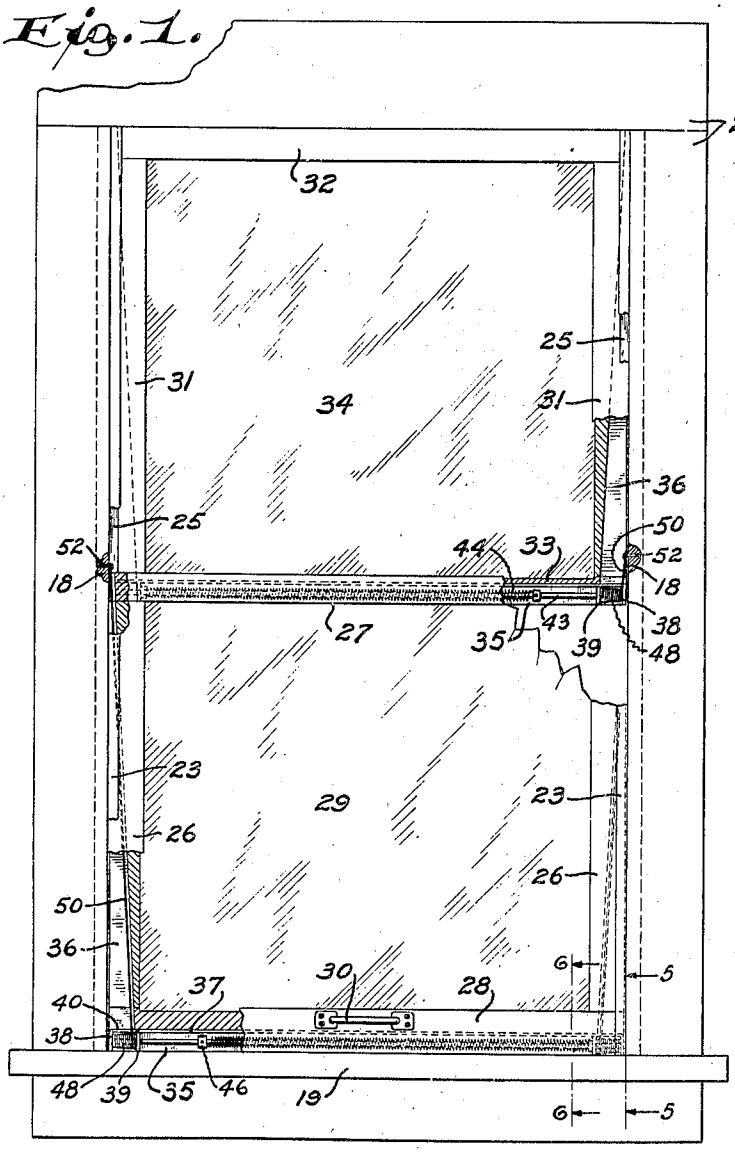
Nov. 18, 1941. R. J. BELLMANN ET AL 2,262,914

WINDOW ASSEMBLAGE

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Fig. 1.



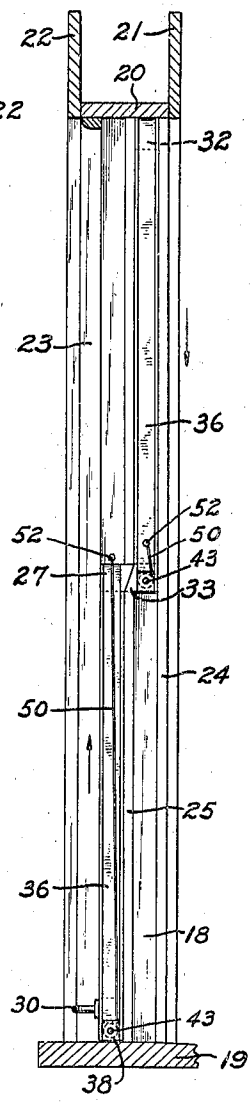


Fig. 2.

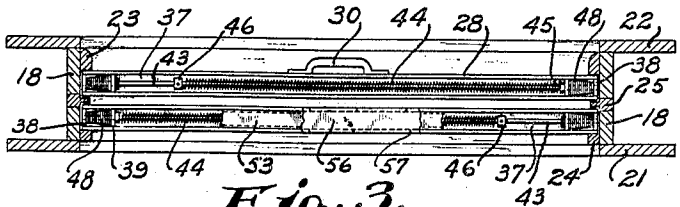


Fig. 3.

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WINDOW ASSEMBLAGE

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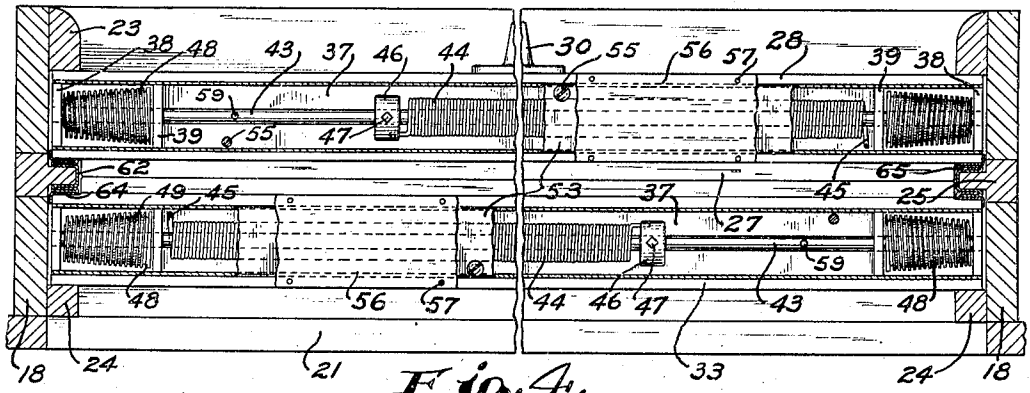


Fig. 4.

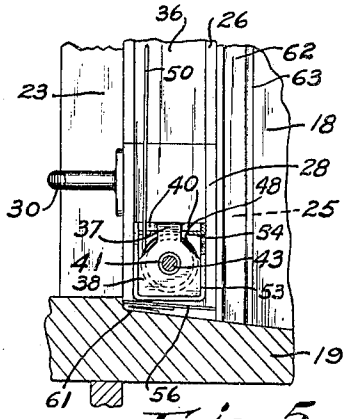


Fig. 5.

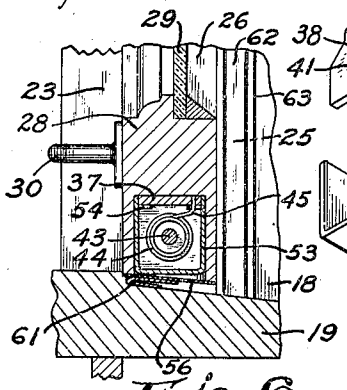


Fig. 6.

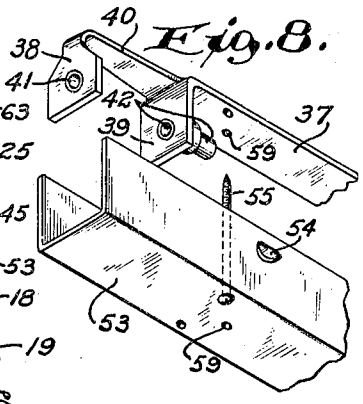


Fig. 8.

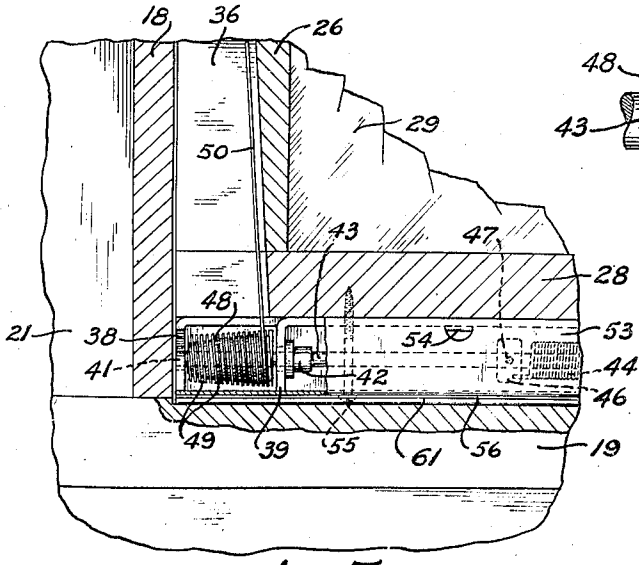


Fig. 7.

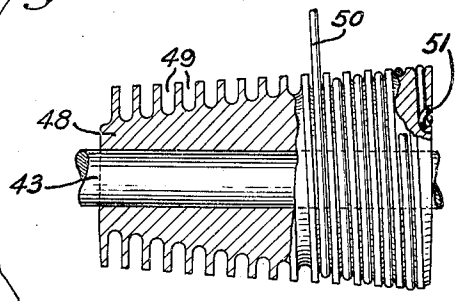


Fig. 9.

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WINDOW ASSEMBLAGE

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Fig. 10.

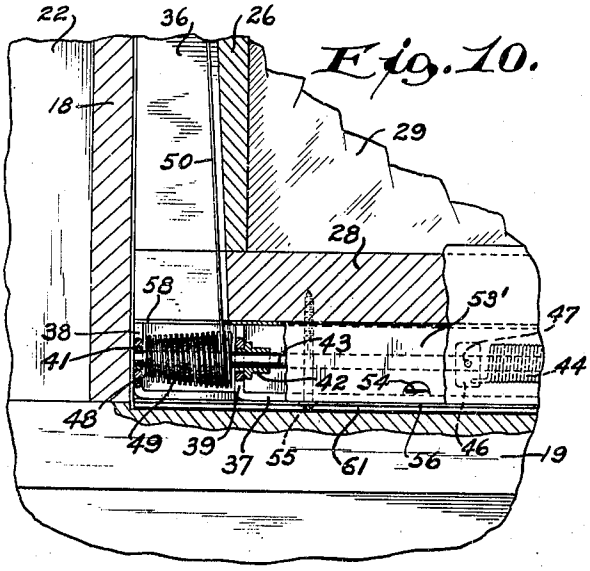


Fig. 13.

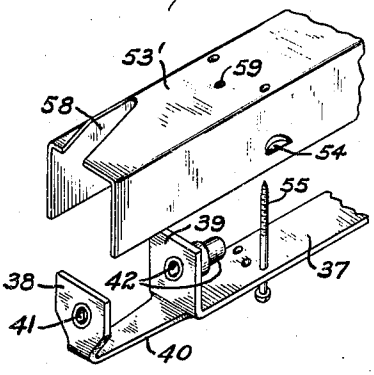
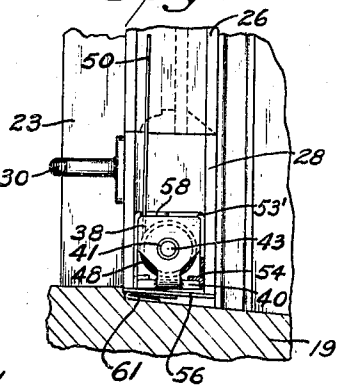


Fig. 12.



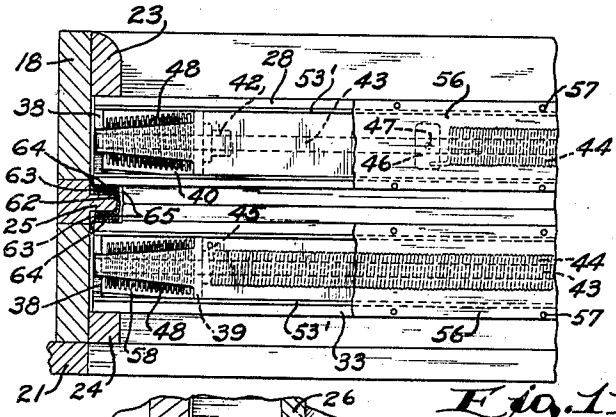


Fig. 11.

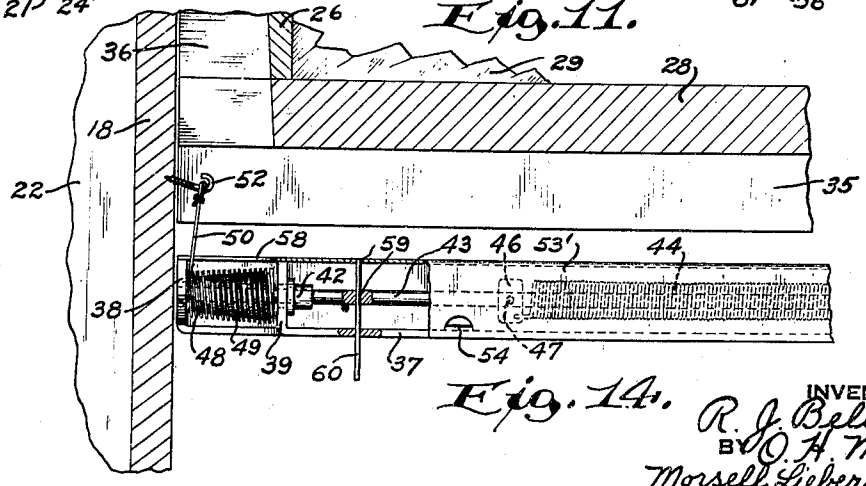


Fig. 14.

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Patented Nov. 18, 1941 2,262,914

UNITED STATES PATENT OFFICE

2,262,914

WINDOW ASSEMBLAGE

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Application February 23, 1940, Serial No. 320,344

4 Claims. (Cl. 16—198)

Our invention relates in general to improvements in the art of producing sliding closures, and relates more specifically to various improvements in the construction and operation of door or window assemblages having sliding sections or sash.

Generally defined, an object of our invention is to provide an improved sliding window assemblage having simple and effective means for retaining the sash in various positions of adjustment, while permitting movement of the sash with minimum effort.

It has heretofore been almost universal practice in the manufacture of sliding balanced sash windows, to utilize sash weights and cords coacting with pulleys on the opposite sides of the window frame, in order to facilitate opening and closing of the window and to retain the upper and lower sash sections in various positions of adjustment. The use of these weights is not only objectionable because of the necessary complications in the structure of the window frame with which the sash coacts, but also because of the fact that it is difficult to properly seal and insulate the building adjacent the frame due to the provision of elongated spaces in which the weights are movable and which therefore cannot be filled with insulating material. Then too, the sash cords frequently break or become otherwise inoperative, and these cords also present an unsightly appearance since considerable portions thereof are exposed to view when either of the sash sections is lowered.

It is therefore a more specific object of our present invention to provide a new and highly useful balanced sash assemblage for sliding windows or the like, which is extremely efficient in operation and can be completely installed in the sash sections alone so as to permit the use of a very simple window frame structure.

Another specific object of our invention is to provide a compact and durable spring actuated counterbalance for slidable closures, which can be readily applied directly to the closure section or sections, and wherein no unsightly cords, cables or chains are visible at any time.

A further specific object of the invention is to provide improved mechanism for effectively counterbalancing the weight of vertically slidable window sash or the like, which can be readily applied to the sash rail and stiles without objectionably increasing the sizes of these elements beyond standard dimensions.

Still another specific object of this invention is to provide an improved window counterbalancing unit which may be readily associated with standard window sash by a prospective user, which will re-enforce and enhance the strength of the sash to which it is applied, and which can be manufactured and sold at moderate cost.

An additional specific object of our invention is to provide a simplified, durable and compact spring and cord or cable actuated counterbalance which may be used effectively in conjunction with any type of upwardly and downwardly slidable closure comprising one or more movable sections.

Another additional specific object of our improvement is to provide a window counterbalance which may be carried entirely by and is concealable from view within the elements of a window sash, and which may be applied to the sash either at the factory or in the field.

Still another specific object of this invention is to provide an improved window assemblage having sliding sash coacting with resilient weather strips, which may be most effectively insulated and tightly sealed, and which has improved counterbalancing means cooperating with the weather stripping to facilitate adjustment of the sash and retention thereof in adjusted position.

These and other specific objects and advantages of our invention will be apparent from the following detailed description.

A clear conception of embodiments of the several features constituting our present improvement, and of the mode of constructing and of operating sliding windows equipped with the new counterbalances, may be had by referring to the drawings accompanying and forming a part of this specification wherein like reference characters designate the same or similar parts in the various views.

Fig. 1 is a part sectional front or inside view of a two sash vertically slidable window assemblage having portions broken away to reveal internal structure;

Fig. 2 is a longitudinal vertical section through the side portion of the frame of the window assemblage of Fig. 1, showing side views of the sash sections;

Fig. 3 is a transverse horizontal section through the lower portion of the frame of the window assemblage of Figs. 1 and 2, showing bottom views of the sashes with portions of the counterbalance covers removed.

Fig. 4 is an enlarged fragmentary bottom view of a pair of coacting sliding sashes, with the major portions of the counterbalance enclosing covers removed;

Fig. 5 is a similarly enlarged fragmentary vertical section taken through the window frame along the line 5—5 of Fig. 1, and showing a side view of the lower part of the lower sash;

Fig. 6 is a likewise enlarged fragmentary vertical section through the lower portion of the lower sash and frame, taken along the line 6—6 of Fig. 1;

Fig. 7 is a similarly enlarged vertical section taken through the lower corner of the lower sash and frame in a plane parallel to the glass;

Fig. 8 is a fragmentary perspective view of part of the support and closure for one of the improved counterbalances;

Fig. 9 is a further enlarged part sectional elevation of one of the helically grooved tapered cord winding drums;

Fig. 10 is a vertical section similar to that of Fig. 7, but showing a modified application of an improved counterbalancing unit to the bottom of the sash;

Fig. 11 is a fragmentary view similar to that of Fig. 4 but showing a bottom view of modified counterbalancing assemblages such as shown in Fig. 10;

Fig. 12 is another fragmentary view similar to that of Fig. 5, but showing an end view of the modified counterbalancing unit of Fig. 10;

Fig. 13 is a fragmentary perspective view of a part of the support and closure for the modified counterbalance; and

Fig. 14 is a partially dismantled fragment showing the mode of applying one of the improved counterbalance units to a sash.

While the invention has been shown herein by way of illustration, as being applied to a standard two sash window having definite dimensions, it is not our desire or intent to thereby unnecessarily restrict the scope or utility of the improvement, since the counterbalancing units are applicable to windows and other closures of various dimensions having one or more movable sections. The term "sash" as used herein should therefore be given an interpretation such that it will include any sliding closure.

Referring specifically to Figs. 1 to 9 inclusive, the improved counterbalanced window assemblage shown therein, comprises in general a simple main window frame having opposite vertical side jambs **18**, a lower sill **19**, a top plate **20**, outside and inside casings **21**, **22**, an adjustable inside stop **23**, a fixed outside or blind stop **24**, and parting stops **25**; a lower slidable section or sash having opposite side stiles **26**, top and bottom rails **27**, **28** respectively connecting the stiles **26**, and a panel or glass pane **29** secured within the stiles and rails, the lower sash also being provided with a handle **30**; an upper slidable section or sash also having opposite side stiles **31**, top and bottom rails **32**, **33** respectively connecting the stiles **31**, and a panel or glass pane **34** secured within the stiles and rails; a spring actuated sash retainer or counterbalance unit associated with each of the bottom rails **28**, **33** of the lower and upper sashes respectively; and resilient metallic weather strips associated with the parting stop **25** and stiles **26**, **31**, and with the lower sill **19**.

The main frame structure is of extremely simple construction, and the jambs **18**, lower sill **19** and top plate **20** thereof are not perforated or pierced by openings in any manner, being adapted for relatively snug insertion within wall openings formed between studs and headers. The wall insulation may therefore be brought directly against the outer surfaces of the frame to provide a tight seal, without interfering with sliding of the closure sections or sash within the frame, and the stops **23**, **24**, **25** may be formed and applied to the window frame in the usual well known manner, so as to permit ready insertion or removal of the sash sections.

The sash sections are also of relatively standard construction, except that the bottom rails **28**, **33** are provided with lower longitudinal recesses **35** extending from one side of the sashes to the other, and the side stiles **26**, **31** are provided with longitudinal tapered grooves **36** terminating at the ends of the rail recesses **35**. Each of the improved counterbalance or retainer units shown in Figs. 1 to 9 inclusive, comprises an elongated metal base plate **37** having its opposite ends provided with integral depending lugs **38**, **39** and with cut out portions **40** between these lugs; alined journal bearings **41**, **42** secured to the lugs **38**, **39** respectively; a shaft or rod **43** journalled for rotation within the bearings **41**, **42**; a helical torsion spring **44** embracing the medial part of the rod **43** between the lugs **39** and having its one end **45** fixedly secured to the plate **37** while its opposite end is secured to a collar **46** adjustably attached to the rod **43** by a set screw **47**; a pair of helically grooved tapered fusee drums **48** secured to the opposite ends of the rod **43** between the lugs **38**, **39** and each having a helical spiral groove **49** of gradually increasing depth formed on the periphery thereof; an elongated flexible element or cord **50** cooperable with the groove **49** of each drum **48** and having one end **51** knotted and secured to the corresponding drum while its opposite end portion extends upwardly through one of the cut outs **40** and is attached to the adjacent frame jamb **18** by means of a hook screw **52**; a U-shaped housing **53** adapted to enclose and conceal the rod **43**, spring **44** and drums **48** of each unit, and having lugs **54** cooperable with the plate **37**; and a plurality of fasteners such as screws **55** for holding each counterbalancing unit assembled and within the adjacent rail recess **35**.

All of the counterbalancing units may be of similar interchangeable construction, and the base plates **37** and housings **53** may be formed of sheet metal with the aid of punches and dies, while the lugs **39** may be welded or otherwise rigidly attached to the plates **37**. The units applied to the upper and lower sashes will preferably be so positioned that the springs **44** are reversely disposed as shown in Figs. 1 and 3, and after each retainer unit has been fastened into its receiving recess **35** by means of screws **55**, the recess may be covered and concealed by means of a thin closure strip **56** of metal or the like, held in place in any suitable manner as by small brads or screws **57**, or by formation of the strip with edge flanges snugly engaging front and rear surfaces of the rails. The tension of each spring **44** may be readily varied to suit conditions, by releasing the set screw **47** and by thereafter adjusting the collar **46** relative to its carrying rod **43**; and the cord winding fusee drums **48** may be rigidly attached to the end portions of the rod **43** between the base plate lugs **38**, **39** in any suitable manner. It is to be noted that the fusee winding drums **48** are tapered so that when a window sash is raised or lowered, the cord **50** coacting with the groove **49** of the corresponding drum **48** will wind up slower as the sash approaches its uppermost position due to the gradually decreasing diameter of the drum groove **49**, and will unwind faster as the same sash approaches its lowermost position, providing the speed of travel of the sash in either direction is uniform. The cables or cords **50** must be formed of durable material, and these cords **50** are always concealed within the stile grooves **36**. The ends of the cords **50** remote from the drums **48** are fastened to the frame jambs **18** by means of the screw hooks **52** in such manner, that when a cord is completely unwound its permanently fastened end will be near the top rail **27**, **32** of its sash, and

when the cord 50 is completely wound up the same cord end will be near the bottom rail 28, 33. It is this fastening of the cords 50 which maintains them constantly concealed within the stile grooves 36, see Fig. 1, and this is an important feature of the present invention.

The modified type of counterbalancing or retaining unit specifically illustrated in Figs. 10 to 14 inclusive, is quite similar to that shown in Figs. 1 to 9 inclusive, except for the relative disposition of the rod and spring supporting and confining elements. In this modification, the base plate 37 and the housing 53' are cooperable with each other as heretofore described, but these elements are reversely insertible within the lower recesses 35 of the bottom rails 28, 33 of the sashes. The cooperating supporting and concealing elements of the modification may also be held in assembled position and within the grooves 35 by means of screws 55; but because of the reversal of the housings 53', the opposite ends of each housing must be provided with a slot or opening 58 to permit passage of the cord 50 therethrough. While the notches 40 of the plate 37 are not necessary in the modified form, they may or may not be provided as they will do no harm and may facilitate removal of the units from the grooves 35.

In order to facilitate preliminary assembly of the counterbalancing units, and transportation thereof to the point of application to the sash sections with the springs 44 properly pre-set or tensioned, the shaft or rod 43, the plate 37 and the housing 53 of each unit may be provided with alined holes 59 adapted for the reception of a pin 60 as shown in Fig. 14. When the spring 44 of a unit has been properly adjusted and tensioned at the assembly plant, the pin 60 may be inserted in the holes 59 as shown, and the housing 53 and plate 37 may be tied together and thus retained until the unit is inserted within and is fastened to its receiving groove 35. The hook screws 52 of the cords 50 may then be applied to the jambs 18 of the receiving frames after the pin 60 has been removed, whereupon the unit is ready for use.

The window frames and sashes may either be constructed complete at the factory, or the grooves 35 and recesses 36 may be applied to the sash in the field. These recesses 36 and grooves 35 must however be properly formed as shown, to provide proper clearance for the cords 50 and to snugly receive and confine the units; and the top rail 27 of the lower sash should be formed for snug coaction with the bottom rail 33 of the upper sash along an inclined surface, when the window is closed, as in Fig. 2. In order to insure tight closing and to prevent rattling when the window is closed, it is also desirable to provide suitable weather stripping. As shown in Figs. 5, 6, 7, 10 and 12, the sill 19 may be provided with a resilient metallic weather strip 61 which is cooperable with the bottom rail 28 of the lower sash when this sash is in closed position, in order to afford a tight seal, and the top rail 32 of the upper sash may be caused to coact with a similar weather strip secured to the upper frame plate 20, if so desired. The parting stop 25 which extends from the upper plate 20 to the sill 19, is preferably provided with a U-shaped resilient metallic weather strip 62 having flanges 63 forming elongated recesses, and each sash stile 26, 31 has a resilient metallic weather strip 64 secured thereto and provided with a flange 65 which coacts with the adjacent flange 63 of the weather strip 62, in the manner shown in Figs. 4 and 11. While these coacting weather strip flanges 63, 65 provide for tight closure and sealing of the window when closed, they permit ready sliding of the sashes up and down, and the tension of the springs 44 should be so adjusted as to compensate somewhat for the resistance offered by the weather stripping.

When a window embodying the present improvement has been properly assembled, as shown in Fig. 1, either the upper or the lower sash may be vertically adjusted at will and will positively remain in adjusted position even if the window is subsequently subjected to considerable vibration. When either sash is elevated, the cords 50 associated with the winding drums 48 thereof will wind within the spiral helical grooves 49 so that when the sash is in its extreme elevated position, the cords 50 will be wound up, as shown in solid lines at the right of Fig. 1. When either sash is lowered to its extreme lowermost position, the cords 50 associated therewith will be completely unwound as illustrated in solid lines at the left of Fig. 1. When the cords 50 are completely wound up on the adjacent drums 48, the corresponding spring 44 will be subjected to minimum tension, and as the cords 50 are unwound, the corresponding spring will be subjected to gradually increased torsional tension. However, for any intermediate position of either of the sashes, the spring 44 will be subjected to a tension sufficient to counterbalance the weight of the sash and to compensate for the resistance offered by the weather strips 62, 64, and the sash will always be retained in any desired position of adjustment but may be readily shifted from such position into any other position with least effort on the part of the operator.

From the foregoing detailed description, it will be apparent that our present invention, provides an extremely simple, compact, durable and highly efficient counterbalance for sliding closures, which by proper design may be applied to closures or sashes of any shape or dimension. The improved counterbalancing units may obviously be applied to standard window sashes, and when properly applied the cords 50 are practically concealed at all times, thereby presenting a neat appearance. The construction of the window frame is obviously simplified by utilizing the improved counterbalancing units, and tight sealing of the building adjacent the frame is obviously made possible since no spaces for weights or the like are necessary. The improved window retaining units may also be applied to old or new windows, either at the factory or in the field, and by virtue of the fact that all units of a particular type are readily interchangeable with others of the same type, installation of these units is greatly facilitated. It has also been found that the manufacture of the improved counterbalancing units in quantity, is not excessive as compared to the former cord and weight counterbalancing means, and the improved counterbalance has also been found far more efficient and will more effectively retain the window sections or sashes in any desired position of adjustment while permitting more convenient manipulation of the sashes. It is also to be noted that the improved spring counterbalances may be adjusted to compensate for variations in the frictional resistance offered by weather stripping of various types, and there is a direct cooperation between the actuating spring of the im-

proved retaining unit and the metallic weather stripping. By utilizing closure plates 56, such as shown herein, the improved units may be totally concealed and effectively protected, and when the units are assembled, it is preferable to supply the journal bearings 41, 42 with a graphite lubricant so that subsequent attention is entirely unnecessary. It has also been found that by proper selection of cords 50, the life of these units may be considerably prolonged, thus eliminating annoyance and subsequent attention after the invention has been applied to a window. It is also noteworthy that while the bottom rails 28, 33 of the sashes may be somewhat weakened by the initial formation of the recesses therein, these rails are in fact re-enforced and materially strengthened when the metal frames and housings of the retaining units are finally snugly confined within these recesses. The final closure plates 56 may also be of diverse shape and attached to the rails in such manner as to further enhance the strength of the assemblage, and may be combined with the weather stripping so as to simplify the construction. The improvement has proven highly satisfactory in actual use and can be applied to standard windows at moderate cost by a novice.

It should be understood that it is not desired to limit this invention to the exact details of construction or to the precise mode of operation, herein shown and described, for various modifications within the scope of the claims may occur to persons skilled in the art.

We claim:

1. A sash balance unit comprising, a single narrow elongated plate having integral outer flanges at its extreme opposite ends and also having an integral inner flange spaced inwardly from each of said outer flanges, a thin rod supported in all of said flanges and being spaced from said plate, a fusee drum mounted upon each end of said rod between the adjacent outer and inner flanges, each cooperating set of said flanges being disposed closely adjacent to the ends of the intervening drum and the portions of said plate between each set of flanges being narrower than the medial plate portion between the inner flanges, a torsion spring embracing said rod between said inner flanges and cooperating with said drums to simultaneously rotate the same, a thin elongated U-shaped housing fitting snugly against all edges of all of said flanges and against the opposite sides of the medial portion of said plate but being spaced from said narrower plate portions to provide elongated openings adjacent to said drums, and a cable coacting with each of said drums and having one end attached to its drum and its opposite end extended through one of said elongated openings.

2. A sash balance unit comprising, a single narrow elongated plate having integral outer flanges at its extreme opposite ends and also having an integral inner flange spaced inwardly from each of said outer flanges, a thin rod supported in all of said flanges and being spaced from said plate, a fusee drum mounted upon each end of said rod between the adjacent outer and inner flanges, each cooperating set of said flanges being disposed closely adjacent to the ends of the intervening drum and the portions of said plate between each set of flanges being narrower than the medial plate portion between the inner flanges, a torsion spring embracing said rod between said inner flanges and cooperating with said drums to simultaneously rotate the same, a thin elongated U-shaped housing fitting snugly against all edges of all of said flanges and against the opposite sides of the medial portion of said plate but being spaced from said narrower plate portions to provide elongated openings adjacent to said drums, a cable coacting with each of said drums and having one end attached to its drum and its opposite end extended through one of said elongated openings, and common means for clamping said housing to said flanges and plate and for attaching the latter to a support.

3. A sash balance unit comprising, a single narrow elongated plate having integral outer flanges at its extreme opposite ends and also having an integral inner flange spaced inwardly from each of said outer flanges, a thin rod rotatably supported in all of said flanges and being spaced from said plate, a fusee drum secured to each end of said rod between the adjacent outer and inner flanges, each cooperating set of said flanges being disposed closely adjacent to the ends of the intervening drum and the portions of said plate between each set of flanges being narrower than the middle plate portion between the inner flanges, a torsion spring embracing said rod between said inner flanges and having one end secured to said plate and its opposite end secured to said rod, a thin elongated U-shaped housing fitting snugly against all edges of all of said flanges and against the opposite sides of the middle portion of said plate but being spaced from said narrower plate portions to provide elongated openings adjacent to said drums, and a cable coacting with each of said drums and having one end attached to its drum and its opposite end extended through one of said elongated openings.

4. A sash balance unit comprising, a single narrow elongated plate having integral outer flanges at its extreme opposite ends and also having an integral inner flange spaced inwardly from each of said outer flanges, a thin rod rotatably supported in all of said flanges and being spaced from said plate, a fusee drum secured to each end of said rod between the adjacent outer and inner flanges, each cooperating set of said flanges being disposed closely adjacent to the ends of the intervening drum and the portions of said plate between each set of flanges being narrower than the middle plate portion between the inner flanges, a torsion spring embracing said rod between said inner flanges and having one end secured to said plate and its opposite end secured to said rod, a thin elongated U-shaped housing fitting snugly against all edges of all of said flanges and against the opposite sides of the middle portion of said plate but being spaced from said narrower plate portions to provide elongated openings adjacent to said drums, a cable coacting with each of said drums and having one end attached to its drum and its opposite end extended through one of said elongated openings, and common screws penetrating said housing and plate for clamping the housing to said flanges and for attaching said plate to a support.

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