face plate and the nose or forward end of the ratchet hub extends through the hole in the plate substantially flush with the outer surface of said plate and so that it bears against the inner periphery of the said flange. The double bearing relationship thus established between the flange and the associated axle and ratchet member is an important one for thereby those parts are maintained in correct alignment between the back plate, where the rear end of the axle is mounted on the boss 25, and the front plate.

When the ratchet member is turned so that the ends of the teeth thereon spring the front plate forward and are thereby lifted from their corresponding arcuate slots in said plate, the axle may no longer surround and bear against the outer periphery of the flange but the nose of the ratchet member will still bear against the inner periphery of said flange so as to maintain the associated axle and ratchet member in correct alignment between the back and front plates.

Secured at 47 to the periphery of the cable drum is a flexible wire 48 which has several turns around the drum, and to the outer end of which is attached a glider hook 49. Tape or cable may be used in place of the flexible wire.

The glider hook, an improved form of which comprises the subject matter of my copending application, Serial No. 327,155, filed April 1, 1940, consists generally of an L shaped bracket member 50 and a spring friction member 51 attached thereto. As shown in Figure 3, the member 50 is ordinarily to be attached to the lower corner of the sash, in which position the spring 51 frictionally engages the stile.

The parts comprising the adjustable spring sash balance, including the cable 48 and the glider hook 49, are assembled at the factory, and the axle 30 with its associated ratchet member 40 is rotated in a clockwise direction a sufficient number of turns to give the spring 37 a predetermined normal tension. This tension is maintained due to the fact that the cable 48 is almost entirely wound up on the cable drum and the glider hook 49 is pulled up against the lower end of the box 21, being prevented from entering it due to the small size of the cable opening 38.

I achieve the advantage of a factory adjusted balance wound to a predetermined specific carrying capacity so that it may be installed on most of the average size window openings used throughout the country, without the necessity of adjustment after installation, but with the added feature of the user knowing that if the particular sash on which the balance is used exceeds normal weight as is frequently the case, added tension may be applied by the use of a common screw driver. This is a distinct advantage because it eliminates the necessity of pulling out the balance and replacing it with another one. It also compensates for workmen's errors in

installing a balance not sufficiently strong enough to carry the sash.

In a duplex balance, the operating units are identical except that they are reversed. Thus, the unit previously described in detail was the lower one. The upper unit has spring **37** coiled in the opposite direction, and cable **48** wound on the drum in the opposite direction. The ratchet member **40** is formed with the teeth tapered opposite to the illustration in Figure 6, and of course the upper unit is tensioned by turning the ratchet member in an anti-clockwise direction.

The adjustable spring sash balance is installed in the pulley stile by driving nails **52** through the face plate **33** as indicated. Screws may be used as a substitute for nails. The plate can be let into the stile if desired.

The cable on one of the twin units is then drawn out against the action of the spring, and the glider hook at the end of the cable is screwed or nailed onto the sash as illustrated in Figure 3. The cable of the other unit and its corresponding glider hook are similarly utilized on the other sash.

The usual clearance is illustrated at **55** in Figure 3 between sash and stile to accommodate the spring **51** and cable **48**, and assures easy operation of the window.

The weight of the sash opposes the action of the spring **37**, the tension of which may now be increased by rotation of the axle as previously described to the extent necessary to obtain a nice balance of the sash. When the sash is raised or lowered it will remain at whatever point its movement is stopped due to the balance between sash and spring balance and the friction of the spring **51** on the glider hook **49**, which acts between the sash and the pulley stile to govern movement.

In case of windows of ordinary size one adjustable spring sash balance is sufficient. It is sometimes desirable in connection with larger or heavier windows to employ two balances, one at each side of the stile.

By my present invention I have made several improvements in the construction and operation of adjustable sash balances of the type described. I have eliminated the necessity of auxiliary springs for tensioning the ratchet adjusting mechanism and consequently have increased the available width for the flat coil spring, or if this width is not needed, the total thickness of the device may be consequently reduced. The latter is very important because it is preferable that the balance be let into the stile, and as the stile and stud in conventional building construction are flush, the total thickness of the balance should be no greater, and preferably less than, the stile.

The back or box of my device may be drawn from relatively soft sheet stock. The latter is a decided advantage because the box comprises a back, two sides and the rounded ends. The face plate should be made of tempered cold rolled steel with some spring characteristics, but it is relatively simple to manufacture this plate, including, if desired, a flange along each side as illustrated in the drawing. The face plate requires just sufficient spring characteristics to flex when the ratchet member **40** on the axle is rotated for increasing the tension of the spring. I have also greatly facilitated and simplified the axle and tensioning ratchet in reducing it to the two pieces illustrated in Figure 6, each of which may be manufactured by a single operation and which when assembled are strong and compact. The relatively deep cup shaped body of the ratchet member affords a maximum of strength and rigidity and the relatively deep recesses **32** formed in the axle to accommodate the bases of the teeth on the ratchet member, provide a simple but very efficient means of coupling the ratchet member and axle together. Moreover, by reason of this new axle construction, the entire device may be more easily assembled than any previous similar device with which I am familiar.

An added advantage not previously pointed out is that I have provided an adjustable spring sash balance in which the axle and adjusting ratchet in effect comprise a single element when the two parts are assembled. Moreover, the slots for adjustment are in the tempered coil rolled steel of the face plate; the back plate, which is of relatively soft drawn material, does not have to be weakened by the presence of any adjusting slots.

Still another advantage which, in my opinion, constitutes a novel and important step over all other prior devices with which I am familiar, is the cooperation of the flange defining the holes in the face plate and the axle **30** as well as the hub of the ratchet member **40**. As previously explained, the flange acts as a double bearing member for the axle and for the ratchet member, and maintains at all times, whether or not the ratchet teeth are engaging the arcuate slots, the correct alignment between the combined axle and ratchet member and the back and front plates. With that construction there can be no lateral displacement of the axle and associated ratchet.

What I claim as my invention is:

1. An adjustable spring sash balance comprising: a housing including a back plate, and a relatively flexible face plate, said face plate having radially arranged slots therein, an axle between the plates, said axle comprising a hollow sleeve with end recesses, a ratchet member having a central hub and provided with outwardly extending ratchet teeth the bases of which are adapted to seat in the axle recesses to interlock the axle and the ratchet member, means on said plates rotatably mounting the axle in correct alignment, means accessible from outside the face plate to rotate the axle, a spring attached to the axle, means for operatively connecting the spring to a sash, the ends of the teeth on the said ratchet member being adapted normally to project through said slots in the face plate and upon rotation of the axle to intermediately disengage from the slots and to impart a forward axial thrust and thereby spring the face plate forward so as to permit the rotation of the said axle for tensioning the spring.

2. An adjustable spring sash balance comprising: a housing having a back, and a relatively flexible face plate with an annular bearing therein formed by a flange, a boss formed on the back plate, an axle mounted between the plates with the rear end thereof seating on the said boss and the forward end thereof engaging and bearing upon the outer periphery of the said flange so as normally to maintain the axle in correct alignment between the said plates, means accessible from outside the face plate to rotate the axle and to lock the axle against reverse rotation, said means comprising a ratchet member having a central cup shaped hub provided with ratchet

teeth adapted to impart a forward axial thrust and thereby spring the face plate forward, and slots in the face plate for the ratchet teeth normally to project through, the said axle being maintained in correct alignment between the two plates during rotation of the axle while the teeth on the ratchet member are disengaged from the slots, by the hub of the ratchet member bearing against the inner periphery of the said flange.

3. An adjustable spring sash balance comprising: a housing including a back plate and a face plate having spring characteristics, an annular boss formed on the back plate, an annular hole in the face plate, and an annular flange extending from said hole on the inner surface of said face plate, an axle between the plates with one end thereof seated on the said boss and the other end engaging the outer surface of the said flange, means accessible from outside the face plate to rotate the axle, a spring attached to the axle, means for operatively connecting the spring to a sash, means yieldably locking the axle against rotation including slots in the face plate surrounding the hole in said plate, and a ratchet member comprising a central hub provided with ratchet teeth, said ratchet member being interlocked with said axle, the forward end of the said ratchet hub projecting through the annular hole in the face plate and adapted to bear against the inner periphery of the said flange in the face plate, the said ratchet teeth being adapted normally to project through the slots in the face plate and upon rotation of the axle to disengage from the slots and to impart a forward axial thrust and thereby spring the face plate forward so as to permit the rotation of the said axle for tensioning the spring, the said axle being maintained normally in correct alignment between the said plates by means of the end of said axle bearing upon the boss and upon the flange and the ratchet teeth projecting through the slots in the face plate, and upon rotation of the axle and the springing forward of the face plate said alignment being maintained by means of the forward end of the ratchet hub bearing against the inner surface of the said flange.

4. An adjustable spring sash balance comprising: a housing including a back plate, a face plate having spring characteristics and being formed with radially arranged slots therein, an axle between these plates, means on said plates rotatably mounting the axle in correct alignment, a drum journaled for rotation on the axle, a flexible member wound on the drum and having and end free for attachment to a sash, a spiral spring arranged within the drum and having its inner end connected to the axle and its outer end connected to the drum, and means accessible from outside the face plate for adjustably tensioning the spring comprising a rotary ratchet member interlocked with the axle, the said member being provided with ratchet teeth adapted to engage in the said slots in the face plate and upon rotation of the axle to impart a forward axial thrust and thereby spring forward the face plate and to engage in successive slots in the said plate, the said axle being a hollow sleeve with end recesses and the ratchet member comprising a cup shaped hub provided with the said ratchet teeth, the bases of said teeth being adapted to seat in the recesses.

5. In an adjustable spring sash balance, a pair of supporting members, one of said members having spring characteristics, an annular boss on one member, a hole in the other member defined by edges turned inwardly to form a flange adapted to act as a bearing member, slots radially arranged around the hole in the said latter supporting member, a drum mounting means between the said members comprising a cylindrical shaft formed with recesses in one end, a ratchet member including a central hub provided with outwardly extending ratchet teeth adapted to seat in said slots and the bases of which teeth are adapted to seat in the said recesses to interlock the shaft and the ratchet member, one end of the shaft seating on the annular boss and the other end of the shaft normally enclosing and bearing upon the outer periphery of the flange on the opposite supporting member, with the forward end of the ratchet hub extending through the annular hole in the last said supporting member and bearing against the inner periphery of the flange, so as to maintain the said axle in correct alignment between the supporting members during rotation of the axle to impart a forward axial thrust whereby the last named supporting member is sprung outwardly.

6. In a device of the character described the combination of: supporting base plates joined to form a housing, at least one of which plates is flexible and one of which is formed with slots, an axle extending between the plates for supporting a spring, means on the plates to rotatably support the axle, and means for tensioning the spring comprising a terminal notch in the end of the axle adjacent the slotted plate, and a ratchet member having a hub with projections seating in the notch to interlock the ratchet member and axle and having teeth radially arranged substantially in the cylindrical plane of the outer surface of the axle to effectively form an extenion thereof and adapted to engage in the slots in the plate.

JAMES B. JESSUP.