Sept. 15, 1959 R. F. VREDBERG 2,903,754

SLIDING-SASH BALANCE

Filed May 21, 1958 2 Sheets-Sheet 1

FIG. 1

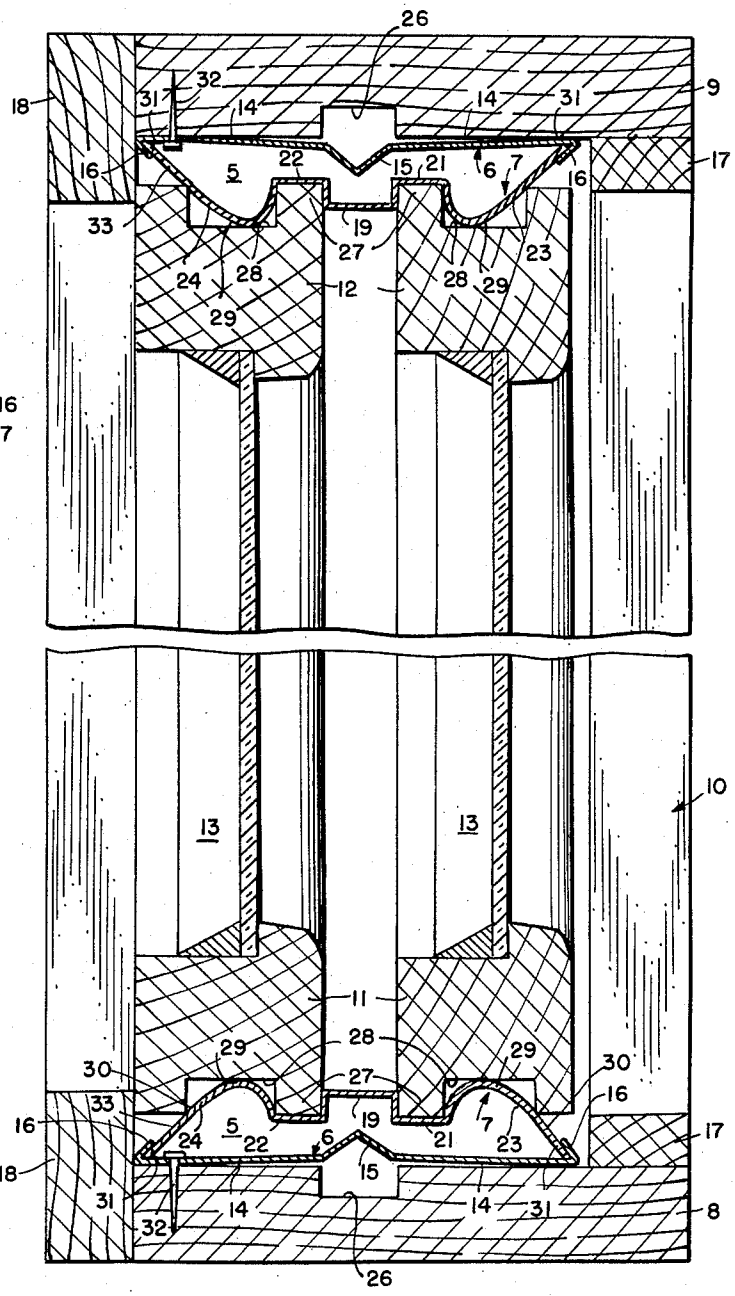


FIG. 3

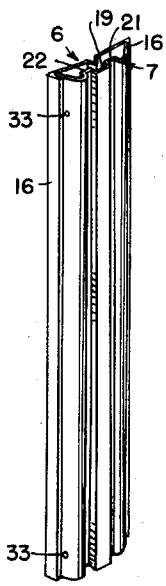
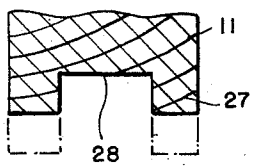


FIG. 2



INVENTOR:
ROBERT F. VREDBERG
BY Kenmuller & Snow
ATT'YS

Sept. 15, 1959 R. F. VREDBERG 2,903,754

SLIDING-SASH BALANCE

Filed May 21, 1958 2 Sheets-Sheet 2

FIG. 4

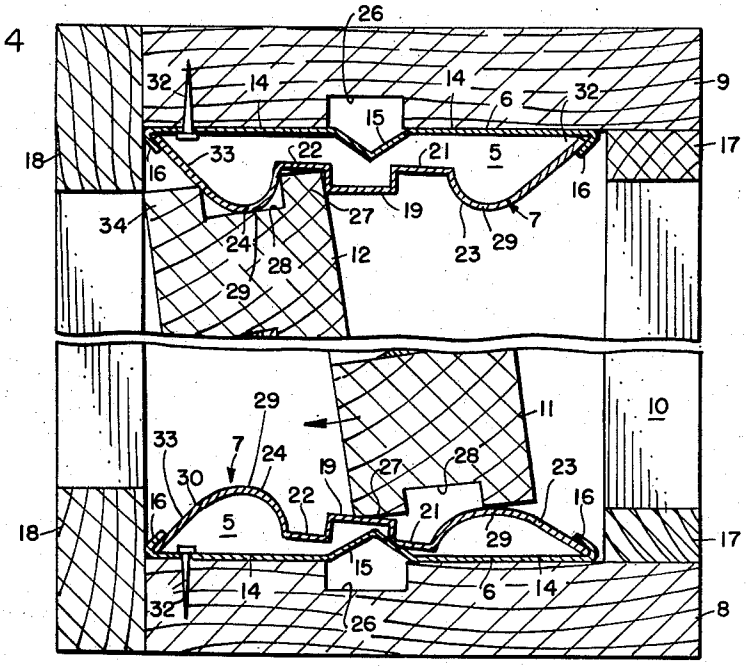
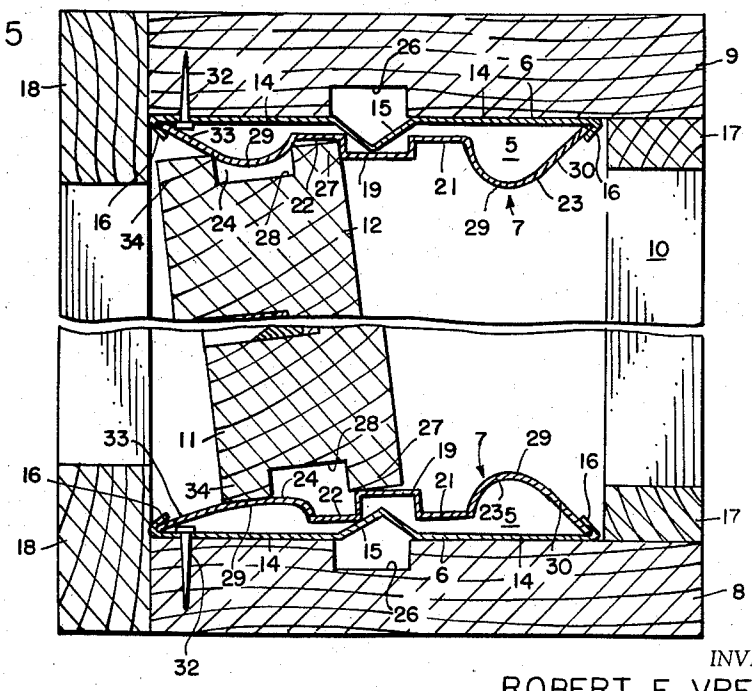


FIG. 5



INVENTOR:
ROBERT F. VREDBERG
BY Fennemore & Craw
ATT'YS

United States Patent Office 2,903,754 Patented Sept. 15, 1959

2,903,754

SLIDING-SASH BALANCE

Robert F. Vredberg, Chicago, Ill.

Application May 21, 1958, Serial No. 736,882

10 Claims. (Cl. 20—12)

This invention relates to balances for conventional, sliding window sash and particularly to sliding sash holding means of the friction-balance type.

The main objects of this invention are to provide an improved form of friction balance for holding slidably shiftable window sash in any desired position within the normal range of their movement; to provide an improved and simplified form of sash balance of this kind adapted to be secured to conventional window-frame jambs, between the conventional blind stops, and to frictionally engage in the ordinary grooved sash-stile so as to yieldingly center the sash in the plane of the frame between the frame jambs and permit easy shifting of the sash to and from its retention at any desired point possible within its range of movement; to provide an improved form of balance of this kind which permits facile horizontal transverse insertion of the sash into and removal from the frame as occasion may require; to provide a sash balance of this kind which frictionally seats in the conventional stile grooves and yet resiliently holds the individual sash in firm friction engagement with the parting stop as a weather seal; to provide an improved form of sash balance of this kind which yields automatically, transversely of the window frame, to accommodate conditions of expansion and contraction caused by the changing humid conditions of the ambient air; to provide an improved sash balance of this kind formed of resilient metal plates ready for attachment to the opposed window frame jambs to seat conventional sash after modification only to the extent of stripping thin pieces from the stiles; and to provide an improved form of sash balance of this kind which is so simple in construction as to be economically manufactured, easy to attach to the window frames, positive in their functioning, and practically free of the need for repair and/or replacement.

A specific embodiment of this invention is shown in the accompanying drawings in which:

Figure 1 is a transverse, sectional view of a conventional window frame and assembled sash equipped with sash balances constructed in accordance with this invention;

Fig. 2 is a fragmentary sectional detail of one edge of a sash stile showing in dotted outline the portion that needs to be stripped from the stiles to accommodate conventional sash for use with balances constructed in accordance with this invention;

Fig. 3 is a perspective view of a complete sash balance showing its lengthwise form.

Fig. 4 is a transverse, cross-sectional view of a conventional window frame, with intermediate portions broken away, showing how a sash is inserted when the frame is equipped with balances constructed in accordance with this invention; and

Fig. 5 is a view similar to Fig. 4 showing the final step of sash placement and how the sash is removed.

The principal concept of this invention is to provide a simple, resilient, frictional sash balance and guide means

for use with conventional window frames and conventional window sash, instead of the more costly spring or weight balance arrangements and specially constructed frame and sash combinations heretofore proposed; and to provide such a means in the form of a hollow resilient sheet metal structure having its front face formed with a central longitudinally extending rib projecting outwardly from coplanar flat surfaces which laterally connect with outwardly projecting rounded or arched sections having laterally and rearwardly extending margins which terminate rearwardly of the said coplanar flat surfaces so as to support the said rib and flat surfaces resiliently in forwardly spaced relation with respect to a transversely resilient rear wall of the structure.

In such a structure the central rib serves as a parting stop for the parallelly disposed sash and the arched sections provide the sash retaining guides for slidably supporting the sash; and the entire sash supporting and guiding front face of the balance means is resiliently yieldable both in the plane of the sash, to provide a frictional hold on the sash and retain it at any position to which it may be slidably moved, and transversely of the sash to maintain the sash elements against the central parting stop and to permit easy insertion or removal of the sash with respect to the sash frame, as will be hereafter described.

A window-sash balance **5**, embodying the foregoing concept, comprises a pair of plates **6** and **7** interlockingly assembled in spaced face to face relation and attachable to the opposed jambs **8** and **9** of a conventional window frame **10** to bear against the stiles **11** and **12** of each sash **13** and yieldingly position the sash in the frame **10** and hold them in slidably shiftable relationship within the frame **10**.

The plates **6** and **7** are preformed from stable, resilient metal and each is transversely arched for transverse resiliency, as will be shown. An aluminum alloy is preferred since it is rust proof, light in weight and easily formable. Also, as shown in section in the drawings, the preformed plates **6** and **7**, are connected together at their margins to form a hollow box-like structure, and a single balance unit **5** comprises an elongate member of like structure which extends the length of the window frame.

As shown, the base plate **6** has substantially flat side portions **14** extending laterally and rearwardly from a longitudinally-extending, inwardly projecting, medial V-shaped ridge **15** and inwardly-turned or reversely bent lateral flanges **16**. The width of the plate **6**, between the flanged edges, is substantially the same as the total thickness of the two sashes plus the thickness of the conventional parting stop and the inner blind stop **17** is preferably made slightly narrower to provide expansion space for the balance assembly for reasons which will be explained presently.

As shown, the outer or compression plate **7** is formed with a forwardly projecting, longitudinally-extending, rectangular-shaped medial rib **19**, a pair of oppositely-disposed coplanar flat sections **21** and **22** extending laterally outward from the base of the rib **19**, and forwardly arched lateral sections **23** and **24**. The medial rib **19** is made with an external width substantially the same as the width of the conventional parting stop, which it replaces and which ordinarily would be mounted in the groove **26** of the jambs **8** and **9**, and this rib **19** coacts with the blind stops **17** and **18** to provide the guideways between which the window sashes **13** slide and are held in their proper planes. The adjacent, coplanar flat portions **21** and **22** are made with a width substantially equal to that of the usual inner ridge **27** on the sash stiles **11** and **12**, formed by the conventional grooves or channels **28** normally provided in all standard sash

to enclose the cables for spring or weight balances, and the depth of these flat portions, inwardly of the rib **19**, is made at least sufficient to allow the sides of the rib **19** to have a firm enough bearing on the adjacent faces of the sash to keep them properly aligned in their respective operating planes.

The laterally extending arched portions **23** and **24**, of the compression plate **7**, are made with an involute form of curvature which normally rises sharply from the outer edge of the adjacent flat portion, curves outwardly to a rounded peak or crest **29**, and then falls away along a less sharply curved line which then flattens to a marginal edge portion **30**, disposed at about a 45 degree angle with respect to the plane of the flat portions **21** and **22** and terminating at a plane spaced rearwardly or behind the flat portions a distance of at least twice the heighth of the rib **19** forwardly of the said flat portions. Thus, as shown in Figs. 1 and 3, the rib **19** is located midway between the margins **30**, of the arched portions **23** and **24**, and the crest **29** of each arched portion is formed to lie substantially midway between the adjacent flat side of the rib **19** and the outer edge of the respective margin **30**. The reason for this is functional and will be explained hereafter.

The two plates **6** and **7** are assembled by compressing the side portions of the arched sections **23** and **24**, laterally inward to the extent necessary to seat or engage the outer edges **31** of the plate **7** in the bight of the flanges **16** of the plate **6**. This laterally compresses the compression plate **7** so that the entire body thereof is tensioned in arched spaced relationship to the flat sections **14** and V-shaped offset **15** of the base plate **6**. The plate **7** thus is held so that it may be flexed transversely, or from side to side, as well as toward the base plate **6** to distort its normal profile to permit the insertion of the sash **13** into and removal from the frame **10**, as indicated in Figs. 3 and 4, and as presently will be explained more fully.

Generally the plates **6** and **7** would be thusly assembled to provide a single balance unit for mouting in position on a window frame jamb, and such units of proper length may be secured to the respective jambs **8** and **9** by suitable fasteners as screws or nails **32** inserted through preformed holes **33** in the margin of the outer arched portion **24** of the plate **7**. Such fasteners may be set by any suitable device such as a nail punch or screw driver to force the fastener heads firmly against the margin of the plate **6** as shown.

In any event only few fasteners **32** are needed and as a general rule one adjacent each end of the plate **6** would be sufficient. Preferably the balance assembly **5** is secured in place with the outer lateral flanged edge snug against the outer blind stop **18** and with a space between the inner free edge and the inner blind stop **17**. This is done to permit a transverse shifting or lateral expansion of the plate **6** with respect to the mounting jamb, between the outer and inner blind strips **17** and **18**, as conditions may require. The conditions that might require such shifting may be the humidity of the ambient air causing a swelling of the outer sash or parts of the frame **10**, when constituted of wood. Other conditions that might cause such shifting or extension of parts would be changes in heat and cold. In any event, the width of the base plate **6** being less than that between the inner and outer blind strips **17** and **18** insures against the likelihood of the base plate **7** buckling, under any changes in the atmospheric conditions, and thereby cause a binding of the sash **13**.

As is indicated clearly in Fig. 1, a pair of these assembled sash balances, secured to the opposed jambs **8** and **9** in the manner just explained, will position the sash elements **13** in the same relative positions on the window frame **10** as is accomplished with the conventional spring or weight balances.

The inner ridges **27** of the sash stiles **11** and **12** seat on the flat sections **21** and **22** of the plate **7** between the medial parting stop **19** and the sharply curved inner margins of the respective arched sections **23** and **24**. Thus each sash is normally urged toward and held firmly against the parting stop **19** by the sharply rising curve of the resilient arched portions and this provides a sliding weather seal. Also the crowns **29** of the arched sections **23** and **24** extend into and substantially to the bottom of the stile grooves **28**, at substantially the center thereof, thus providing resilient rails or runners on which the sashes slide and are at the same time held firmly against the parting stop rib **19**.

Since, as previously explained, the balance assembly is narrower than the distance between the blind strips **17** and **18** and has its outer edge set up and secured against the blind strip **18**, the outer sash **13** is normally held firmly against the outer blind strip **18** (Fig. 1). Accordingly, there is a slight spacing of the inner sash **13** from the inner blind strip **17** to accommodate any swelling of parts of the sash or expansion of the balance assembly.

In order to use balances **5** of this construction, with the conventional window frame **10**, the only modification required of the sash **13** is cutting a narrow strip from each of the sash stiles **11** and **12**. Generally, these stiles have standard grooves **28** five-eights inch deep. Thus, by cutting a five-sixteenths inch strip from each stile (see Fig. 2), the outer sash **13**, when normally positioned in the frame by the counteracting forces of the opposed balances **5** of this improved construction, is positioned with ample overlap of the outer blind stop **18**, as shown in Fig. 1.

Thus positioned in the frame **10**, each sash **13** is free to be vertically shifted to any position within its range of sliding movement and each sash **13** will remain positively positioned at the point where shifting pressure is released.

Another, and material advantage, incidental to the use of balances **5** of this improved construction, is the facility with which the sash **13** may be inserted into and removed from the frame **10**. Fig. 4 shows the first step of a sash **13** being inserted; Fig. 5 shows the final step of sash insertion, or the first step of sash removal.

As Fig. 4 shows, the outer sash **13** is first positioned at an angle to the frame **10** with the groove **28** of the stile **12** seated on the crown **29** of the arched section **24** and the ridge **27** engaged in the flat section **22** of the one balance **5**. More or less concurrently with such positioning of the sash stile **12** the stile **11** is set in over the arched portion **23** of the opposite balance **5** and gradually pressed outwardly across the parting stop **19** toward the outer blind stop **18**. As shown in Fig. 4, the arched plate **7** of said opposite balance **5** yields compressively and laterally outward to a distortion of its normal profile sufficient to permit the stile **11** to pass over the parting stop **19**. As the stile **11** engages the arched portion **24** both balances become compressed and yield laterally inward, as shown in Fig. 5, to permit the stile **11** to seat its groove **28** on the crown **29** and locate the sash in its final position as shown in Fig. 1.

The outer sash **13** being thus positioned, the inner sash **13** is similarly set in place, except in this case the arched portion **23** and the entire inner half of the balance yields inwardly under compression, toward the inner stops **17**.

To remove the sash **13**, one at a time, it is only necessary to reverse the operation just described. Obviously, this requires first raising or lowering the respective sash **13** to permit the placing of one's hands over the top and bottom rails of the sash. The stile **11** is first pulled out across the yielding compression plate **7** of the one balance **5** to an angle similar to that at which the sash was positioned during its insertion into the frame **10**, and then, upon reaching a position where the stile **11** is clear, the sash may be withdrawn readily from its engagement with the other balance.

It will be noted that the inner blind stops **17** are made

with a thickness somewhat less than would ordinarily be used since they serve only as finishing strip and need only close the gap between the inner sash stiles 11 and 12 and the respective jambs 8 and 9. Also being of less heighth than normal the stops 17 will not interfere with removal of the sash and reinsertion, as may be necessary for repair or cleaning, after the initial installation has been completed. At the time of first installation, of course, the stops 17 are not in place. They are only installed afterward as a finishing means.

During initial installation of the improved sash balances it may be necessary to make adjustments because of variations in the manufactured widths of the preformed frames 10 and this can be done, after the sash have been installed, by merely inserting appropriate shims between the balances 5 and the jambs 8 and 9 from the free or unattached sides of the balances. The thickness of such shims can be readily gauged on the job to make certain that the balances will properly hug the sash to keep them firmly in place, free from rattle, and yet readily slidable to opened and closed positions.

The main advantages of this invention reside in the simple and efficient form and construction of the improved balances whereby they can be manufactured at a much lower cost than the similar devices heretofore proposed and be installed quickly by relatively unskilled labor with only the most simple tools. Also the improved balances can be made of standard lengths to fit all standard windowframes and, in the event that any trimming or shaping of the ends may be required, trimming can be done easily and quickly with ordinary sheet metal cutting means because of the relatively simple contour or form of the balance elements.

Other advantages are to be found in the fact that the resilient hugging of the sash will not only obviate rattle of the sash, while permitting free sliding movement thereof, but will also provide a secure weather seal and obviate any need for auxiliary weather stripping; in the fact that the individual sash can be readily removed and replaced without the need of tools and without any manipulation of secondary fastening means; and in the fact that the improved balances are at all times self-adjusting to compensate for expansion and contraction of the sash or frame structure due to temperature and humidity changes.

Although but one specific embodiment of this invention has been herein shown and described it will be understood that numerous details of the construction shown may be altered or omitted without departing from the spirit of this invention as defined by the following claims.

I claim:

1. A window-sash balance comprising a pair of resilient plates one of which plates is substantially flat and the other of which plates is formed with an outwardly and laterally arched portion on each side of and in spaced parallel relation with a central longitudinally extending outwardly projecting rib, the two plates being secured together along their lateral edges in superimposed relationship and with the arched portions of the said other plate extending to and terminating at the edge of said one plate whereby said other plate is maintained in flexed concave opposition to the one plate, the said one plate having a longitudinally extending ridge intermediate its lateral edges and projecting toward said superimposed other plate, and the last named ridge being adapted to yield resiliently in the transverse direction of the plate.

2. A window-sash balance comprising a pair of resilient plates one of which plates is substantially flat with inwardly extending lateral edge flanges and a longitudinally-disposed V-shaped ridge intermediate said flanges and the other of which plates is formed with a longitudinally-disposed outwardly projecting rectangular-shaped rib and with laterally and outwardly arched portions extending along opposite sides of the said rib in spaced relation therewith, the two plates being secured together by having the edges of the other plate seated under the lateral flanges of the one plate and with the arched portions and rib of the other plate maintained in spaced concave opposition to the one plate, whereby said other plate is transversely flexible in either direction relative to said one plate while secured thereto and both said plates are resiliently expansible transversely when under face to face compression.

3. A window-sash balance comprising a pair of resilient plates one of which plates is substantially flat with its side edges bent upon themselves to provide inwardly-extending lateral flanges, said one plate having a longitudinally-disposed V-shaped medial ridge, the other of which plates is formed with a rectangular-shaped rib disposed along the longitudinal median of the plate and with portions of the plate on opposite sides of the rib extending transversely outward in coplanar relationship and then arched outwardly to the opposite lateral edges, the two plates being secured together face to face by having the edges of the other plate seated under the flanges of the one plate with the rib and arched portions of the other plate maintained in spaced concave opposition to the one plate, whereby said plates are yieldable toward and away from each other in their face to face relation by transverse flexing of said arched portions and are transversely expansible resiliently in unison.

4. A window-sash balance comprising a pair of resilient plates one of which plates is substantially flat with inwardly-extending lateral flanges and has a longitudinally-disposed V-shaped medial ridge, the other of which plates is formed with a rectangular-shaped forwardly projecting rib disposed along the longitudinal median of the plate and with the portions of the plate on opposite side of the median ridge extending transversely outward in coplanar relationship and then arched forwardly and laterally to the lateral edges of the plate, the width of the thusly-formed other plate being greater than the width of the flanged plate, the two plates being secured together in face to face relation by having the lateral edges of the other plate seated under the flanges of the one plate with the arched portions and rib of the other plate maintained in spaced concave opposition to the one plate, whereby the said other plate is transversely yieldable relative to the one plate by flexing of the said arched portions while the said lateral edges remain seated and both plates are resiliently expansible when under face to face compression.

5. A friction sash balance comprising a face plate of resilient material adapted to be mounted longitudinally on the face of a window jamb, said face plate having a forwardly projecting longitudinal medial rib of rectangular cross section to serve as a parting stop for sliding sash operable in parallel planes, coplanar laterally extending flat portions on opposite sides of said rib at the base thereof, and a forwardly and laterally arched portion extending outwardly from each of said coplanar portions, each said arched portion being of substantially involute curvature rising rapidly from the respective flat portion to a rounded crest and then falling away rearwardly along a flattening line to terminate in a rearwardly projecting margin behind the plane of said flat portions, whereby said face plate when supported by said margins with one of the margins fixed is disposed with said rib and the arched portions in forwardly spaced relation with respect to the plane of said margins.

6. A friction sash balance comprising a face plate of resilient material adapted to be mounted longitudinally on the face of a window jamb, said face plate having a forwardly projecting longitudinal medial rib of rectangular cross section to serve as a parting stop for sliding sash operable in parallel planes, coplanar laterally extending flat portions on opposite sides of said rib at the base thereof, and a forwardly and laterally arched portion extending outwardly from each of said coplanar por-

tions, each said arched portion being of substantially involute curvature rising rapidly from the respective flat portion to a rounded crest and then falling away rearwardly along a flattening line to terminate in a rearwardly projecting margin behind the plane of said flat portions, whereby said face plate when supported by said margins is disposed with said rib and the arched portions in forwardly spaced relation with respect to the plane of said margins, the crest of each arched portion being located substantially midway between the adjacent side of said rib and the edge of the respective rearwardly projecting margin.

7. A friction sash balance comprising a face plate of resilient material adapted to be mounted longitudinally on the face of a window jamb, said face plate having a forwardly projecting longitudinal medial rib of rectangular cross section to serve as a parting stop for sliding sash operable in parallel planes, coplanar laterally extending flat portions on opposite sides of said rib at the base thereof, and a forwardly and laterally arched portion extending outwardly from each of said coplanar positions, each said arched portion being of substantially involute curvature rising rapidly from the respective flat portion to a rounded crest and then falling away rearwardly along a flattening line to terminate in a laterally and rearwardly projecting margin behind the plane of said flat portions, and a base plate having forwardly and inwardly turned marginal flanges, said face plate being mounted on said base plate in face to face relation and with the rearwardly projecting margins of the face plate engaged laterally in the bight of said flanges.

8. A friction sash balance comprising a face plate of resilient material adapted to be mounted longitudinally on the face of a window jamb, said face plate having a forwardly projecting longitudinal medial rib of rectangular cross section to serve as a parting stop for sliding sash operable in parallel planes, coplanar laterally extending flat portions on opposite sides of said rib at the base thereof, and a forwardly and laterally arched portion extending outwardly from each of said coplanar portions, each said arched portion being of substantially involute curvature rising rapidly from the respective flat portion to a rounded crest and then falling away rearwardly along a flattening line to terminate in a rearwardly projecting margin behind the plane of said flat portions, the crest of each arched portion being located substantially midway between the adjacent side of said rib and the edge of the respective rearwardly projecting margin, and a base plate having its side edges turned forwardly and inwardly upon themselves to provide marginal flanges, said face plate being mounted on said base plate in face to face relation and with the rearwardly projecting margins of the face plate engaged laterally in the bight of said flanges.

9. A friction sash balance comprising a face plate of

resilient material adapted to be mounted longitudinally on the face of a window jamb, said face plate having a forwardly projecting longitudinal medial rib of rectangular cross section to serve as a parting stop for sliding sash operable in parallel planes, coplanar laterally extending flat portions on opposite sides of said rib at the base thereof, and a forwardly and laterally arched portion extending outwardly from each of said coplanar portions, each said arched portion being of substantially involute curvature rising rapidly from the respective flat portion to a rounded crest and then falling away rearwardly along a flattening line to terminate in a rearwardly projecting margin behind the plane of said flat portions, and a base plate of resilient material having a longitudinally extending forwardly projecting laterally expansible ridge located between its side margins, said base plate having forwardly and inwardly turned marginal flanges, and said face plate being mounted in face to face relation with said base plate and with its rearwardly projecting margins engaged in the bight of the respective base plate flanges.

10. A friction sash balance comprising a face plate of resilient material adapted to be mounted longitudinally on the face of a window jamb, said face plate having a forwardly projecting longitudinal medial rib of rectangular cross section to serve as a parting stop for sliding sash operable in parallel planes, coplanar laterally extending flat portions on opposite sides of said rib at the base thereof, and a forwardly and laterally arched portion extending outwardly from each of said coplanar portions, each said arched portion being of substantially involute curvature rising rapidly from the respective flat portion to a rounded crest and then falling away rearwardly along a flattening line to terminate in a rearwardly projecting margin behind the plane of said flat portions, the crest of each arched portion being located substantially midway between the adjacent side of said rib and the edge of the respective rearwardly projecting margin, and a base plate of resilient material having a longitudinally extending forwardly projecting laterally expansible ridge located between its side margins, said base plate being of less width than said face plate and having forwardly and inwardly turned marginal flanges, and said face plate being mounted in face to face relation with said base plate and with its rearwardly projecting margins tensioned inwardly and engaged in the bight of the respective base plate flanges.

References Cited in the file of this patent

UNITED STATES PATENTS

2,307,647	Starck	Jan. 5, 1943
2,688,165	Kinish	Sept. 7, 1954

FOREIGN PATENTS

522,368	Canada	Mar. 6, 1956