June 23, 1942. J. I. LEVYN 2,287,741

WINDOW STRUCTURE

Filed Aug. 10, 1939 4 Sheets-Sheet 1

Fig. 1.

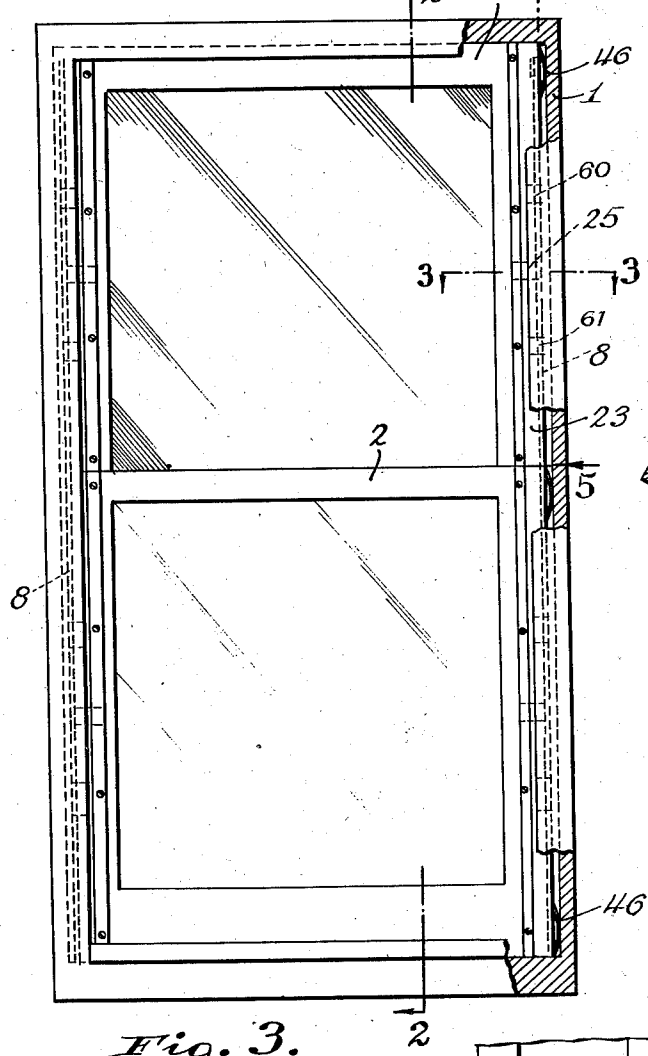


Fig. 2.

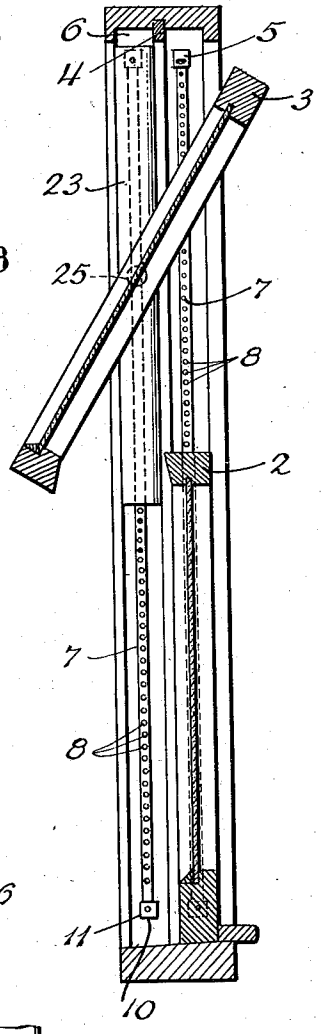
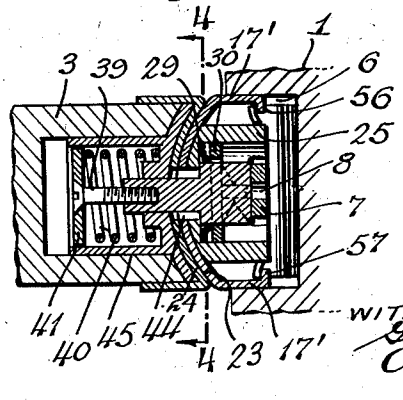


Fig. 3.



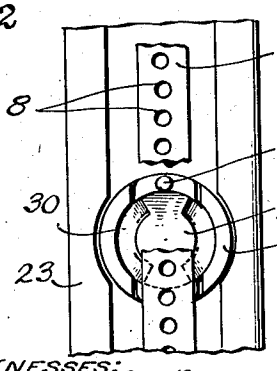


Fig. 4.

INVENTOR
JOSEPH I. LEVYN
BY

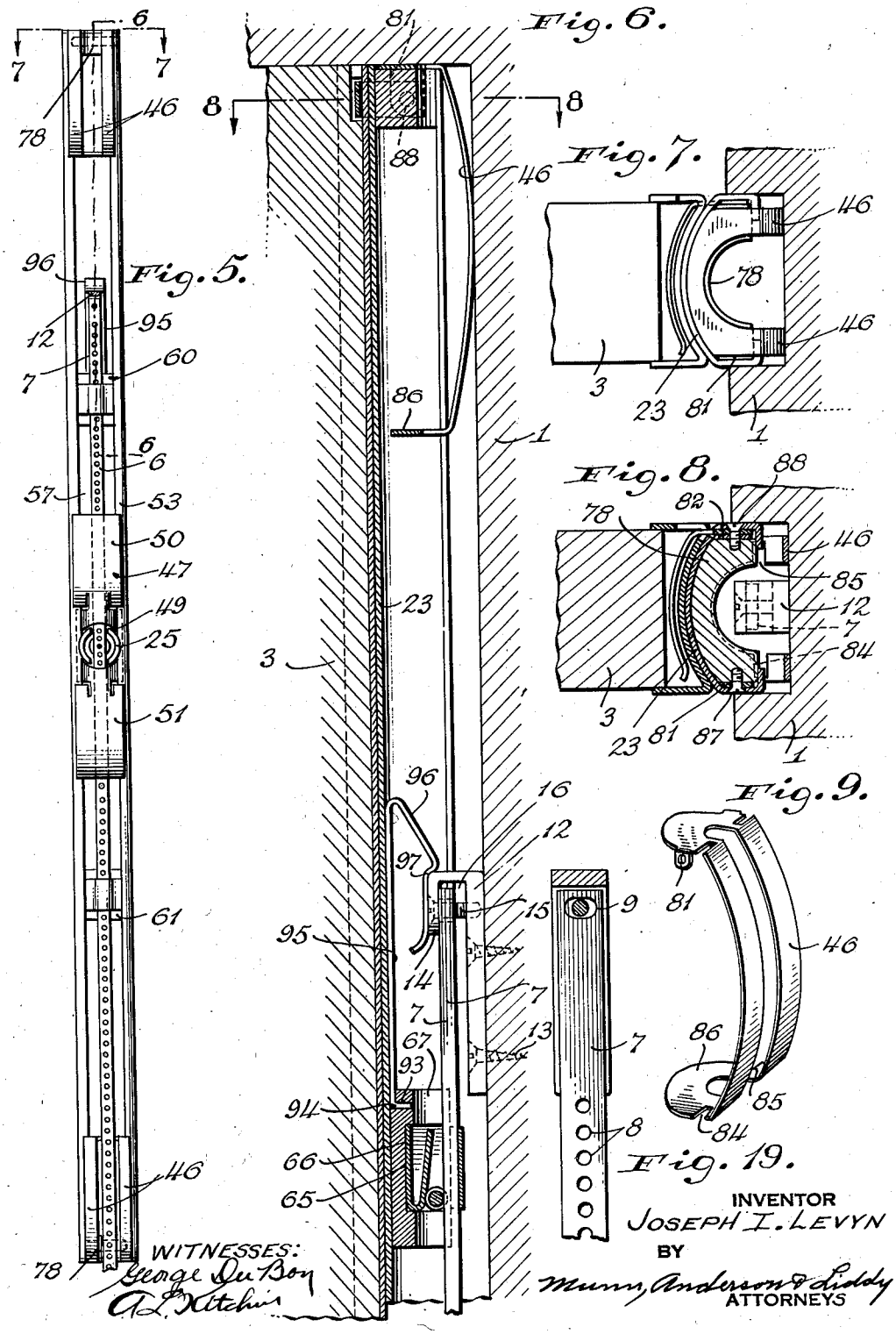
WITNESSES:
George Du Bois
A. L. Hutchin

Munn, Anderson & Liddy
ATTORNEYS

June 23, 1942. J. I. LEVYN 2,287,741

WINDOW STRUCTURE

Filed Aug. 10, 1939 4 Sheets-Sheet 2



WITNESSES:
George DuBoy
A. L. Hitchins

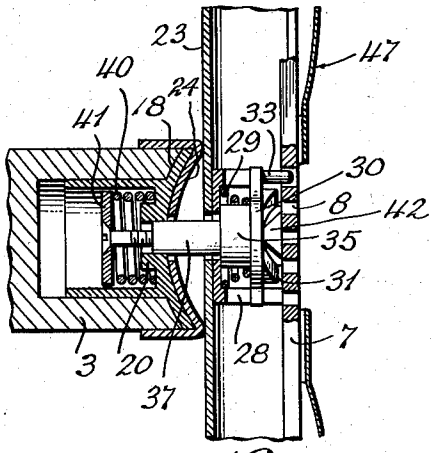
INVENTOR
JOSEPH I. LEVYN
BY
Munn, Anderson & Liddy
ATTORNEYS

June 23, 1942. J. I. LEVYN 2,287,741

WINDOW STRUCTURE

Filed Aug. 10, 1939 4 Sheets-Sheet 3

Fig. 10.



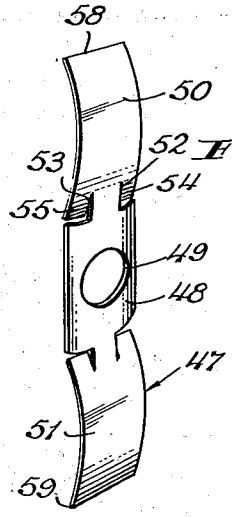
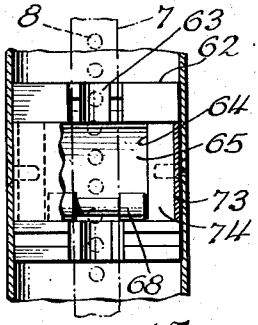


Fig. 11.

Fig. 12.

Fig. 13.



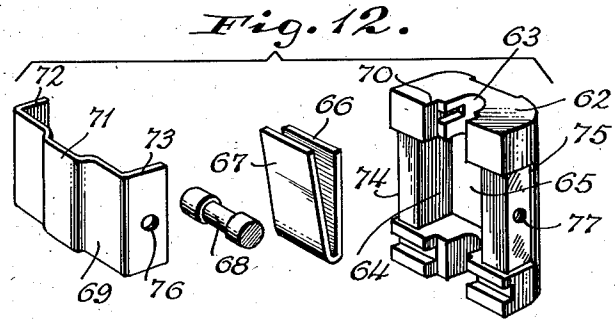
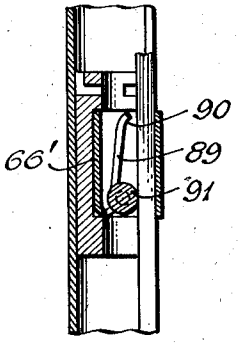
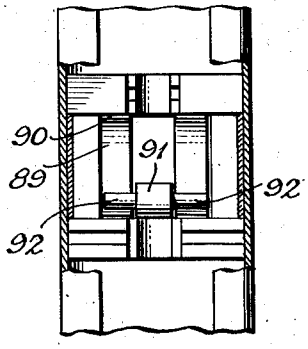


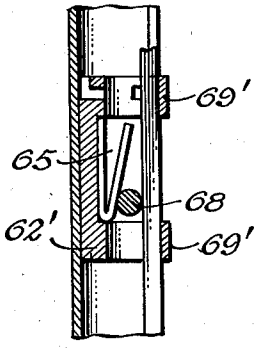
Fig. 15.

Fig. 14.

Fig. 16.







WITNESSES:
George DuBon
A. L. Kitchin

INVENTOR
JOSEPH I. LEVYN
BY
Munn, Anderson & Liddy
ATTORNEYS

June 23, 1942. J. I. LEVYN 2,287,741

WINDOW STRUCTURE

Filed Aug. 10, 1939 4 Sheets-Sheet 4

Fig. 17.

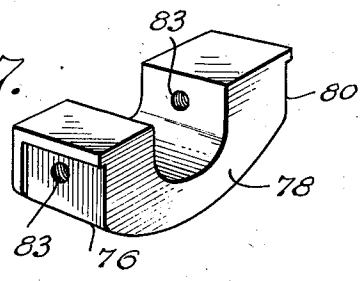
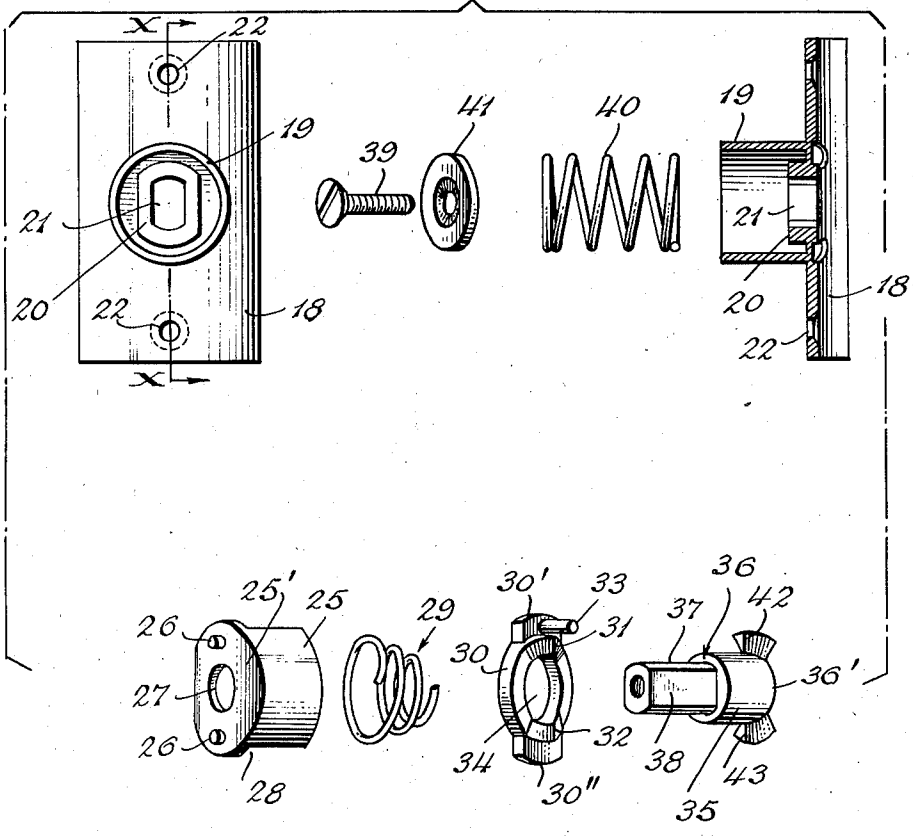


Fig. 18.



WITNESSES:
George Du Bon
A. L. Kitchin

INVENTOR
JOSEPH I. LEVYN
BY
Munn, Anderson & Liddy
ATTORNEYS

Patented June 23, 1942

2,287,741

UNITED STATES PATENT OFFICE

2,287,741

WINDOW STRUCTURE

Joseph I. Levyn, Brooklyn, N. Y.

Application August 10, 1939, Serial No. 289,381

4 Claims. (Cl. 20—49)

This invention relates to window structures and has for an object to provide an improved construction designed to eliminate the use of chains or ropes and counterbalances for supporting the respective sashes.

Another object of the invention is to provide a window structure wherein the usual counterbalances are eliminated and the parts formed so that either sash may be swung from a vertical position at various heights.

An additional object is to provide a window structure wherein the sashes may normally be raised and lowered as desired and wherein the sashes may also be tilted from the vertical and locked against up-and-down movement while in a tilted position.

An additional and more specific object is to provide a window structure wherein the sashes may normally slide up and down and be held in any desired relation but may also be tilted at substantially any point from the vertical and locked in tilted position without interfering with the means for frictionally holding the sashes in various vertical positions.

In the accompanying drawings—

Fig. 1 is a front view of a window structure disclosing an embodiment of the invention, certain parts being broken away to better illustrate certain details;

Fig. 2 is a sectional view through Fig. 1 approximately on the line 2—2;

Fig. 3 is an enlarged fragmentary detail sectional view through Fig. 1 on the line 3—3;

Fig. 4 is a view looking at the right-hand part of Fig. 3 when viewing the same on the line 4—4 of Fig. 3;

Fig. 5 is an edge elevation of the mechanism on one side of a window sash, said elevation being viewed from line 5—5 of Fig. 1;

Fig. 6 is an enlarged sectional view through Fig. 5 approximately on the line 6—6;

Fig. 7 is a sectional view looking from line 7—7 of Fig. 5;

Fig. 8 is a sectional view through Fig. 6 on the line 8—8;

Fig. 9 is a detail perspective view of one of the spring friction members embodying certain features of the invention;

Fig. 10 is a view similar to Fig. 3 but showing the window sash and associated parts turned to a position at right angles to that shown in Fig. 13;

Fig. 11 is a perspective view of a central spring structure embodying certain features of the invention;

Fig. 12 is a view showing the friction balance with the parts in perspective and separated to illustrate their general structure and relation;

Fig. 13 is a front view of the structure shown in Fig. 12 after the same has been assembled with certain parts broken away;

Fig. 14 is a view similar to Fig. 13 but showing a slightly modified construction;

Fig. 15 is a sectional view through Fig. 14 on the line 15—15;

Fig. 16 is a view similar to Fig. 15 but showing a slightly modified construction;

Fig. 17 is a retaining block for holding the spring illustrated in Fig. 9 in functioning position;

Fig. 18 is a view of the locking structure shown in Fig. 3 with the parts in perspective and slightly spaced apart;

Fig. 19 is an elevation of the upper end of the sash bar shown in Fig. 5.

Referring to the accompanying drawings by numerals, 1 indicates a window frame which may be of any conventional structure and which is provided with inner and outer window sashes 2 and 3. A parting strip 4 of any desired structure is provided for providing inner and outer runways 5 and 6 which accommodate the respective inner and outer sashes 2 and 3. In the present invention means have been provided which are connected respectively to the sashes and to the window frame 1 for frictionally supporting the respective sashes in any desired height in the runways 5 and 6 without the use of counterbalances and accompanying chains or cords. The parts are so constructed and proportioned that either sash may be raised or lowered easily and when released will automatically remain in the new adjusted position. In addition, each sash may be tilted from the vertical and as soon as this occurs certain special mechanism embodying certain features of the invention will function to lock and positively hold the sash against vertical movement while allowing free pivotal movement. This will allow any one to wash both the inside and outside of the window pane whenever desired. Also, the respective window sashes may be tilted for ventilation at substantially any height in their respective runways. As both sashes are identical except one is an inner sash and the other an outer sash, a description of sash 3 will also apply to sash 2.

As shown particularly in Figs. 1, 2 and 6, there is provided a rectangular rod 7 in each of the runways 5 and 6, that is, two on the right-hand side of the frame 1 as shown in Fig. 1, and two

on the left-hand side. Each of the rods 7 is provided with a number of spaced apertures 8 and at the upper end a transversely elongated aperture 9. At the lower end each rod may be placed in a suitable fitting 10 and an ordinary wood screw 11 applied. At the upper end, however, there is provided a special hook-shaped member 12, as shown at the lower part of Fig. 6. This member is held in place by suitable wood screws 13 and a hook extension 14 is provided with an aperture through which a screw 15 extends into the body part of the hook structure 12 and loosely extends through the aperture 9 in the rod 7. Where a carpenter is inexperienced in mounting a window of this kind or where there is a little carelessness in mounting the same, the slot or aperture 9 will permit a side motion while the space 16 will permit a small motion in and out from the bottom of the runway. This will prevent any binding of the friction balance hereinafter fully described or of any of the other parts as the respective sashes are moved up and down even if the rod is somewhat incorrectly mounted. The extension 14 also functions in an additional manner as hereinafter fully described.

The respective rods 7 and their associated hook structures 12 and fittings 10 are the only parts which are connected directly to the frame 1. The remaining parts are connected either directly to the respective sashes or present a floating structure between the sashes and the window frame 1. The rods 7 and associated parts may be made of brass, steel, or other suitable metal, and the respective apertures 8 may be spaced one-quarter of an inch apart, or any other distance as may be desired.

As illustrated in Fig. 3, the sash 3 is provided with certain parts substantially centrally between the top and bottom and these parts coact with what may be termed a slide bar 17. The slide bar 17 is shown as fitting into the runway 6 in Fig. 3 and extending longitudinally thereof. The sash 3 is also shown in this figure as extending longitudinally of the runway, but in Fig. 10 the sash 3 is shown as having been turned at right angles to the slide bar 17 and the runway 6. The structure shown in Figs. 3, 10 and 18 acts as means for pivotally supporting and locking the sash when in other than a vertical position. This locking structure or pivoted lock is shown in detail in Fig. 18, from which it will be seen that there is an arc-shaped plate 18 having a tubular upstanding member or housing 19 projecting from the convex surface thereof and in this housing an upstanding boss 20 is provided with an opening 21 round at the ends and flat at the sides. The slide bar 17 is shown in cross section in Fig. 3 and is hollow throughout and provided with a pair of side walls 17' and 17'' and an arc-shaped outer friction surface 23 cotacting with the arc-shaped friction member 24 secured by screws or otherwise to the sash 3. The members just described are preferably of aluminum or other suitable metal and by reason of their arc-shaped structure, as shown in Fig. 3, the slide bar 17 will move to the right as shown in Fig. 3, when the sash is swung to the position shown in Fig. 10.

As shown in Fig. 18, there is a tubular guide 25 having pins 26 extending into suitable apertures in the friction member 23 of slide bar 17, whereby it is prevented from independent rotation. The guide 25 is provided with a round aperture 27 in the bottom and slots 28 on diametrically opposite sides. A locking bolt 35 is fitted into guide 25 and also a small or auxiliary spring 29 is placed in the guide around the body of a bolt 35. On top of the spring 29, a cam plate 30 is positioned. Cam plate 30 has a pair of radially extending ears 30' and 30'' respectively projecting into the slots in guide 25, cam members 31 and 32 and a locking or pivotal pin 33. The plate 30 has an aperture 34 sufficiently large to permit a projection 37 of bolt 35 to extend therethrough and through the bottom of the tubular guide 25. The projection 37 has flat sides 38 so that the projection may readily slide into and through the opening 21 so as to receive a screw 39. A comparatively large spring 40 surrounds the projection 37 and is held in functioning position by a washer 41 and screw 39, as shown in Figs. 3 and 10. From Fig. 3 it will be seen that the bolt 35 rests on the bottom of the tubular guide 25 and is normally held against the same by the spring 40. This arrangement takes away wear on ears 30' and 30'' and cams 31 and 32. The bolt 35 is provided with diametrically oppositely extending cams 42 and 43 which coact with the cams 31 and 32 for causing the projection 37 to move longitudinally against the action of spring 40 when the sash is swung to a horizontal position, as shown in Fig. 10. As illustrated in Fig. 3, the cams 42 and 43 are resting on cams 31 and 32 but when swung to the position shown in Fig. 10 they will not rest on cams 31 and 32 so that spring 29 will move plate 30 and pin 33 to the right, as shown in Figs. 3 and 10, whereby the pin 33 will enter one of the apertures 8 of the rod 7. This locks the sash against any up-and-down movement but permits a free pivotal movement. It will be understood that each sash is provided with a pivotal locking structure as just described on each side substantially centrally thereof, as indicated in Fig. 1. Whenever desired the sash may be moved from the position shown in Fig. 10 back to the position shown in Fig. 3 and the parts will assume the proper position for permitting the sash to slide freely upwardly and downwardly. The spring 29 acts to force the cam plate 30 and associated parts to the right or into the position shown in Fig. 10 as soon as the cams 42, 43, 31 and 32 function. The cam plate 30 is provided with the extensions or ears 30' and 30'' positioned to extend through the slots 28, whereby cam plate 30 cannot rotate independently of the guide 25 which, in turn, cannot rotate because it is connected by pins 26 to the slide bar 17. The guide 25 is fitted on to the slide bar 17 so that the bottom 25', which is arc-shaped, will fit against the arc-shaped member or section 23, as shown in Fig. 3, while the pins 26 extend through suitable apertures in the member or section 23. This prevents the tubular guide 25 from rotating.

It will be seen from Figs. 3 and 10 that the spring 29, enlarged portion 36 of bolt 35, and cam plate 30 are all arranged in the tubular guide 25 and the bar 7 extends through the slots or cuts 28. Means hereinafter fully described have been provided for holding bar 7 against the end 36' of member 36 so that whenever the parts are turned to the position shown in Fig. 10 and cam plate 30 is moved to the right as shown in said figure, pin 33 will move into one of the apertures 8 of rod 7. From this it will be seen that the tubular guide 25 and associated parts are arranged in the slide bar 17, while the arc-shaped plate 18 and associated parts including the spring 40 are carried by the friction member 24,

which is secured by screws or other means to the sash 3 (Fig. 3). The extension or projection 37 of member 36 projects through apertures 44 and 45 in the respective members 17 and 24 and through the boss 20. By reason of the flat sides 38 and the flat side of the opening 21, bolt 35 rocks with the plate 18 and with the sash 3. As shown in Fig. 3, the spring 40 surrounds the boss 20 in the tubular extension 19 and is compressed by the washer 41 when the screw 39 is tightened or when the parts are moved to the position shown in Fig. 10.

As there is a construction similar to that shown in Figs. 3 and 10 on each side of each sash, it will be readily seen that when sash 3 is rotated, as shown in Fig. 2, the slide bar 17 on each side of the sash will be forced in opposite directions into their respective runways and when returned to a vertical position the slide bars 17 will be moved back to their former positions by spring members 46 (Figs. 6 and 9). There is provided one of the spring members 46 at each end of each sash which prevents rattling or unnecessary loose movement as well as allowing a free sliding movement of the slide bars 17. Spring 40 also assists in causing the parts to snugly fit together, as shown in Fig. 3.

Referring again to Figs. 2, 3 and 10, it will be seen that the rod 7 extends through the slots 28 in the tubular guide 25 so as to be always in a position to receive pins 33 when the parts are moved to the position shown in Fig. 10. In order to always insure a correct position of the rod 7 against the end 36' of member 36, as shown in Fig. 18, a spring structure shown in Figs. 5 and 11 is provided. This spring structure acts as a resilient clamp for clamping the bar in proper position while allowing a free sliding movement between the bar and slide 17. The resilent clamp 47 is provided with a central section 48 having an aperture through which projects the end of the tubular guide 25. From the central body 48 resilient arc-shaped extensions 50 and 51 project. Each of these extensions is provided with slits 52 and 53 for providing resilient prongs 54 and 55. These prongs rest on the inturned flanges 56 and 57 of slide bar 17, as shown in Figs. 3 and 5. The outer ends 58 and 59 rest on the bar 7 and resiliently press the same against the end 36' or the locking bolt 33. The spring clamp 47, by reason of the structure just described, resiliently holds the rod 7 in proper functioning position but permits the ready sliding movement of the slide bar 17 in respect to rod 7.

As hereinbefore mentioned, the window structure is so formed as not to require counterbalancing weights or chains or cables. To take the place of these members and, at the same time, permit a ready up-and-down sliding movement of the sashes, each sash is provided with two friction balances on each side, though a greater number or even a less number could be used without departing from the spirit of the invention. As illustrated in Fig. 5, there are provided friction balances 60 and 61. As these balances are identical in construction, a description of one will apply to both.

As illustrated in Figs. 12 and 13, each of these friction balances is provided with a block or base 62 preferably of die cast metal though it could be made in any other desired way. As shown in Fig. 12, the block 62 is provided with an opening 63 which might receive a cord in case a sashweight should be desired for any purpose, though ordinarily it is completely eliminated. The base 62 is provided with a chamber 64 having a bottom 65 and on this bottom there is positioned a resilient V-shaped cam 66 (Fig. 6) having a resilient section 67 at an angle to the section resting on bottom 65. This cam is merely loosely placed in the chamber 64 and then roller 68 is placed on top of the cam, after which the retaining plate 69 is placed in position, as shown in Figs. 6 and 13. The block 62 is provided with notches 70 at each end through which the bar 7 extends and the plate 69 is provided with a pressed-up portion 71 in line with these notches. The plate 69 extends across the block 62 so that the depending flanges 72 and 73 may fit against the respective sides 74 and 75. These sides are preferably indented somewhat so that the outer surface of flanges 72 and 73 will be flush with the outer surface of block 62. This assemblage is then slid into the slide bar 17 to the position shown in Fig. 5, so that the assemblage will be between the inturned flanges 56 and 57 and the curved member 23. Suitable retaining screws are passed through apertures in the slide bar 17, apertures 76 in the flanges 72 and 73, and into the threaded bores 77, which are arranged on diametrically opposite sides of plate 62. In this way one set of screws holds the parts together and also in the slide bar 17. The resilient member 67 of cam 66 holds the roller 68 against the rod 7 sufficiently to cause the roller to move upwardly from the position shown in Fig. 6 when the sash is lowered. As the roller 68 moves upwardly it will compress the resilient member 67 and produce friction against the pressed-out portion 71 of member 69, so that the sash will be properly supported but have a free sliding movement. By providing two of these friction balances on each side of each sash, the friction is evenly distributed and is ample to support the sash though permitting ready sliding movement thereof.

In order to properly center the sashes and provide a proper resilient friction between the slide 17 and the window frame 1, spring members 46 are provided. These spring members are held in place by a bracing retaining block 78, as shown in Figs. 6 and 17. This block may be a die casting or block formed of any other desired material. This block is substantially arc-shaped and is provided with recesses 79 and 80 on opposite sides for receiving the ears 81 and 82 (Fig. 9) so that a single set of screws may be inserted through these ears and into the respective apertures 83 arranged on diametrically opposite sides of the block. As illustrated in Fig. 9, notches 84 and 85 are provided in the turned-down end 86 of spring 45. This is in order that the turned-down end 86 may be slid on to the slide bar 17 and the notches 84 and 85 accommodate the turned-in flanges 56 and 57. This will slidingly hold one end of the spring in place while the screws extending through ears 81 and 82 will hold the opposite end firmly to block 78. The screws 87 and 88 extending through ears 81 and 82 also extend through suitable apertures in the slide bar 17 so that all these parts are locked together by two screws, as illustrated particularly in Figs. 6 and 8.

In Figs. 14 and 15 a slightly modified construction is shown to that illustrated in Figs. 12 and 13. In these two figures the construction is the same as that shown in Fig. 12, except that the cam 66' is provided with a pair of spaced resilient fingers 89 and each finger is provided with a turned-up end 90. The roller

in this form of the invention has a large center 91 and small ends 92, whereby the large center 91 will extend between the fingers 89 and thereby center the roller.

In Fig. 16 a further modified form is shown wherein the block 62' is provided with integral straps or retaining members 69' instead of a strap member 69 as shown in Fig. 12. In this form of the invention cam 65 is used together with the roller 68.

The various parts are so arranged that the slide bar 17 acts as a slide bar as just described and also as a weather-strip. The respective springs 46 function to hold the sashes centrally so that they will readily slide upwardly and downwardly when in ordinary functioning position. After the upper sash has been moved downwardly one-half an inch or so to free the parting strip 4, it may be readily tilted or it may be further moved down and tilted. The same thing is true of the inner sash, whereby either sash may be readily tilted at any point along its travel except for a fully closed position. In regard to the upper or outer sash 3, a special construction is shown in Fig. 6 to prevent the sash from dropping down when pushed upwardly to its highest point in its runway 6. As the sash is supported by the friction balances 60 and 61, sometimes the upper sash will drop down one-quarter of an inch, more or less, before the roller 68 therein will catch. This will leave a small crack at the top. To avoid this, the two friction balances 60 at the top part of the sash 3 are provided with a notch 93 in the blocks 62 which receives the inturned end 94 of a resilient bar 95. This bar has a bent-back resilient end 96 having an offset 97 which presents a shoulder fitting against the hook end 14 of the hook member 12. When the upper sash is completely closed the offset portion 97 of member 95 will be arranged as shown in Fig. 6. This will prevent the upper sash from dropping down. A slight downward pull on the upper sash will cause the member 96 to swing inwardly and allow the upper sash to slide down as far as desirable. The lower sash does not need the bar 95 and associated parts as it naturally will remain in its lowered position when closed.

While I have illustrated and described what I believe to be preferred embodiments of my invention, it is obvious that various changes may be made with regard to the form and arrangement of the parts without departing from my invention and hence I do not limit myself to the precise details set forth but consider myself at liberty to make such changes and alterations as fairly fall within the spirit and scope of the claims.

I claim:

1. A window structure comprising a frame having a pair of facing runways, a sash, a rod provided with a row of apertures arranged in each of said runways extending from near the bottom to near the top of the runway secured at their ends to said frame, a slide bar on each side of said sash, and a pivotal lock on each vertical side edge of said sash for pivotally locking said sash to said rods, each of said pivotal locks including a spring-pressed pin adapted to be forced into one of the apertures in a rod, and cam means caused to function by said sash when the sash is turned from a vertical position to release said spring-pressed pin.

2. A window structure comprising a frame having a pair of facing runways, an apertured rod positioned in each of said runways, a slide bar slidably mounted in each of said runways, each of said slide bars having a convex arc-shaped edge, a sash arranged between said slide bars, said sash having concave arc-shaped vertical edges formed to fit over the convex edges of said slide bars, and a pivotal lock for pivotally locking said sash against vertical movement without interfering with its rotary movement, said pivotal lock including a spring-pressed pin for each of said rods positioned to move into one of the apertures in the respective rods, and cam means actuated by the turning movement of said sash for moving said pin to a non-functioning position.

3. In a window structure, a frame having a pair of facing runways, an apertured rod in each of said runways, a slide bar for each of said rods, each of said slide bars having a convex longitudinal edge, a sash having vertical concave side edges normally fitting over the convex edges of said slide bars, springs engaging each of said runways to resiliently hold said slide bars spaced from the bottom of the respective runways, a pivotal balance for each of said slide bars partly carried by the respective slide bars and partly by said sash, each of said pivotal balances including a plate secured to said sash provided with a tubular member extending into the sash, a connecting bar connecting a slide bar and said sash, said connecting bar rotatably connected with the slide bar and non-rotatably extending into said tubular member, a removable end in said tubular member secured to said connecting bar, a coil spring arranged in said tubular member acting against said removable end for urging said connecting bar toward said sash, a tubular guide carried by said slide bar, said connecting bar extending into said tubular guide with the end in said tubular guide enlarged and resting against the bottom of the tubular guide, said enlarged end having a pair of cams facing the bottom of said tubular guide, a cam plate having a pin and a pair of cam members coacting with the first-mentioned cams respectively to move said cam plate and said pin in a direction away from said apertured rod when said sash is turned into a vertical position, and a spring acting on said cam plate and the bottom of said tubular guide for moving said pin into one of the apertures in said rod when said sash is moved from its vertical position whereby said sash may freely rotate but cannot move longitudinally of said apertured rods.

4. In a window structure of the character described, a plate arc-shaped in cross-section provided with an opening therein substantially centrally, said opening having at least one flat side, said plate on the convex surface thereof having an upstanding boss surrounding said opening and of the same shape as the opening and an upstanding tubular member surrounding said boss, a locking bolt provided with a tubular body and a reduced extension projecting from one end of said body, said extension having a shape similar to said opening whereby the extension may reciprocate in said opening, said extension having a threaded bore, a spring positioned in said tubular member having one end surrounding said boss, a washer positioned against the free end of said spring, a screw extending through said washer into said threaded bore for holding the washer and spring in functioning position, said body at the end opposite said extension being

provided with a pair of cams, a cam plate loosely surrounding said body, said cam plate being provided with a locking pin, a pair of cams coacting with the cams on said body to move said locking bolt longitudinally against the action of said spring when functioning, and a pair of radially extending ears, a tubular guide surrounding said extension with the bottom thereof normally resting against the end of said body adjacent the place where said extension joins the body, said tubular guide having a pair of slots for loosely accommodating said ears whereby said cam plate will be held against rotation by said tubular guide but may reciprocate on said body independently of the tubular guide, and an auxiliary spring surrounding said body and acting on the bottom of the tubular guide and on said cam plate for urging the cam plate toward the cams on said body.

JOSEPH I. LEVYN.