

Jan. 22, 1957

A. KAUFMAN ET AL
WINDOW CONSTRUCTION

2,778,068

Filed Aug. 24, 1954

3 Sheets-Sheet 1

Fig. 1.

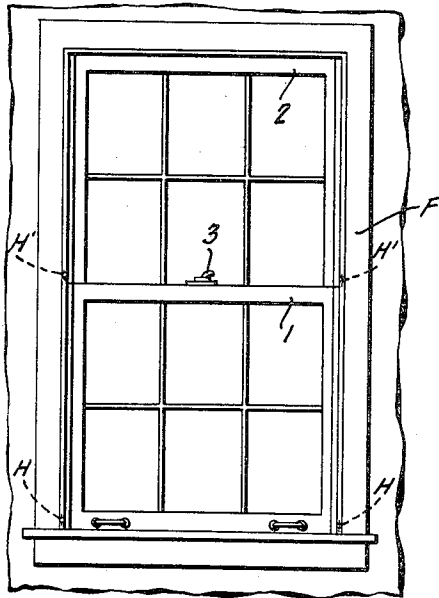


Fig. 2.

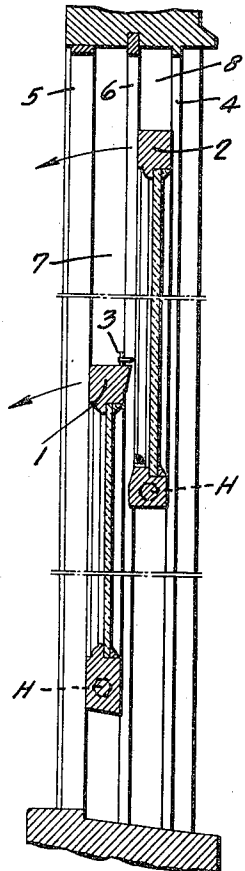
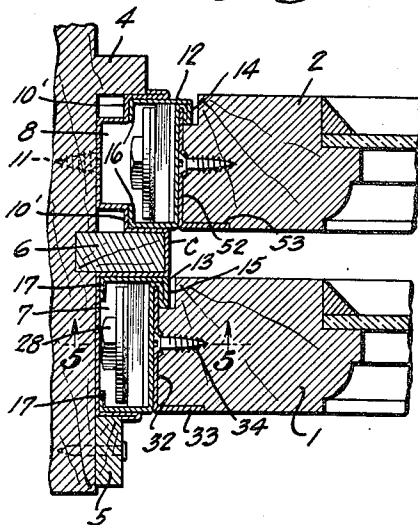


Fig. 3.



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Fig. 4.

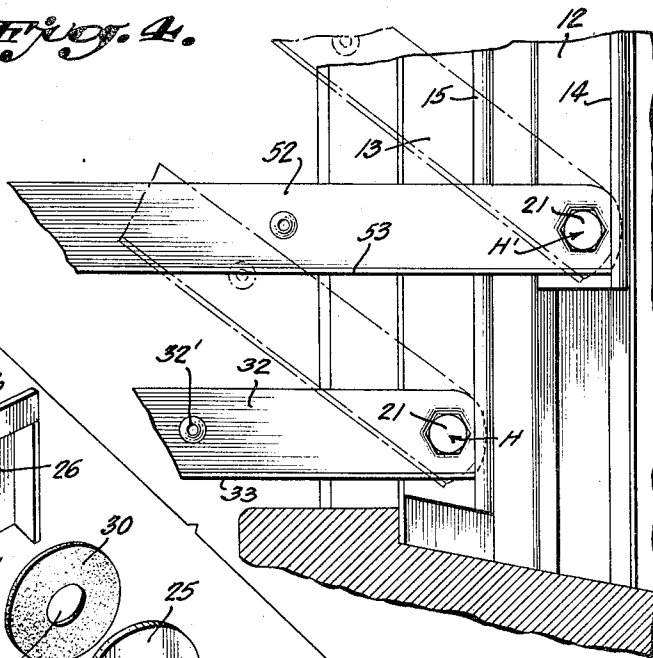


Fig. 6.

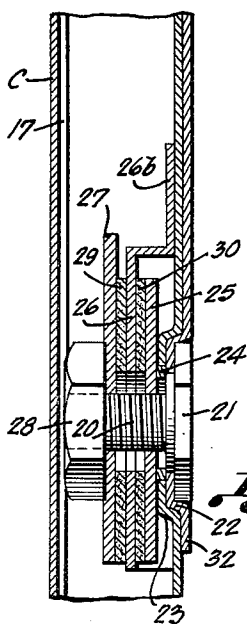
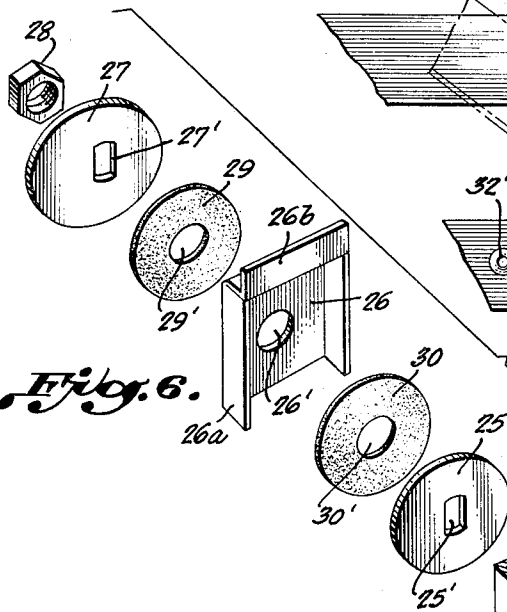
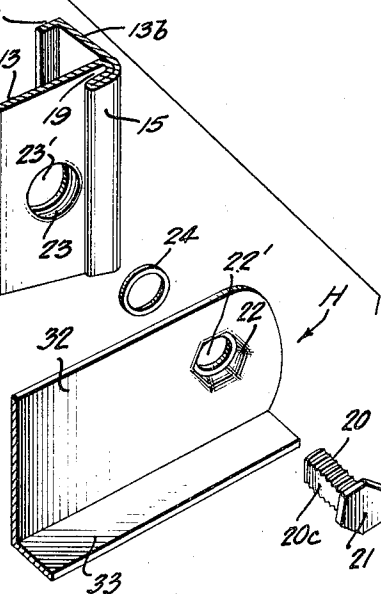


Fig. 5.



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Fig. 7.

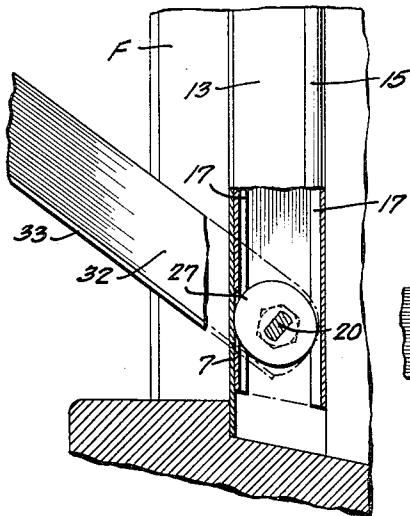


Fig. 8.

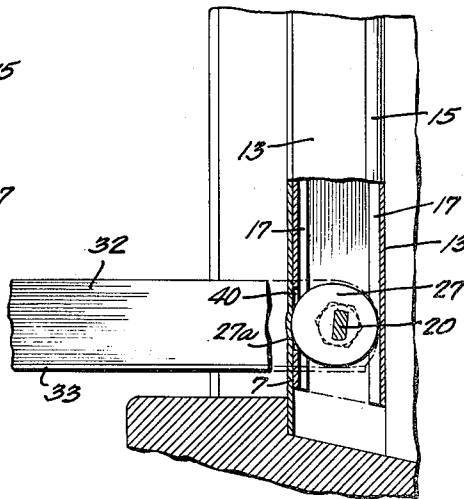


Fig. 11.

Fig. 9.

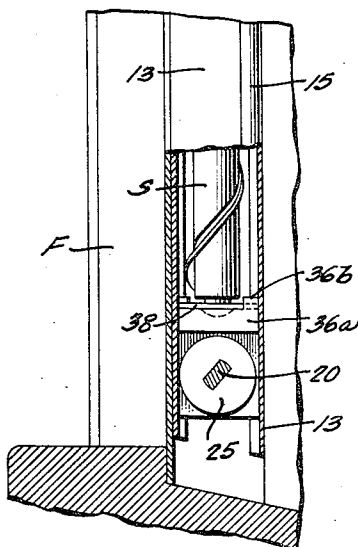
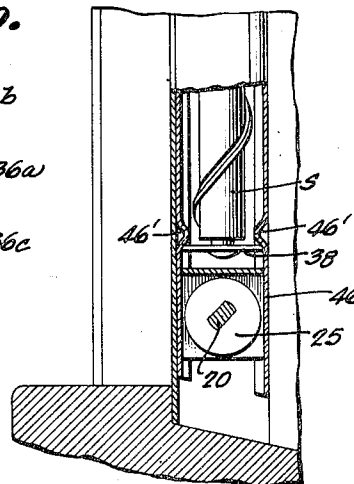
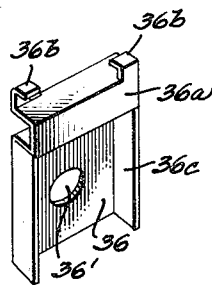


Fig. 10.



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2,778,068

WINDOW CONSTRUCTION

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Application August 24, 1954, Serial No. 451,839

5 Claims. (Cl. 20—49)

This invention relates to a window construction having slidable and horizontally swingable window sashes to permit convenient ventilation and cleaning of the window panes entirely from the interior of the building in which the window constructions are installed.

It is the object of the present invention to provide a window construction embodying one or more slidable and swingable window sashes which is characterized by a high degree of ruggedness and simplicity as well as economy in cost.

It is a further object of the invention to provide a window construction embodying slidable and horizontally swingable window sashes which are fitted with pivotal joints or hinges for the latter, which hinges are completely concealed, which improves the appearance of the entire assembly. Nevertheless, the concealed hinges are readily accessible to effect quickly and easily adjustments of the pivotal joints, in order to attain whatever frictional resistance may be required in the joints in dependence upon the weights of the window sashes, the air currents operating thereon, or other variable factors.

It is another object of the invention to provide a window construction embodying slidable and horizontally swingable window sashes which are fitted with concealed pivotal joints and which may be incorporated in either frictionally balanced sashes or sash balances of any type such as cord and counterweight, spring, rack and pinion, etc. The present window construction is particularly well adapted to be combined with spring sash balances of the type shown in Patent No. 2,329,463, September 14, 1943.

It is a further object of the invention to provide pivotal joints for slidable window sashes composed of relatively few parts of simple hardware which may be stamped from sheet metal and fiber, and processed at a low cost preliminary to their assembly in the window construction. The pivotal joint also incorporates a frictional lock which effectively binds the window sash in any position to which it may be swung and in addition the friction lock is designed to provide a limit stop for the window sash so that it may turn with utmost safety no more than 90° from its vertical position when the same is rotated for purposes of ventilation, cleaning, glazing or painting.

Other objects and purposes will appear from the detailed description of the invention following hereinafter, taken in conjunction with the accompanying drawings, wherein:

Fig. 1 is a front elevation of the window construction in accordance with the invention;

Fig. 2 is a vertical sectional view along the median line of the window construction showing the upper window sash in partly lowered position and the lower window sash in partly raised position;

Fig. 3 is a horizontal sectional view of the left stile of the window shown in Fig. 1, on an enlarged scale;

Fig. 4 is an enlarged right end view of the left stile of the window shown in Fig. 1;

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Fig. 5 is a vertical sectional view along line 5—5 of Fig. 3, showing the structural details of the concealed hinge in assembled condition;

Fig. 6 is an exploded perspective view showing the component parts of the pivotal joint shown in Fig. 5;

Fig. 7 is a right end view of a portion of Fig. 4 with certain parts in section to show the part of the concealed joint operating as a friction lock for the window sash in any adjusted position;

Fig. 8 is a right end view similar to Fig. 7 and illustrating the friction lock functioning as a limit stop to limit the swing of the window sash to 90° from its closed vertical position;

Fig. 9 is a right end view of a portion of Fig. 4 with certain parts in section to illustrate a different embodiment of the invention which combines the concealed hinge in accordance with the invention with a spring sash balance of a type known in the art;

Fig. 10 is a perspective view of the component part of the concealed hinge which interconnects a spring sash balance therewith; and

Fig. 11 is a right end view similar to Fig. 9 showing a different form of interconnection between the concealed hinge and spring sash balance for fixing the lower end of the latter in place.

In the drawings is shown a window frame F which may be of wood or metal construction in which is disposed a lower sash 1 and upper sash 2 and which may be provided with the conventional companion members of a locking device 3 on the meeting rails of the two window sashes. The sashes 1 and 2 may likewise be of wood or metal and may have multiple panes or a single pane. Guideways are provided in the opposite stiles of the window frame for the purpose of facilitating the vertical reciprocating movements of the window sashes 1 and 2, and these guideways are defined by outer retaining strips 4, inner retaining strips 5 and intermediate parting strips 6. The construction on each side of the window is congruous with respect to the opposite side and therefore the arrangement on only one side will be described in the interest of simplicity.

In addition to the vertical movements of the sashes 1 and 2 in the guideways provided in the opposite stiles of the window frame, the sashes are capable of pivotal or swingable movements inwardly about horizontal axes, in order to permit the cleaning of both faces of the window panes in the sashes from the interior of the building in which the window constructions are installed. In addition, the controlled tilting of both the upper and lower window sashes enables a convenient control of the ventilating effects upon the interior of the room. Therefore, pivotal joints H at the opposite bottom ends of the lower sash 1 and pivotal joints H' at the opposite bottom ends of sash 2 enable the swinging of the sashes in a counterclockwise direction as indicated by the arrows in Fig. 2.

Window constructions of the type generally described above and shown in the drawings have been known for many years and such constructions are exemplified by the structure shown in the U. S. patent to Wight et al., No. 1,658,317, February 7, 1928. The instant invention seeks to simplify such structural assemblies known heretofore.

On each side of the window, the guideway 8 for the upper window sash, between the strips 4 and 6, as well as the guideway 7 for the lower window sash, between the strips 5 and 6, are sheathed or lined with an integral sheet metal member C which also bridges the parting strip 6. This sheet metal member C is retained within the guideways of the stile and affixed thereto by means of fastening screws 11. In view of the fact that the spacing between the opposed bases of channels C at guideways 7 is greater than that at guideways 8, for the reason

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that the lower window sash 1 is wider than the upper window sash, a pair of offset shoulders 10', functioning as auxiliary bases, are provided in guideway 8 in order to compensate for the differences in width between the lower and upper sashes 1 and 2.

A sheet metal slide 12 extending substantially for the full length of the upper window sash is adapted to be sprung into each guideway 8 and is formed with a re-entrant flange 14 at its exposed part as well as with terminal flanges 16 at its concealed portion which serve to rigidify and strengthen the slide. The flange 14 is provided for the purpose of affording a weather stripping joint with the metal edging 52 affixed to the side of the window sash 2 when the window sash is coincident with the slide 12 for reciprocal up-and-down movement. The edging 52 joins with a front flange 53 at the front of the window sash.

Similarly a slide 13 for the lower window sash is formed by sheet metal channel having the weather stripping flange 15 at its exposed portion and retaining flanges 17 at its concealed portion for reinforcement purposes. The perspective view of slide 13 in Fig. 6 clearly illustrates the formation of both slides 12 and 13 which extend substantially for the height of each window sash on the opposite sides thereof and which normally travel therewith in the course of raising and lowering each window sash to any desired extent as indicated in Fig. 2.

The window in accordance with the instant invention presents a simplified construction by virtue of its adaptation to windows provided with sash balances of all types or to windows having no sash balances whatever. In the former case the chambers formed between the interior of the slides 12 and 13 and the guideways 7 and 8 of the channel C provide housings for the cords, spring mechanisms and the like which constitute component parts of the sash balance mechanisms; for example, Figs. 9 to 11 show a spring sash balance of the type disclosed in Patent No. 2,329,463 fitted in such spaces. In the latter case, the concealed joint in accordance with the instant invention is designed to provide a friction lock extending between the respective slide and guideway which becomes effective when the window sash is swung from its closed vertical position, which supplements the frictional force arising from the pressure of the front and rear walls of the slides against the adjacent walls of the metal lined guideways 7 and 8, respectively, which frictional hold tends to retain each window sash within its guideway in any set position, without the need for any counterbalancing weights or springs.

The lower window sash is provided on its opposite vertical sides with a rectangular edging having front portion 33 extending along the front of the window and a lateral portion 32 extending along the edge of the window sash for its entire extent, and this edging is maintained in integrated condition with the window sash by means of fastening screws 34 extending through stamped openings 32' at displaced points along the lateral wall 32 of the metal edging. It is desirable that the lateral wall of the sheet metal edge 32 of the window sash and the contacting face of the slide 13 adjacent thereto be maintained in closely fitting engagement in order to exclude the entry of air currents into the interior of the building. This weather-sealing function is assisted by the weather-stripping flange 15 which forms the groove 19 at the end of the face 13 of the slide, which groove accommodates therein the terminal edge of the lateral strip 32 as shown in Fig. 3. At the same time, the window sash may be swung forwardly of the flange 15 when it is desired to do so as clearly shown in Fig. 4, for the full extent of 90° shown in full lines. A simple fully concealed hinge joint is provided at each side in order to permit the pivotal movement of the window sash relative to the slide members 13, and is composed of relatively few parts, all of which are illustrated in Fig. 6.

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In Fig. 6 is illustrated, in an exploded view, the details of the hinge H for the lower sash 1, which is illustrated in assembled condition in the sectional view of Fig. 5 and which is indicated generally in the side elevational view of Fig. 4. The structural details of the hinge H' for the upper sash 2, which is pivoted to slide 12, and which slide reciprocates in guideway 8 are identical to those of hinge H, and the following description of the construction of hinge H applies as well to hinge H'.

The hinge H between the sheet metal edging 32 and the vertically reciprocating slide 13 is assembled upon threaded bolt 20 which is provided with a polygonal head 21 and which is capped by nut 28 on the end of the bolt opposite the head 21 within the channeled sheet metal slide 13. The head 21 of the bolt 20 is of small depth and is seated within a pressed countersunk seat 22 adjacent circular aperture 22' through which passes the shank of the bolt. The external surface of the head 21 is disposed flush with the interior surface of edging 32 so that it may present no obstacle to the flush mounting of the sheet metal edging 32 against the side of the window sash. The seat 22 is of polygonal outline in conformity with that of the head 21 so that the bolt can execute no relative rotation with respect to the edging 32. The polygonal convexity formed on the outer face of the sheet metal edging 32 or the face contacting slide 13 is designed to fit into an annular concavity 23 in the wall of the slide 13 which is formed with a circular aperture 23' for the free passage of the bolt 20 therethrough. A spacer washer 24 fits freely within the opening 23', which is of slightly greater diameter than circular opening 22', and surrounds the bolt 20 as the same extends into the chamber of slide 13 whereat is disposed a circular metallic washer 25 provided with an aperture 25' for the passage of the bolt 20 therethrough. The bolt 20 is provided with one or two flattened chords 20c and the aperture 25' is formed correspondingly so that the washer 25 executes rotation with the bolt 20. The ring washer 24 serves to bridge the space between the external surface of edging 32 at opening 22' and the disc washer 25 to facilitate rotary movement of these parts relative to the fixed slide 13, washer 24 functioning as a journal bearing at that point.

A non-rotatable central spacer 26 is disposed in the channel of slide 13 and its position within the channel is fixed by means of the upper offset 26b which lies adjacent to the wall 13 of the interior thereof and which fixes the spacing of the washer 26 from the wall 13 a predetermined amount. The front lateral wall 26a of the central spacer also serves as a brace for the front wall 50 of the channeled sheet metal slide on the side of the vertical slot 40 therein, the purpose of which is explained below. The spacer 26 is of rectangular outline so that the same is fixed within the channel and does not partake of the rotary movements of the bolt 20.

Fiber washers 29 and 30, explained in greater detail hereinafter, provided with circular apertures 29' and 30', respectively, flank each side of the fixed central spacer 26, washer 30 being disposed between rotary metallic washer 25 and fixed washer 26 while washer 29 is disposed between fixed washer 26 and another rotary metallic disc washer 27. The latter is provided with an aperture 27' corresponding to the cross-section of bolt 20 so that the washer partakes of the movement of the bolt, and the same may be of eccentric outline if a friction lock is sought to be attained, as described below.

The nut 28 is disposed on the opposite side of metallic washer 27 from washer 29 and serves to adjust the tightness of the hinge or pivotal joint which is concealed in its entirety within the channel of the slide 13.

The washers 29 and 30 are formed of special materials in order to impart a desired degree of compressibility thereto without affecting the smooth surfacing thereof so that the pivotal movements may be effected over long periods of time without destroying the tightness of the joint. These washers are known as "natural grade

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C canvas Lamitex washers" which are fabricated from canvas impregnated and pressed with urea-formaldehyde resins to attain a product of the Formica type. The areas of these washers are substantial in order to attain the necessary frictional forces and are preferably formed of $\frac{1}{32}$ " thickness with an outside diameter of $1\frac{1}{4}$ ", having an inside diameter of 0.382" in order to enable the same to be slipped over a $\frac{3}{8}$ " diameter bolt. The $\frac{3}{8}$ " diameter bolt may be $\frac{1}{2}$ " long with #24 threading at the end, and is provided with a special hexagon head of only $\frac{1}{8}$ " depth and the whole of which is cadmium plated.

It is a simple matter to adjust the bolts 28 in either of the pivot assemblies H or H' in order to vary the degree of tightness of the pivotal joints, this operation being very simple. In view of the smoothness of the fiber washers and the enforced rotation of the disc washers 25 and 27 with bolt 20, the degree of the tightness of the pivotal joint does not vary despite the repeated rotary movements of the window sash.

The hinge joint H as described above is duplicated on the right side of the window sash, some of the structural parts being correspondingly reversed in view of the obverse disposition of the assembly. Furthermore, as stated above, the construction of the pivotal joints H' on each side of the upper window sash is similar to the assembly described above and the bolts 28 in each of these assemblies may be easily turned to vary the tightness of the joints between the sheet metal edgings 32 and 52 relative to the slides 13 and 12, respectively.

In order to provide a compensating effect for the weights of the window sashes when the same are swung from their normally vertical positions, whether the same are associated with sash balances or merely friction balances, the metallic washer 27 of the hinge assembly is designed to perform an additional function besides acting as a component part of the adjustable compressible hinge assembly.

The slot 40 is provided in the front wall 13a of the slide 13 and a similar slot may be provided in the front wall of the slide 12 in alignment with the washer 27. As the window is tilted from its normal vertical position, the eccentric portion of the washer 27 protrudes from the interior of the channel through the slot 40 and engages the front wall of the guideway 7 to act as a friction lock therewith. The greater the extent of hinging movement, the greater the protrusion of the eccentric portion of washer 27 through opening 40 and the greater the binding effect exerted upon the wall of the guideway which is lined with metal sheath C. This is readily seen by a comparison of Figs. 7 and 8 wherein a small degree of swinging of the window sash results in a smaller extent of locking than is occasioned by a greater degree of swinging movement. In addition, the lower limiting edge 41 of the vertically extending slot 40 functions together with the contour of the eccentric washer 27 to act as a limiting stop against the swinging movement of the window sash beyond an angle of 90° from the vertical. This limiting position is shown in Fig. 8 in conjunction with a decided pressing of the washer against the front wall of the guideway 7 which preceded the positive stopping movement of the window sash against further turning. This friction lock may be provided on each side of the upper as well as the lower sash.

The non-rotatable central washer 26 may also serve additional functions in the assembly of the window construction and such additional functions are illustrated in Figs. 9 to 11. The washer 36, shown in Fig. 10, is provided with a circular aperture 36' for the passage of the bolt 20 therethrough and the wall 36a adjacent to the slide wall 13 is fitted with retaining prongs or hooks 36b which may overlie and retain in place the lower end plate 38 of a spring sash balance device of the type disclosed in Patent No. 2,329,463, September 14, 1943, part

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of which is fixed upon the window frame F while the spring assembly is housed within the channeled sheet metal slide 13.

In a different embodiment of the retainer, as shown in Fig. 11, the vertical walls 46 of the central washer may be extended upwardly and may be dimpled at 46' to overlie and retain the end portion 38 of a spring sash balance mechanism S, of the type disclosed in the aforementioned Patent No. 2,329,463. Thereby, the central washer may serve a dual function, which results in a simplification and an economy in the assembly.

The concealed hinge assembly described herein results in a window construction of pleasing appearance. The construction is easy to assemble and is capable of simple adjustment for tightness which remains effective for long periods of time.

While we have described our invention as embodied in a specific form and as operating in a specific manner for purpose of illustration, it should be understood that we do not limit our invention thereto, since various modifications will suggest themselves to those skilled in the art without departing from the spirit of our invention, the scope of which is set forth in the annexed claims.

We claim:

1. In a window construction wherein a window sash is slidable in a frame and swingable inwardly for cleaning and ventilating purposes, a channeled sheet metal slide mounted for reciprocating movement within a guideway of said frame, a window sash fitted with a sheet metal edging pivotally mounted to said slide at the lower end thereof with the adjacent contacting faces of said sheet metal slide and said sheet metal edging being in close frictional engagement for weather-sealing purposes, and a unitary pivoted joint between said slide and said edging comprising a polygonally headed bolt extending from said edging into the channel of said sheet metal slide whereat it is capped with a nut, the head of said bolt being seated in a correspondingly shaped recess in the face of said edging remote from said contacting faces to fix said bolt against relative rotation therewith, a convexity in said edging surrounding said bolt cooperating with an annular concavity in said sheet metal slide to permit rotary movement between said edging and said slide, and a plurality of apertured spacers including smooth compressible apertured washers mounted on said bolt between the head thereof and said nut to effect a controlled degree of compression of said convexity against said annular concavity which remains unaffected by the pivotal movements of said sash relative to said slide.

2. A window construction according to claim 1 wherein said bolt is flattened at least along one chord thereof and said plurality of apertured spacers comprises a non-rotatable central washer flanked on the opposite faces thereof with the said smooth compressible washers, and metal washers which are non-rotatable relative to said bolt, one of which is disposed on each remote face of each smooth compressible washer.

3. A window construction as set forth in claim 2 wherein one of said last-mentioned non-rotatable metal washers is adjacent to said nut while the other is adjacent to a ring washer surrounding said bolt and fitting freely within the concavity within said sheet metal slide.

4. A window construction as set forth in claim 2 wherein one of said last-mentioned non-rotatable metal washers is adjacent to said nut and is formed of eccentric outline, a slot in the front lateral wall of said channeled sheet metal slide in alignment with said eccentric washer, said washer being adapted to protrude through said slide when said sash is turned from its normal vertical position, thereby to press against the guideway in which said slide reciprocates to act as a friction lock for the window-sash in its outwardly swung position.

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5. A window construction as set forth in claim 4 wherein the lower boundary of the slot in the front lateral wall of said sheet metal slide is so correlated to the eccentric outline of the washer that the slot and the eccentric functions as a limit stop against the turning of the sash in excess of approximately 90°.

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