Oct. 23, 1956 E. L. GRUPP 2,767,426

SASH BALANCE

Filed May 13, 1953

Fig. 1.

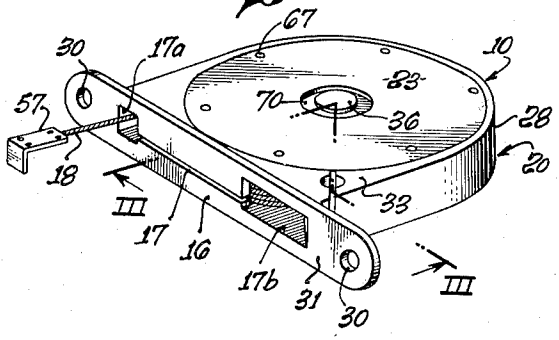


Fig. 2.

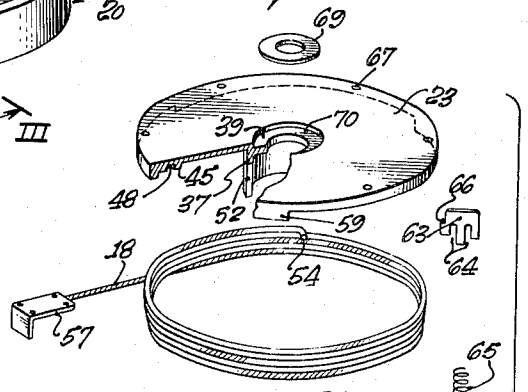


Fig. 4.

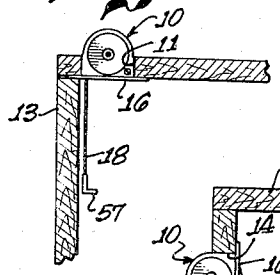


Fig. 5.

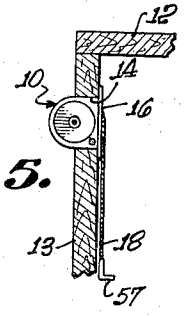
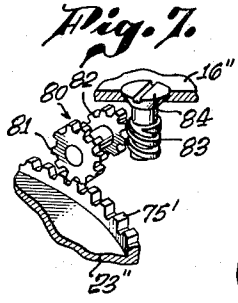


Fig. 7.



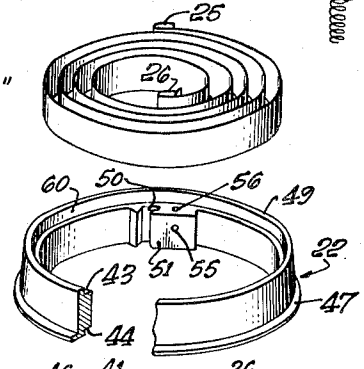
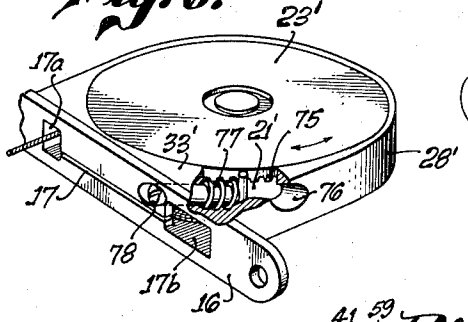


Fig. 6.



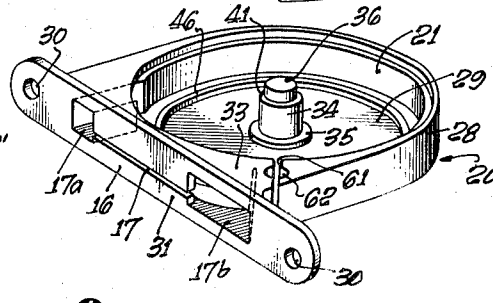
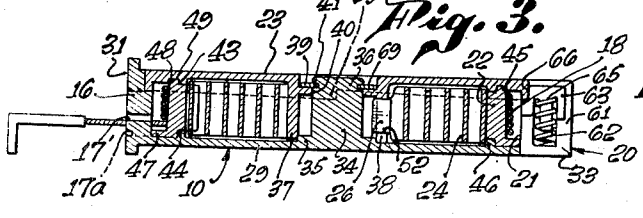


Fig. 3.



INVENTOR.
EDWARD L. GRUPP,
BY
ATTORNEY.

United States Patent Office

2,767,426

Patented Oct. 23, 1956

2,767,426

SASH BALANCE

Edward L. Grupp, Glendale, Calif.

Application May 13, 1953, Serial No. 354,743

9 Claims. (Cl. 16—198)

This invention relates to sash balances, and more particularly to a readily adjustable sash balance for counterbalancing and facilitating raising and lowering of window sash and other vertically movable windows, screens, and the like.

Prior sash balances have usually been made from pressed sheet metal parts or elements in different weights and styles, each weight and style being used for a particular weight and style of window sash. Each prior balance was therefore preset at the factory for the particular weight and style of window upon which it was to be used. The effective variation from the preset weight was usually not more than plus or minus two pounds. Thus the range of utility of prior sash balances was extremely limited, and in the event balances of wrong weight and style were delivered to a construction job, they could not be employed because they would be either too light or too heavy for the window sash requirements. To meet the normal range of variation found in usual building construction, approximately six or eight different weights and styles of sash balances were manufactured.

In addition, prior sash balances were relatively large, that is, were relatively wide and thick and required window frame members of relatively heavy construction. The prior sash balances became rapidly worn in use, and because they were often inaccurately assembled from the sheet metal parts, the forces acting on the balances would cause the winding drums to wobble and stick, or the cable would slip from the winding drum and become wedged between the drum and an adjacent part of the balance. When an installed sash balance was thrown out of kilter in the above manner, the balance was practically impossible to repair and the entire balance had to be replaced. Assembly of pressed metal sash balances was difficult, was not adapted to automatic assembly and labor costs were high. The cost of tooling for the production of pressed metal balances, including the great many dies for the production of the large number of small parts required, was an expensive burden to the manufacture of such prior pressed metal sash balances.

This invention is directed to an improved sash balance in such a manner that a minimum amount of machining is required. The cast sash balance provides smooth surfaces in the completed balance and eliminates cuts and hazards resulting from prior pressed sheet metal constructions. A sash balance embodying the present invention is capable of assembly in a simple and rapid manner because the several parts may be arranged in a relaxed condition and tensioned after the balance has been assembled.

The present invention contemplates an improved sash balance which is relatively thin, as compared to prior balances, and which is provided with means for readily adjusting the balance to deliver a selected degree of tension. As a result, the sash balance of this invention

may be adjusted to lifting a six-pound, eight-pound, ten-pound or even a fourteen-pound window sash. The sash balance of this invention may be installed in relaxed or unwound condition by a finish carpenter, and after having been properly fitted into the frame and attached to the sash, may be easily tensioned so as to most effectively maintain a window in every position from fully open to fully closed. Thus installation of the present sash balance is facilitated and operation may be maintained at a maximum level of efficiency.

Therefore the primary object of this present invention is to disclose and provide an adjustable sash balance of either single or dual-type, giving rise to one or all of the advantages above recited.

The invention particularly contemplates a single sash balance which is readily adapted for installation in either the head or side member of a window frame.

An object of this invention is to provide an adjustable sash balance which is made from a minimum number of parts, preferably of lightweight metal alloys cast in desired form.

A further object of this invention is to provide a sash balance wherein the several parts of the balance are arranged for producing exceptionally smooth operation and for facilitating rapid production and assembly of the balance.

Still another object of this invention is to disclose and provide a sash balance in which the cable-carrying reel member is mounted in novel manner so as to be rotatably mounted for maximum smoothness of operation under varying conditions of load imposed thereon by the cable wherein wobbling or sticking of the reel member is eliminated.

This invention contemplates an improved sash balance of relatively thin section or depth and having virtually only three major integrally cast parts, namely, a housing, a reel member and a cover plate.

A still further object of this invention is to design a sash balance which facilitates the casting of the several parts and which utilizes a minimum of metal.

Another object of the invention is to provide adjustable tensioning means for the spring means used therewith whereby the balance may be readily set to a selected tension in the field.

A still further object of this invention is to disclose a sash balance having various parts designed for convenient casting as by a pull operation and without employing cores or special dies.

The invention contemplates a reel or ring member for winding the cable which is provided with a slightly tapered or inclined cable winding surface upon which the cable may be wound without jamming or overlapping of the cable turns.

Other objects and advantages of this invention will be readily apparent from the following description of the drawings in which an exemplary embodiment of this invention is shown.

In the drawings:

Fig. 1 is a perspective view of a single-type sash balance embodying this invention.

Fig. 2 is an expanded, exploded perspective view of the parts of the single sash balance shown in Fig. 1.

Fig. 3 is a sectional view taken in vertical planes bisecting the balance of Fig. 1 as indicated by line III—III thereof.

Fig. 4 is a fragmentary, diagrammatic, sectional view illustrating installation of a single-type balance in a head member of a frame.

Fig. 5 is a fragmentary, diagrammatic, sectional view illustrating installation of a single-type balance in a side jamb of a frame.

Fig. 6 is a fragmentary, perspective view of a single-type balance illustrating a modification of adjustable tension locking means for said balance.

Fig. 7 is a fragmentary perspective view of another modification of an adjustable tension locking means for a sash balance.

Referring first to Figs. 4 and 5, there are illustrated two different installations of a single-type sash balance generally indicated at **10**. In Fig. 4 the sash balance is installed in a recess **11** provided in a head **12** of a window frame, the recess being located adjacent to a jamb member **13** of said frame. In Fig. 5 the sash balance **10** is installed in a recess **14** provided in the side jamb member of the frame adjacent the top thereof. The single sash balance **10** is provided with a face plate **16** having a longitudinally extending slot **17** having enlarged end openings **17***a* and **17***b* for the passage therethrough respectively of a cable **18** of the balance. The opening **17***a* accommodates cable **18** when installed as in Fig. 4 for positioning the cable closely adjacent to the jamb member **13**. The adjacent end portion of face plate **16** may extend between the top face of jamb member **13** and the head **12** for securing and positioning one end of the balance. A single screw through a port in the other end of the face plate and into the head **12** will thus firmly secure the balance.

The opening **17***b* affords or permits passage therethrough of the cable **18** when installed in a recess in the jamb member **13**, end ports in the face plate receiving securing screws as in Fig. 5. Thus the single sash balance **10** is readily adapted to installation in a window frame in such a manner as to provide a most efficient and effective employment of the sash balance.

The sash balance **10** generally comprises an integral, hollow housing **20** having a cylindrical chamber **21** having one end open and which receives therein a cylindrical open-ended ring member **22** upon which cable **18** may be wound. A circular cover plate **23** extends over the opening of chamber **21** and is cooperable with tension adjusting and locking means carried by the housing for regulating the tension of a helical spring **24** carried within the ring member **22**. The helical spring **24** is arranged to be connected at its outer end **25** to the ring member and connected at its inner end **26** to the cover plate **23** so that turning of the cover plate will tension the spring and the tension will be held by the tension locking means.

The housing **20** may comprise integrally cast, cylindrical side walls **28** defining therewithin the cylindrical chamber **21** and an end wall **29** closing one end of chamber **21** and integral with side walls **28**. The opposite end of chamber **21** is open. The side walls **28** may include an integral, lateral extension, forming the face plate **16** at one end of the housing, the face plate **16** lying in a plane perpendicular to end wall **29**. The face plate **16** may be provided at opposite ends with ports **30** for installing the sash balance in a window frame member as by wood screws. The face plate **16** may be provided with a smooth, flat, outer surface **31** which is adapted to be installed flush with the adjacent face of a frame member. While the face plate **16** is illustrated on this single-type sash balance as being provided on an end of the balance, it is understood that end wall **29** may serve as a face plate when the construction of this balance is employed in a dual-type sash balance and wherein the balance is mounted in a side frame member in a relatively shallow, elongated recess.

The side walls **28** may also include an end portion **33** adjacent to face plate **16** of relatively thick, metal section for carrying spring tension adjusting and locking means, such means being described in detail hereinafter.

Means for rotatably and coaxially positioning cover plate **23** in the open end of chamber **21** may comprise an axial, upstanding post or stub axle **34** integrally formed on end wall **29** and having a length approximately equal to the depth of chamber **21**. Encircling the base of post **34** may be an annular, shallow boss **35**. The top end of post **34** is provided with a reduced portion **36** adapted to be peened over as later described. The cover plate **23** is provided with a depending, hollow, axial, open-ended, integral sleeve **37** arranged to be sleeved over post **34** and having its bottom open end adapted to receive the boss **35** so as to provide a bearing at **38**. Adjacent the top end of sleeve **37** is provided a radially, inwardly directed, annular flange **39** having an inner, circumferential edge adapted to bear as at **40** on the adjacent, annular surface of post **34** slightly below a shoulder **41** defining the reduced portion **36** of the post. The axially spaced bearings at **38** and **40** of cover plate **23** with the post **34** serves to accurately mount the cover plate for rotation with respect to the cylindrical chamber **21** in the housing.

Bearing means for rotatably and accurately mounting the ring member **22** within chamber **21** and between end wall **29** and cover plate **23** may include oppositely and outwardly facing inner, marginal, annular recesses **43** and **44** adapted to respectively receive annular, inwardly facing ribs **45** and **46** carried by the cover plate and end wall **29** respectively. It should be noted that the annular ribs **45** and **46** are of virtually the same diameter and are located adjacent outer margins of the circular cover plate **23** and cylindrical chamber **21**. The cooperable engagement of these ribs **45** and **46** with the recesses **43** and **44** thus provide a relatively large, accurately determined bearing affording smooth operation of the ring member when it is caused to rotate within the balance during use.

The ring member **22** is also provided with a bottom, external, circumferential flange **47** adapted to be received within the annular space afforded between the annular rib **46** and the internal wall of the cylindrical chamber **21**. The flange **47** serves to prevent the cable **18** from being jammed or lodged between the ring member **22** and end wall **29**.

The annular rib **45** on the cover plate **23** defines with an outer, depending, circumferential, thickened metal section of the cover plate **23**, an annular groove **48** which receives an outer, annular edge portion **49** of ring member **22** so as to prevent jamming of the cable between ring member **22** and cover plate **23**.

The helical spring **24** may be connected to reel member **22** by its outwardly turned end **25** which is received within a slot **50** formed on the inner surface of the ring member **22** by an inwardly extending portion **51**. The inner end **26** of the spring **24** may be conveniently connected to the cover plate **23** by reception of end **26** within a longitudinally extending, open-ended slot **52** provided in sleeve **37**.

The cable **18** may be connected to the ring member **22** by inserting inner end **54** of the cable first into and through port **55** in the portion **51** of the ring member **22** and then bending said end upwardly and downwardly into a top hole **56** provided in the portion **51**. The cable **18** may be wound around the ring member **22** and its free end may be passed through slot **17** for connection to a shoe or glide **57** of angle shape in any suitable manner. The glide **57** is adapted to be attached to the bottom corner of a window sash to be balanced.

Means for adjustably tensioning spring **24** within ring member **22** and for maintaining said spring under the selected tension may comprise a plurality of circumferentially arranged and spaced, depending teeth **59** provided on the outer depending circumferential section of cover plate **23**. The teeth **59** are received within an outwardly facing inner circumferential annular recess **60** formed on side walls **28** at the open end of chamber **21**.

An angularly arranged slot **61** provided in end portion **33** of the housing opens into the chamber **21** and is provided with a vertical bore **62** intermediate its ends. Slot **61** accommodates a flat locking element **63** having a pair of parallel, open-ended slots **64** adapted to receive

and position a coil spring **65**, said spring **65** being received and seated in bore **62**. Locking element **63** includes a shoulder **66** which is positioned adjacent the inner end of slot **61** and is biased upwardly by the spring into engagement with the downwardly facing teeth **59** on cover plate **23**. The outer face of the cover plate **23** may include a plurality of circumferentially spaced indents or holes **67** adapted to receive a pointed end of a suitable tool for facilitating rotation of the cover plate against the tension of the spring.

The entire assembly of the sash balance may be secured by a washer **69** sleeved over the reduced end portion **36** of the post **34** and received in the upper circular opening **70** above flange **39**. The reduced portion **36** may then be peened over the washer **69** so as to secure the entire assembly.

It will be readily apparent that tension of the spring **24** may be conveniently adjusted by rotating the cover plate **23** to tighten the helical spring. The locking element **63** is continuously biased upwardly against teeth **59** and as the cover plate **23** is rotated, the locking element engages teeth **59** and maintains the spring under the selected tension when rotation of the cover plate is completed. It may be noted each tooth **59** includes a relatively long, sloping face which facilitates rotation of the cover plate when engaged with the locking element **63**.

In the event it is desired to decrease tension of the spring, the locking element **63** may be depressed by inserting a suitable tool through the top open end of bore **62** and thus disengage the locking shoulder **66** from the teeth **59**. Pressure against the cover plate or holding the plate against rotation by a tightening tool engaged in indents **67** will prevent snap unwinding of the spiral spring.

It will be readily apparent from the above description that assembly of a sash balance embodying this invention is facilitated by the particular construction of the several parts thereof. The housing may be placed upon a suitable work table with the open end of chamber **21** facing upwardly. The ring member **22** with the cable wound thereon may be dropped into the cylindrical chamber **21** and positioned therein by the annular rib **46** and flange **47**. A relaxed spring **24** may then be inserted into the ring member **22** in relaxed condition so that end **25** engages the slot **50** on the ring member. The cover plate may then be placed over the open end of chamber **21** and the slot **52** of the sleeve **37** may be aligned with the inner end **26** of the spring **24**. Insertion of sleeve **37** into the chamber thus engages the inner end **26** of the spring **24** and the sleeve is accurately positioned with respect to the post **34**. The annular rib **45** on the cover plate is aligned and drops into the annular recess **43** on the cylindrical member. The washer **69** is then dropped over the reduced portion **36** of the post and is secured by peening the portion **36** as by striking the same with a hammer. The relaxed spring may then be tensioned as above described after the assembly is completed, the desired tension being held by the engagement of the locking element with the teeth on the cover plate.

It should be also noted that the outer circumferential face of the ring member is tapered slightly inwardly so that the diameter adjacent flange **47** is greater than the diameter at the edge portion **49**. As the cable **18** is wound from the smaller diameter to the larger diameter or vice versa, the taper of the outer ring surface serves to guide the cable for preventing overlapping of adjacent turns of the cable which might cause jamming.

The modification shown in Fig. 6 discloses a single-type sash balance which includes the detailed structure described above with respect to the single-type sash balance but illustrates a modification of the tension adjusting and locking means.

In Fig. 6, a cover plate **23'** is provided with an outer circumferential depending gear toothed portion **75**. A thickened metal portion **33'** extending between the walls **28'** and face plate **16'** may have an angularly disposed bore **76** formed therein which opens along one side into the chamber **21'**. A worm threaded screw **77** is received by the bore for meshing with the gear portion **75** of the cover **23'**. The head **78** of the screw **77** is accessible from the face plate **16**. Thus turning of screw **77** by a suitable tool such as a screwdriver will rotated the cover **23'** and vary the tension of the spring within the sash balance. The angular relationship of the screw **77** with respect to the gear portion **75** provides self-locking of the cover **23'** against rotation and prevents release of spring tension. Since the screw head **78** is accessible from the face plate **16**, the tension of the sash balance may be adjusted even after installation.

In Fig. 7 a still different modification of the tension adjusting and locking means is shown for a sash balance of dual type wherein face plate **16''** lies in a plane at right angles to the axis of rotation of the reel member.

As in Fig. 6, a cover plate **23''**, is provided with an outer circumferential depending gear toothed portion **75'**. The thickened metal portion of the sash balance may be provided with a suitable, radially, inwardly extending bore adapted to receive a dual-type gear **80**. The dual gear **80** includes an inner gear **81** having teeth meshed with gear portion **75'** of the cover plate. An outer, second gear **82** has teeth meshed with a worm threaded screw **83**. The worm screw **83** is carried in a vertically extending bore in the thickened metal portion and presents an outer slotted head **84** which may be readily engaged by a screwdriver.

Rotation of screw **83** by a screwdriver will rotate the dual gear **81** and cause rotation of the cover plate **23''** and thereby tension the spring of the balance which is connected thereto as described in the prior modification. The dual gear **80** and the worm screw **83** are angularly arranged so that upon release of a screwdriver, the gear teeth of the dual gear **81** and worm thread on the screw **83** lock to prevent rotation of cover plate **23'**. Thus automatic locking is provided for the tension adjusting means. The tension of the sash balance may thus be readily adjusted after installation in a frame member.

While the modification in Fig. 7 shows the headed screw **83** facing toward the front face of a dual-type sash balance, it is understood that screw **83** may be reversed in position so that the slotted head **84** is accessible to a screwdriver from the rear face of the sash balance.

It will be understood that the worm screw and gear arrangements of the modifications may be used in place of the biased locking element described in the first modification and that either of these means for adjusting the tension of the balance may be employed on either single or dual-type balances.

The tension means may, if desired, be preset at the factory for a selected weight and size of sash. In the event the balance is required for use on a different weight and size of sash, the balance may be readily adjusted in the field to accommodate the different sash. Preferably the spaced teeth on cover plate **23** are so arranged that turning of the cover plate to engage an adjacent tooth will represent a selected fraction of a pound of tension being applied to the spring. For example, turning the cover plate so as to move three teeth past the locking element may represent an increase or decrease of one pound of tension applied to the spring. Thus by counting the number of clicks that the locking element makes with the teeth, a carpenter may readily adjust the tension of the balance to a selected number of pounds.

It should be particularly noted that the housing, reel member, and cover plate may be conveniently cast and that the design thereof utilizes a minimum amount of metal. In addition, the design of the several parts facili-

tates efficient and rapid production and assembly of sash balances embodying this invention.

The means for rotatably mounting the cylindrical ring member should be particularly noted because the bearing surfaces upon which the ring member is rotated are located adjacent the outer circumference of the ring member and are in direct opposed relation, therefore providing accurate, non-wobbling mounting of the ring member. The cooperative engagement of the annular ribs on the cover plate and the end wall of the housing with the complementary recesses provided on the ring member prevents any twisting or misalignment of the ring member during operation from unusual loads which might be applied by the cable to the ring member.

The tension-adjusting means is located adjacent the outer circumference of the cover plate or the rotatable elements of the sash balance so that a maximum leverage is available when the cover plate is rotated for tensioning the spring. This maximum leverage is also effective for holding the cover plate against rotation when under selected tension.

The slotted face portion of the single-type balance provides a simple, effective, convenient arrangement for guiding the cable of the balance when the balance is installed in either the head member or side member of a window frame. The application of such a single-type balance is thus made more versatile.

It will be understood that various modifications and changes coming within the scope of the appended claims are embraced thereby.

I claim:

1. In a sash balance, the combination of: a housing having integral side walls and an end wall defining a cylindrical chamber provided with a circular open end; a post integral with said end wall and coaxially extending into said chamber; a circular cover plate for the open end and including an integral, central, hollow sleeve receiving said post and having an edge margin bearing on the base of said post and an internal flange bearing on said post adjacent the top thereof; an open-ended ring member received within said chamber in coaxial relation with said post and having oppositely and outwardly facing inner circumferential recesses; circular ribs formed on said cover plate and on the end wall of said housing extending into said oppositely facing recesses to afford bearing for said ring member; an outwardly directed flange integral with one edge of said ring member; a cable wound around the ring member; a plurality of circumferentially spaced teeth carried by the cover plate and received within a circumferential recess formed in the side walls of said housing; a locking element carried by the housing and biased into engagement with said teeth; the outwardly facing surface of one of said walls providing a face plate for said balance; said open-ended ring member being provided with an external tapered surface and said face plate being provided with spaced openings and a slot interconnecting said openings for passage of the free end of said cable therethrough whereby said balance is adapted to be selectively installed in a window frame.

2. In a sash balance, the combination of: a housing having integral side walls and an end wall defining a cylindrical chamber provided with a circular open end; a post integral with said end wall and coaxially extending into said chamber; a circular cover plate for the open end and including an integral, central, hollow sleeve receiving said post and having an edge margin bearing on the base of said post and an internal flange bearing on said post adjacent the top thereof; an open-ended ring member received within said chamber in coaxial relation with said post and having oppositely and outwardly facing inner circumferential recesses; circular ribs formed on said cover plate and on the end wall of said housing extending into said oppositely facing recesses to afford bearing for said ring member; a cable wound around the ring member; a plurality of circumferentially spaced teeth carried by the cover plate and received within a circumferential recess formed in the side walls of said housing; a locking element carried by the housing and biased into engagement with said teeth; said open-ended ring member being provided with an external tapered surface; and the outwardly facing surface of one of said walls providing a face plate for said balance.

3. In a sash balance, the combination of: a housing having integral side walls and an end wall defining a cylindrical chamber provided with a circular open end and an end closed by said end wall; a cover plate for said circular open end; means to axially position the cover plate with respect to the cylindrical chamber; said positioning means including an axial, outwardly extending post integral with the end wall and a hollow, central sleeve carried by the cover plate sleeved over said post and having an internal, ported flange bearing against said post adjacent its end; the end edge margins of said sleeve bearing on an enlarged base for said post; an open-ended ring member enclosed within said housing between the cover plate and said end wall; means for rotatably mounting said ring member including outwardly and oppositely facing recesses on inner margins of said ring member and cooperable, inwardly facing circular ribs on said end wall and said cover plate; a spiral spring means within said ring member having one end connected to said ring member and the other end connected to said sleeve on the plate; said ring member being provided with an external tapered surface; and means for locking said cover plate against rotation comprising teeth on said cover plate and a biased locking element carried by said side walls.

4. In a sash balance, the combination of: a housing having integral side walls and an end wall defining a cylindrical chamber provided with a circular open end and an end closed by said end wall; a cover plate for said circular open end; means to axially position the cover plate with respect to the cylindrical chamber; said positioning means including an axial, outwardly extending post integral with the end wall and a hollow, central sleeve carried by the cover plate sleeved over said post and having an internal, ported flange bearing against said post adjacent its end; the end edge margins of said sleeve bearing on an enlarged base for said post; an open-ended ring member enclosed within said housing between the cover plate and said end wall; means for rotatably mounting said ring member adjacent the circumference thereof including outwardly and oppositely facing recesses on inner margins of said ring member and cooperable, inwardly facing circular ribs on said end wall and said cover plate; a spiral spring means within said ring member having one end connected to said ring member and the other end connected to said sleeve on the plate; and means for maintaining tension on said spring means including a locking element carried by the housing cooperable with means on said cover plate.

5. In a sash balance, the combination of: a housing having integral side walls and an end wall defining a cylindrical chamber provided with a circular open end and an end closed by said end wall; a cover plate for said circular open end; means to axially position the cover plate with respect to the cylindrical chamber; an open-ended ring member enclosed within said housing between the cover plate and said end wall; means for rotatably mounting said ring member including outwardly and oppositely facing recesses on inner margins of said ring member and cooperable, inwardly facing circular ribs on said end wall and said cover plate; a spiral spring means within said ring member having one end connected to said ring member and the other end connected to said plate; and means for maintaining tension on said spring means including a locking element carried by the housig cooperable with means on said cover plate.

6. In a sash balance the combination of: a housing having side walls and an end wall defining a cylindrical cham-

ber provided with a circular open end and an end closed by said end wall; a cover plate for said circular open end; means to axially position the cover plate with respect to the cylindrical chamber; an open-ended ring member enclosed within said housing between the cover plate and said end wall; means for rotatably mounting said ring member including outwardly and oppositely facing recesses on margins of said ring member and cooperable inwardly facing circular means on said end wall and said cover plate; a spring means within said ring member having one end connected to said ring member and the other end connected to said plate; and means for maintaining tension on said spring means including a locking element carried by the housing cooperable with means on said cover plate.

7. In a sash balance the combination of: a housing having side walls and an end wall defining a cylindrical chamber provided with a circular open end and an end closed by said end wall; a cover plate for said circular open end; means to axially position the cover plate with respect to the cylindrical chamber; an open-ended ring member within the housing between the cover plate and said end wall; means for rotatably mounting said ring member including outwardly and oppositely facing bearing means on margins of the ring member and cooperable

inwardly facing bearing means on said end wall and cover plate; a spring means within said ring member having one end connected to said ring member and the other end connected to said plate; a locking element carried by said housing and a cooperable locking means on said cover plate for holding said spring means under selected tension.

8. A sash balance as claimed in claim 7 including a tapered external surface on said ring member.

9. A sash balance as claimed in claim 7 including a cable wound around said ring member; said housing being provided with a face plate having spaced openings and a slot interconnecting said openings for selective passage of the free end of said cable therethrough.

References Cited in the file of this patent

UNITED STATES PATENTS

479,150	Kimball	July 19, 1892
820,962	Erb	May 22, 1906
891,853	Neren	June 30, 1908
1,626,018	Wagniere	Apr. 26, 1927
1,762,821	Kersting	June 10, 1930
2,051,412	Lewis et al.	Aug. 18, 1936
2,679,659	Grupp	June 1, 1954