

Dec. 8, 1942.

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2,304,176

SPRING SASH BALANCE

Filed Jan. 15, 1941

Fig. 1.

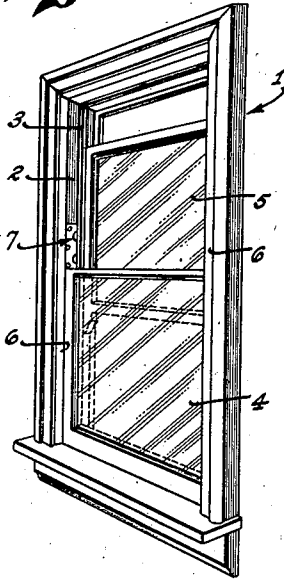


Fig. 2.

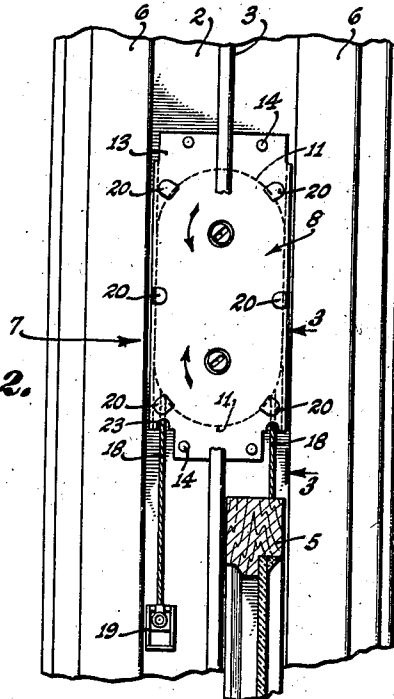


Fig. 3.

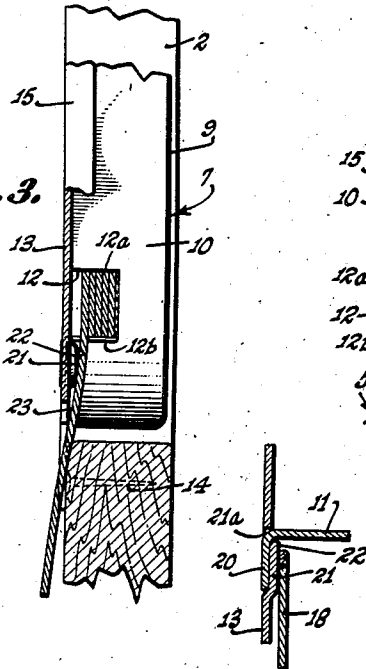


Fig. 5.

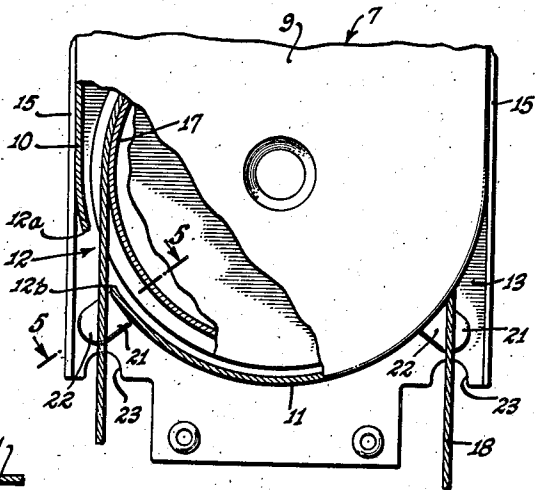


Fig. 4.

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UNITED STATES PATENT OFFICE

2,304,176

SPRING SASH BALANCE

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Application January 15, 1941, Serial No. 374,484

4 Claims. (Cl. 16—198)

This invention relates to spring sash balances and comprises generally a housing containing two sash balance units which are twins, one for balancing the upper sash and the other for the lower sash. Each unit includes an axle within a drum journaled for rotation thereon. A cable or other flexible member is wound on the drum with its free end adapted to extend through a cable opening or slot in the housing for attachment to its respective sash.

A spiral spring is arranged within the drum having its outer end connected thereto and its inner end connected to the axle.

I have found that in balances such as I have described, the cable may become jammed between the members constituting the housing, which may have become sprung apart or otherwise separated, or the cable may suffer undue wear with consequent damage thereto by rubbing against portions of the housing.

An object of my present invention is to eliminate the aforesaid disadvantages, by providing a new and novel means for securing together the two separate members which compose the housing, and which said means also constitutes a bearing member for the cable.

A further object of my invention is to provide in a device of the character described, a simplified construction of housing to contain and support the moving parts of the sash balance, thereby achieving ease of manufacture and assembly as well as decreased cost of manufacture.

A still further object of my invention is to provide in a device of the character described, a simplified form of housing which incorporates a combined fastening means between the component parts of the housing and a bearing member for the cable, said bearing member having a predetermined, critical location in respect to the cable opening in the housing and the path of travel of the cable, so that the cable must of necessity bear against the said bearing member and thus be protected thereby.

Another object of my invention is to provide in a device of the character described, a small, compact, and relatively flat housing for a duplex adjustable sash balance which possesses the characteristics of strength, simplicity, and ease of assembly. From the form of housing which I have illustrated as my preferred embodiment, including, as aforesaid, a novel means for fastening together the parts constituting the housing in which the duplex balances are contained, and which said means also constitutes a bearing member for the cable which travels tangentially

from the drum on which the cable is wound, I achieve certain advantages not possessed by former types of housings. It is essential to predetermine the relative positions and form of the component parts of the housing and of the combined fastening means and bearing member in respect to the position and movement of the exposed end of the cable, and I achieve those objects and advantages with my present invention in a highly satisfactory manner as will hereinafter become apparent.

In respect to the cable, the use of tape or flexible wire or other suitable material, would be considered an equivalent.

Other objects and advantages will become apparent from a further description of the invention in 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 fragmentary sectional view of one unit of the duplex type of adjustable spring sash balance embodying my invention.

Figure 5 is a fragmentary cross-sectional view taken on the line 5—5 of Figure 4.

A window frame assembly 1 of conventional construction includes a pulley stile 2 and a parting bead 3, a lower sash 4, an upper sash 5, and oppositely disposed blind stops 6.

My adjustable spring sash balance 7 is mounted in the pulley stile as shown in detail in Figures 1, 2 and 3.

For the purpose of installing the sash balance, a rectangular cut is made through the pulley stile of the same approximate outside dimensions as the housing. 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 8 preferably formed by a die stamping operation. This box is substantially rectangular in form and includes an integral back plate 9, integral side walls 10, and curved ends 11. The box is formed with cable openings or slots 12, the purpose of which will later appear. Removably positioned on the front face of the box is a face plate 13, the ends of which project a short distance beyond the ends of the box in order to receive nails or screws or like fastening devices 14, whereby the box or housing is secure-

ly fastened to the stile of the window frame, and the lower end preferably having the configuration as shown. Shallow inturned flanges disposed along a substantial portion of each side of the face plate constitute sides 15.

Spaced equi-distant from the ends of the back plate are two circular bosses upon which axles, not shown, may be mounted.

Although I prefer to make the device in duplex form, that is two units which are twins, it is only necessary to refer generally to one of the operating units, as my present invention is more particularly related to the construction of the housing for the unit, and also to the housing in combination with the cable drum and cable mounted on the said drum.

Mounted for rotation on any suitable axle is a cable drum 17 which is in the form of a cylindrical shallow cup formed with a slot at one point on its periphery. A flat spiral coil spring may be enclosed within the cable drum having its inner end secured in a slot on the axle and its outer end secured in a slot on the cable drum, in a manner known to the art, and the spring may be tensioned in any suitable manner.

Secured to the periphery of the cable drum is a flexible wire, tape, cable, or other suitable member 18 which has several turns around the drum and to the outer end of which is attached a glider hook 19, or other means of attachment to a sash.

The glider hook, an improved form of which comprises the subject matter of my copending application Serial No. 327,155, filed April 1, 1940, and issued September 16, 1941, as Patent No. 2,256,205, consists generally of an L shaped bracket member and a spring friction member attached thereto. As shown in Figure 2 the glider hook is ordinarily attached to the lower corner of the sash in which position the spring frictionally engages the stile.

It will be understood of course that one cable 18 is carried by the upper one of the two drums and a separate cable is carried by the lower one of the two drums. The cables are wound onto the drums in different directions, so that the outer end of the upper cable is disposed adjacent one side of the housing while the outer end of the lower cable is disposed adjacent the other side of said housing. The exposed portion of the cable extends through the cable opening or slot 12. The upper edge 12a of said cable slot is formed in the side wall 10 at the point where the curvature of the end commences, and the lower edge 12b is spaced a sufficient distance away so as to permit the cable 18 which extends tangentially from the cable drum to project through the slot without causing any substantial contact with the edges of the slot. As a precaution against the cable snagging on the edge 12b, I prefer to make it rounded and smooth.

To secure and retain the face plate in position upon the box after the operating parts of the balance have been properly assembled therein, I employ ears or lugs 20 which are formed integral with and project from the edges of the side walls of the box.

There may be a number of these lugs at different locations, but a primary feature of my invention is the location of a lug along a projection of the tangent of the cable drum where that tangent crosses the junction between the edge 12b of the slot 12 and the rear of the face plate 13. It is at this critical location where the cable may become fouled in prior devices due to the housing being sprung or distorted and the box

and face plate becoming slightly separated and leaving a crevice for the cable to drop into if the cable is pulled to one side. This possibility has been eliminated in my device by clamping the box and face plate at this point. They cannot become sprung or separated here by accidental jarring or distortion of the housing. In the form I have used as an example, the center of the lug is approximately 45° from the vertical center of the drum. It may be less if the end wall of the housing is spaced farther from the periphery of the drum.

The lug is bent over and pressed into a niche 21 formed in the face plate. The niche is preferably of the same outline as the lug, and its depth about equal to the thickness of the lug. This niche may be pressed inwardly from the face plate, and is struck to form a slot 21a through which the lug may be inserted. The back of the depressed part which forms the niche provides a bearing 22 at the critical position described with reference to the positioning of the lug. This bearing is a smooth raised surface with edges on both sides and one end rounded.

It provides a means of keeping the cable spaced from the back of the face plate 13 and consequently out of the region where snagging of the cable at the junction of box and face plate might occur. I thus provide the double function of tightly joining the box and face plate at this critical intersection, and by the same means maintaining the cable away from the point where it could be fouled, thus doubly insuring its proper operation and long life.

The bearing should be long enough to support the cable when drawn to one side or the other of its intended vertical line of travel parallel to the vertical center of the drum.

The end of the face plate is formed with notches 23 for greater freedom of the cable if drawn at a line off the parallel of the face plate, but the bearing serves the added function in this connection of preventing the cable from riding on the edges of the notch.

In a duplex type of balance as illustrated, I utilize a fastening lug and bearing at each lower corner of the device, and preferably employ similar fastening means at other points as shown. This enables me to adequately secure the box and face plate together, without the fastening means protruding from the face plate.

When installing, the cable on one of the twin units is 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 2. The cable of the other unit and its corresponding glider hook are similarly attached to the other sash. The weight of the sash opposes the action of the spring.

It will be found that when the drum is rotated and the cable is retracted or extended tangentially from said drum, the cable will slide over and bear against and be sustained by the bearing member 22 on the lower portion of the face plate 13, whenever the cable winds off the drum close to the rear part of the face plate. There may be times during operation, when the cable does not touch the bearing, due to a helical winding of the cable on the drum; but whenever the cable approaches the rear part of the face plate the bearing supports and protects it in the manner previously described.

By my present invention I have made several improvements in the construction and operation of adjustable sash balances of the type described

and more particularly in the construction and operation of the housing for containing such balances, in combination with the cable drum and the cable wound thereon. I have particularly improved the means for fastening the box and the face plate of the housing together and whereby the fastening means also constitutes a bearing member for the cables. Such construction is simple and inexpensive to manufacture as the bearing member performs a double function and may be substituted for what would normally be two members, to wit: a fastening means and a separate bearing means. Moreover, the location of independent fastening and bearing means at the identical location might present difficulties which have been avoided by my novel unitary means.

What I claim as my invention is:

1. In a spring sash balance including a rotatable drum having a flexible member wound thereon with one end free for attachment to a sash: a housing to contain and support said drum and provide a bearing for the flexible member comprising, a box having an opening for the free end of the flexible member to travel through, a fastening lug projecting from the box adjacent the opening, and a face plate covering said box and provided with an inwardly depressed niche to receive said lug for fastening relationship between box and plate, said niche having a complementary smooth raised portion on the inner face of the plate providing a bearing for the flexible member when moving onto and off the drum, said lug, niche and bearing being located substantially along a projection of the tangent of the rotatable drum.

2. In a spring sash balance including a rotatable drum having a flexible member wound thereon with one end free for attachment to a sash: a housing to contain and support said drum and provide a bearing for the flexible member comprising, a box having a slot for the free end of the flexible member to travel through, a fastening lug projecting from the box adjacent the slot, and a face plate covering said box and provided with

an inwardly depressed niche to receive said lug for fastening relationship between box and plate, said niche having a complementary smooth raised portion on the inner face of the plate providing a bearing for the flexible member when moving onto and off the drum through the slot, said lug, niche and bearing being located substantially along a projection of the tangent of the rotatable drum substantially where that tangent intersects the lower end of the slot.

3. In a spring sash balance including a rotatable drum having a flexible member wound thereon with one end free for attachment to a sash: a housing to contain and support said drum and provide a bearing for the flexible member comprising, a box having an opening for the free end of the flexible member to travel through, a fastening lug projecting from the box adjacent the opening, and a face plate covering said box and provided with an inwardly depressed niche to receive said lug for fastening relationship between box and plate, said niche having a complementary smooth raised portion on the inner face of the plate providing a bearing for the flexible member when moving tangentially onto and off the drum through the opening, said lug, niche and bearing being located on a projection of the tangent of the flexible member and substantially 45° from the vertical center of the drum.

4. In a spring sash balance including a rotatable drum having a flexible member wound thereon with one end free for attachment to a sash: a housing to contain and support said drum and provide a bearing for the flexible member comprising, a box having an opening for the free end of the flexible member to travel through, a face plate covering said box, a lug on said box and an inwardly depressed lug seat on said plate slotted at one end to receive said lug for securing the box and plate together, the back of said lug seat providing a raised bearing for the flexible member when moving onto and off the rotatable drum through the said opening.

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