

April 21, 1959

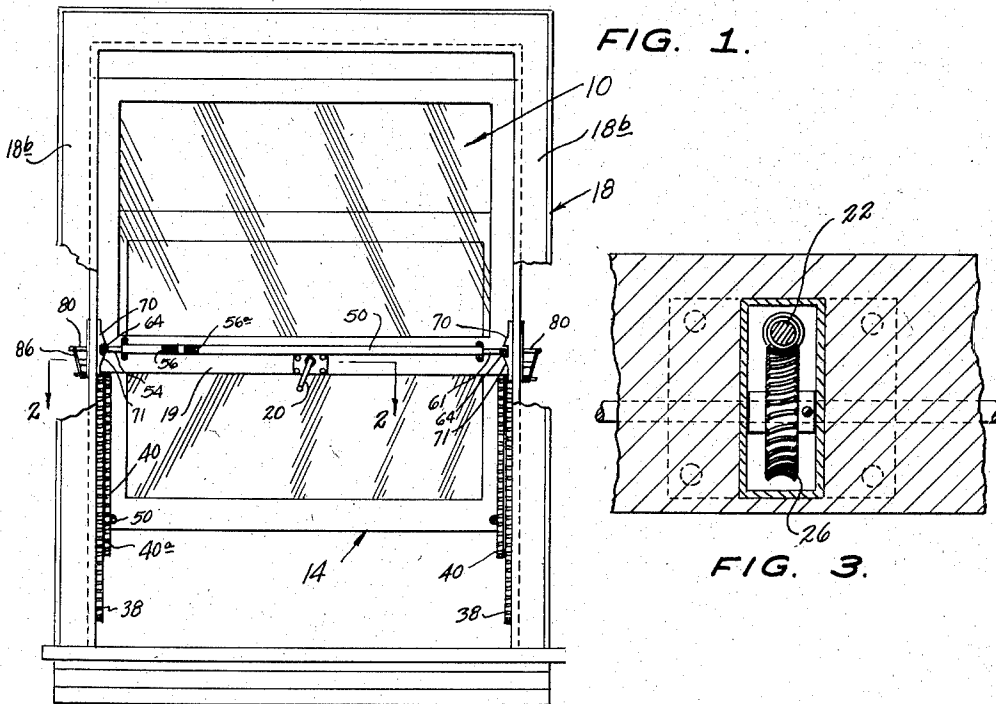
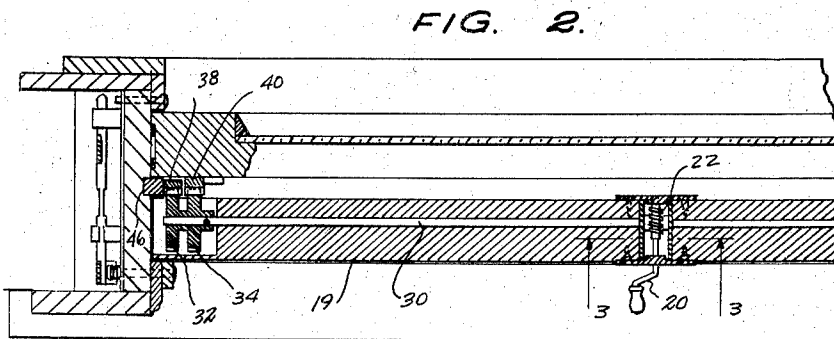
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2,883,225

DETENT MECHANISM FOR DOUBLE HUNG SASH WINDOW

Filed Oct. 16, 1953

3 Sheets-Sheet 1



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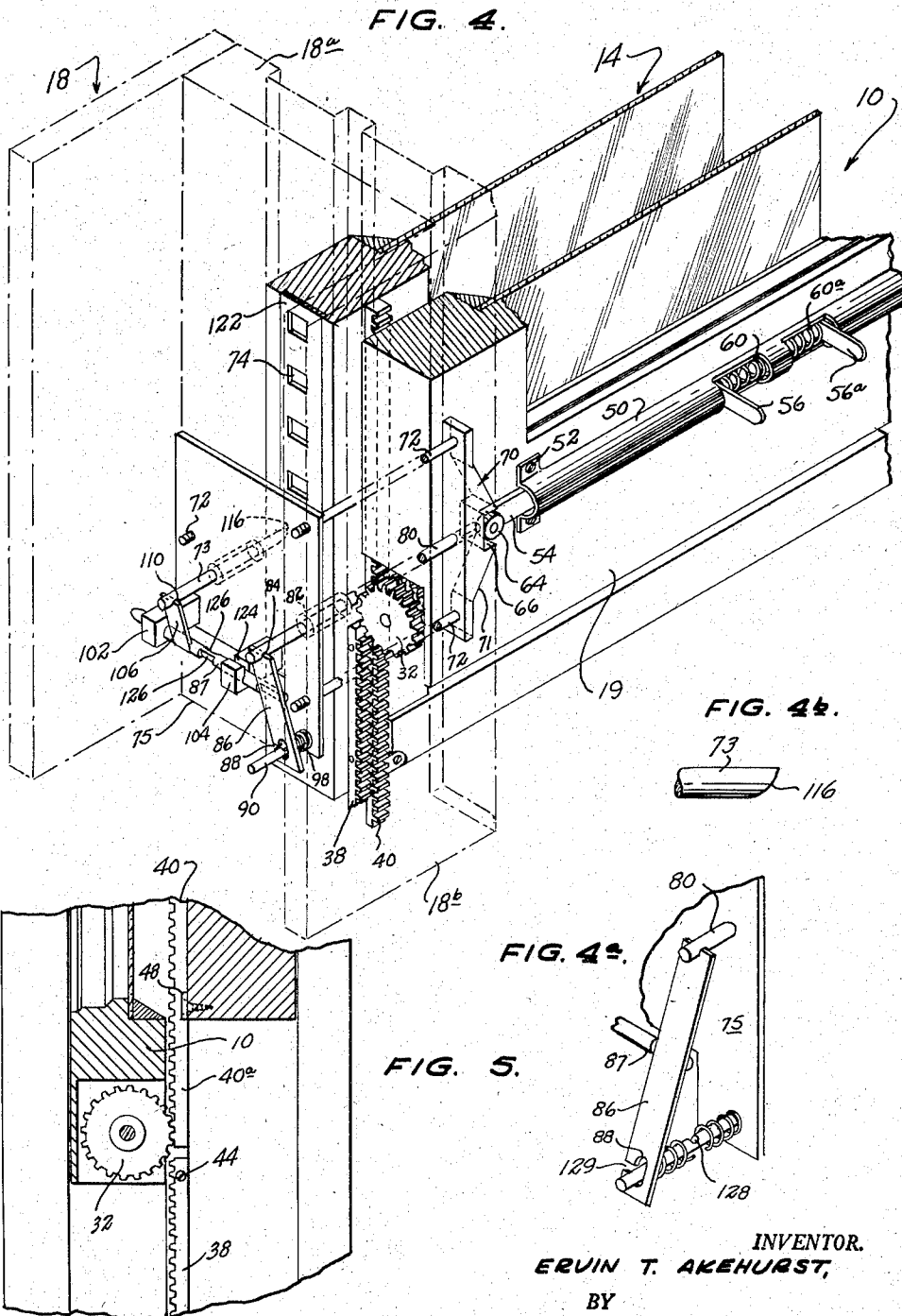
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DETENT MECHANISM FOR DOUBLE HUNG SASH WINDOW

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3 Sheets-Sheet 2



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DETENT MECHANISM FOR DOUBLE HUNG SASH WINDOW

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3 Sheets-Sheet 3

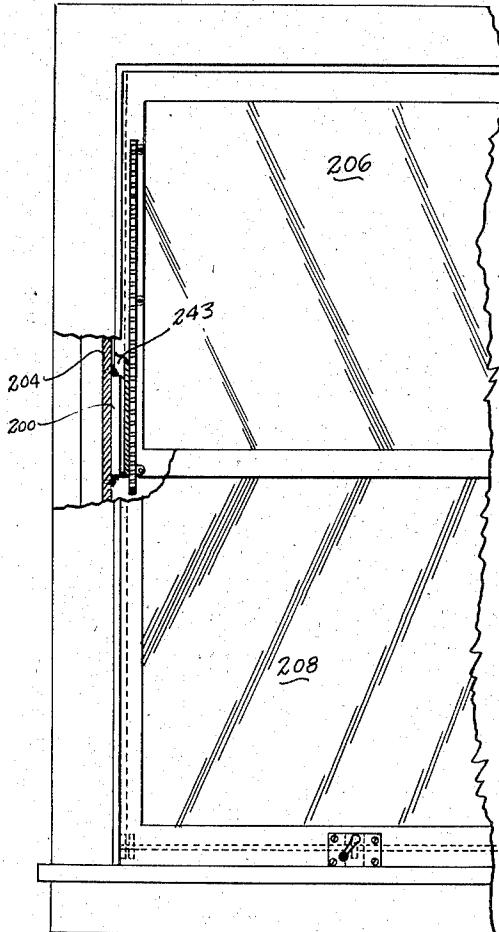


FIG. 6.

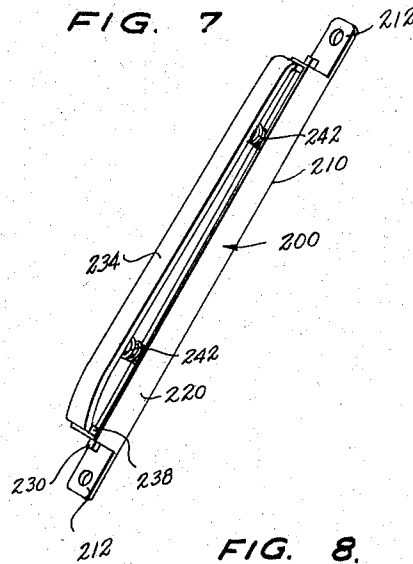


FIG. 7

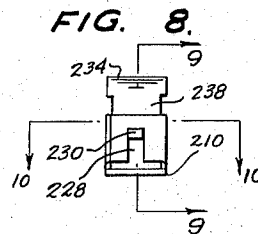


FIG. 8.

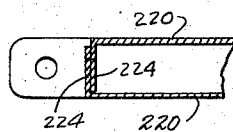


FIG. 10

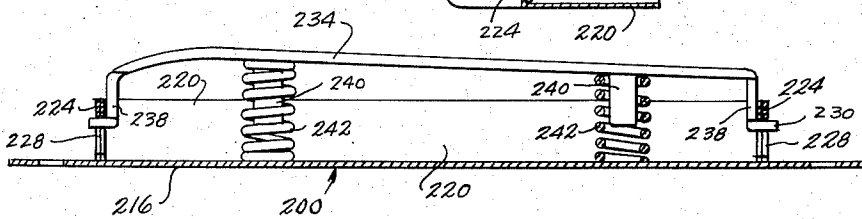


FIG. 9.

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2,883,225

DETENT MECHANISM FOR DOUBLE HUNG SASH WINDOW

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Application October 16, 1953, Serial No. 386,466

5 Claims. (Cl. 292—35)

This invention pertains to double hung sash window operators and more particularly to a mechanism for raising and lowering conventional vertically moving sashes.

The present invention constitutes an improvement over the disclosure of my prior application, Serial Number 318,418, filed November 3, 1952, now abandoned, for "Window Assembly" and deviates from the prior disclosure to the extent of disclosing an improved mechanism for locking the sashes in pre-determined positions. In the prior application there is disclosed a manually operable pin means which may be retracted or inserted in sockets in the window frame through the edges of respective sashes for the purpose of holding the sashes at various adjusted positions. In accordance with the present invention, there is provided a mechanism which eliminates the necessity for separate manual operation of detent means for the upper sash and which provides an essentially improved operation.

A primary object of the present invention, therefore, is to provide relatively cheap and practical mechanism which will automatically lock the upper sash at any of a number of pre-determined positions, in response to manual release means carried by the lower sash only.

It is another object of the present invention to provide a window operating mechanism which can be readily adapted to use with present conventional window frame constructions, and requiring a minimum of modification of the frames.

It is an additional object of the present invention to provide a window operating mechanism and detent elements which will enable adjustment of the sashes to any position desired within a large range of selected positions.

It is still a further object of the present invention to provide a window mechanism of such a nature that it may be optionally modified for use with either of two types of detents for holding the upper sash in adjusted positions.

In brief, the present invention comprises a worm gear and crank arrangement as hereinbefore disclosed in the aforementioned prior application, but wherein the lower sash carries a manually-operable spring biased rod-like element engageable in a notch fashioned in a detent element wherein the notched element is set at a mid position of the window frame so as to hold the lower sash in uppermost position when so desired. In addition, the notched element is provided with a reciprocating pin engageable by the rod-like element so that such pin may be motivated thereby and whereby a relatively simple mechanism is actuated for the purpose of withdrawing a latching pin from one of a series of detent notches in the edge of upper sash so as to release the upper sash for motion.

In a modification of the present invention, only the manually operable rod-like member carried by the lower sash in conjunction with the notched member on the window frame is utilized for holding the lower sash in

uppermost position, relying on a novel frictional detent which engages the edges of the upper sash to hold that sash in any adjusted position.

Other objects and advantages of the present invention will be apparent from the subsequent description and figures of the drawing wherein:

Figure 1 is an elevation of a double sash window incorporating elements of the present invention, certain portions of the frame being broken away to show details of the combination;

Figure 2 is an enlarged section taken generally along the line 2—2 of Figure 1;

Figure 3 is a section taken generally along the line 3—3 of Figure 2;

Figure 4 is an enlarged perspective of the detent means as applied to the upper and lower sashes;

Figure 4a is a fragmentary perspective showing the relationship of certain elements of Figure 4 in a different position;

Figure 4b shows a portion of a detent element;

Figure 5 is a fragmentary elevation showing the relationship of the driving gear and racks of the window sashes;

Figure 6 is a front elevation of a modification of the present invention utilizing a frictional type of detent for the upper sash, a portion of the window frame being broken away to show details;

Figure 7 is a perspective of the frictional detent used in the modification of Figure 6;

Figure 8 is an end view of the detent shown in Figure 7;

Figure 9 is a longitudinal section of the detent shown in Figure 7 taken along line 9—9 of Figure 8; and

Figure 10 is a section along the line 10—10 of Figure 8.

Referring to the figures of the drawing and especially Figures 1 to 5, there is disclosed a window having lower sash 10 and upper sash 14, shown as slidably set in a conventional window frame 18 having a side panel 18a and front panel 18b, the frame and panels being best shown in phantom in Figure 4.

For purposes of illustration the lower sash 10 is shown in a partially raised position while the upper sash 14 is shown in a partially lowered position.

A crank 20 is journaled in a well known manner in the lower edge 19 of sash 10 and serves to rotate a worm 22 engaging a worm gear 26, whence rotation of a shaft 30 is effected for the purpose of driving a pair of spur gears 32 and 34 pinned to the shaft (Figure 2). It will be understood that the shaft 30 extends from both sides of the worm gear 26 and effects rotation of spur gears such as 32 and 34 at both sides of the lower sash 10, as indicated generally in Figure 1 showing gear racks 38 and 40 at both sides of the window.

Accordingly, all mechanism on each side of the window being duplicated on the other side, the description herein will be discussed for the most part for one side only, e.g., the left side as shown in Figures 2, 4, 4a and 5.

The gears 32 and 34 are engageable, respectively, with racks 38 and 40, the rack 38 being fastened to the frame panel 18a as by screws 44, as shown in Figure 5, there being a spacer strip 46 utilized for the proper positioning of the rack, as shown in Figure 2. Thus, gear 32 and rack 38 are engageable for effecting motion of the lower sash. The rack 40 is secured by its flanges 48 which are screwed to the sides of the upper sash (Figures 1 and 5) the rack extending somewhat below the lower edge of that sash as indicated at 40a.

Accordingly, it will be appreciated that when crank 20 is rotated sufficiently to bring the lower sash 10 to its up-

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permost limit, the gear 32 will pass beyond mesh with rack 38 and gear 34 will commence meshing with rack 40. The spacing of the ends of the racks as shown in Figure 5 is such that gear 32 will clear rack 38 subsequent to meshing of gear 34 with rack 40 and thereafter a suitable detent mechanism is effective to hold the lower sash (and gear 32) in proper fixed position for actuation of the upper sash. It will be appreciated, however, that at any point in the travel of the lower sash 10, prior to reaching the uppermost position, the friction between worm 22 and worm gear 26 will be sufficient to hold the lower sash 10 at any intermediate position, the upper sash 14 remaining fully closed by virtue of detent means to be hereinafter described.

Referring now to Figure 4, the device for holding the lower sash 10 in uppermost position includes a housing 50 fastened to the bottom edge of the lower sash as by flanges 52 screwed thereto.

Slidably arranged within the housing is a rod-like element 54, the inner end of which is bent outwardly to form a handle 56 protruding through a slot 58 in housing 50. Socketed within the housing is a compression spring 60 which maintains a constant bias of the rod-like detent element 54 toward the window frame. The same construction is duplicated on the other, i.e., the right side of sash 10 in that the housing 50 extends thereacross and a rod-like element 61 (Figure 1) is slidably housed therein as indicated by another protruding handle 56a and another biasing spring 60a. Thus, it will be understood that the handles 56 and 56a may be grasped, pressed, and forced toward each other against the force of the respective biasing springs so as to draw the outer ends of the slidable detent elements inwardly. It will be noted that the handles 56 and 56a are located off center of the sash so as not to interfere with the path of motion of crank 20, the slidable elements 54 and 61 within housing 50 being obviously of unequal length.

The outer end of the detent elements 54 and 61 are each provided with a roller, such as the roller 64, which is engageable within a notch 66 of a detent element 70, riding into the notch on a cam surface 71 provided as part of element 70. Element 70 is fastened as by bolts 72 to the window frame panel 18a. Thus, as seen on Figure 1, the detent element 70 at each side of the frame 18 is located substantially midway of the vertical height of the frame.

From the description given thus far it will be understood that the lower sash may be raised by means of the crank 20 until such time as the rollers 64 engage the respective sloping cam surfaces 71 at which time the rods 54 and 61 are forced inwardly against the bias of their respective springs 60 until at the uppermost limit of motion the respective rollers 64 snap into the respective notches 66. Thus, an automatic catch for the lower sash 10 is effected and it will be understood that the position of the notch 66 is such that the gear 32 substantially clears rack 38 at the time the rollers snap into the notches. Preferably, the notches should be so positioned that it will not be possible for the gears 32 to grind against the top teeth of the respective racks 38 during the cranking motion and accordingly the notches 66 should be so located that the final fractional inch of upward motion of the lower sash is performed by pinion 34 acting on rack portion 40a to maintain upward motion of sash 10, the sash 14 being restrained against motion at that time, thus providing a clearance between the periphery of the gear 32 and the rack 38.

At uppermost position of sash 10, gear 34 is in mesh with its rack 40 on upper sash 14 as set forth, which sash 14 is restrained from motion until this time by a pin 73 acting in any one of a series of notches 74 in the edge of sash 14.

A mechanism is provided actuatable by the movement of rollers 64 into notches 66 for unlocking upper sash 14. This mechanism has a base plate 75 secured to the inner

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surface of panel 18a by the screws 72, threaded into the base plate 75 on both sides of the window frame as shown in Figure 4, and comprises a slidable pin 80 having a reciprocal fit within a bore of plate 75, and element 70, and biased so as to normally protrude into notch 66, being forced back therefrom by roller 64 when the roller snaps into the notch. The spring 60 will be understood to have sufficient force on rod 54 to overcome the bias on pin 80.

The pin 80 may be slidably supported within a collar 82 inserted in the frame panel 18a.

The outermost end of the pin 80 is provided with a notch 84 engaged over the top edge of a lever 86 secured as by welding to a pivotal shaft 87. Lever 86 is provided with an oversize aperture 88 encompassing a pin 90 carried by plate 75. As viewed on Figure 4a when pin 80 moves toward the left, shaft 87 rotates counterclockwise to the position shown in Figure 4.

A bias on pin 80 is provided by a spring 98 intermediate the plate 75 and the lever 86 and being retained in position by pin 90 fixed to the plate 75, serving to bias the lever for clockwise motion as viewed on Figure 4a which shows the position of lever 86 when the upper sash 14 is under restraint. Thus, when the roller 64 engages in notch 66, pin 80 will be forced to the left, as shown in Figure 4, thereby causing counterclockwise motion of lever 86.

Shaft 87 is journaled in lugs 102 and 104 suitably secured as by welding to plate 75. Likewise welded or otherwise suitably fastened to the shaft 87 is a lever 106, the upper edge of which is engaged by a notch 110 of the locking or restraining pin 73, hereinabove mentioned, which pin is slidably passed through plate 75 and frame panel 18a.

The pin 73 is provided with a cam surface 116 as best shown in Figure 4b, which engages in the series of apertures 74 which apertures are preferably provided in a metal strip 122 fastened to the edge of upper sash 14.

Accordingly, spring 98 acting against lever 86 and through shaft 87 and lever 106 serves to maintain pin 73 in position to engage in any of the series of apertures 74. It will be apparent that pin 80 when pushed by roller 64 will cause rocking of lever 86, shaft 87, and lever 106 to pull the end of pin 73 out of any engaged aperture 74 so as to provide unimpeded motion of the sash 14 under the impetus of its driving gear 34.

By virtue of the cam surface 116, pin 73 serves as a yieldable restraint and even though the lower sash is only partially raised so that gear 34 is not in mesh with rack 40, the upper sash 14 may yet be moved up directly, by pushing it or pulling it with the hands in a well known manner as applied to conventional sashweight type windows, providing the spring 98 is suitably resilient and the cam angle of surface 116 is suitably steep, all deemed a matter of proper design, to permit such surface to snap past the aperture edges when sufficient force is applied to the sash.

Thus, sash 14 can be directly moved to uppermost position from any lowered position whether or not the rack 40 and gear 34 are in engagement. If the rack 40 and gear 34 are in engagement, enough force must be exerted to rotate the gear 34 and mechanism associated therewith.

This ratchet type arrangement of the cam surface 116 enables the upper sash 14 to be quickly closed if partially open in the event of rain or storm while at the same time preventing the lowering or opening of the sash except by means of the crank 20. Since the lower sash can also be quickly lowered by manually pushing the handles 56 and 56a together to disengage the roller 64 from the notch 66, it is evident that the lower sash may also be lowered quickly.

In ordinary operation, lower sash 10 may be fully raised to locked position and the upper sash 14 then partially or fully lowered solely by continued rotation

of crank 20. The handles 56 may then be pressed inwardly to release the lower sash, at which time it may be cranked downwardly to a lower position, or to the lowermost position leaving the window fully open at the top.

The teeth of the two racks will be approximately aligned for the various positions of apertures 74 and suitable tolerances between the gear teeth and rack teeth provided so that no binding effect will be experienced.

From the above description it will be apparent that both sashes may, by virtue of mechanical cranking, be placed in fully raised position or fully lowered position, or in any desired individual intermediate positions, such intermediate positions being effected by raising the lower sash to uppermost position so as to engage gear 34 and rack 40, automatically disengaging the restraining pin 73, whereupon continued cranking serves to lower the upper sash.

It is desirable to provide for assembly or removal of the detent mechanism when the side panel 18b is removed along with the sashes 10 and 14 in the manner of conventional window frame construction. To this end the aperture in lug 104 is provided with a slot 124 while the shaft 87 is notched as at 126 on both sides. The pin 90 is provided with a notch 128 as shown in Figure 4a. Aperture 88 in lever 86 is slotted as shown at 129. Accordingly, if the lever 86 be grasped it can be forced against spring 98 to a position where the slot 129 is in register with notch 128, and thus pulled away from pin 90. This will cause the notches 126 to register with slot 124 while at the same time pulling lever 106 away from engagement with pin 73. Lever 86 is now entirely cleared of pin 80 and the sub-assembly comprising the levers and shaft 87 may be lifted upwardly to clear the lug 104, the end of shaft 87 having slid clear of lug 102. The screws 72 may then be removed from the sash side and the plate 106 from the back of the panel 18a.

In the form of the invention shown in Figure 6 through 9 an arrangement is shown of a simplified nature comprising a frictional detent such as the detent 200 set within the window frame on the side panel 204 and arranged to press against the edge of the upper sash 206. The detent 200 comprises a base 210 having flanges 212 which are perforated to accommodate screws for fastening to the inner surface of the side panel. The base 210 is fashioned from a single piece of metal having a base portion 216 from which is bent a flange 220 on each side. The ends 224 of the flanges are bent at right angles thereto and overlapped as shown on Figure 10, being soldered or welded together.

Ends 224 are slotted as at 228 in register with each other to accommodate outwardly struck lugs 230 of a frictional element or shoe 234 which engages within a groove 243 or rabbeted portion in the side edge of the sash. The lugs 230 are carried at the ends of inwardly bent flanges 238 and accordingly it will be seen that the member 234 is secured for reciprocal motion with respect to the base 216. The element 234 is likewise provided with a pair of pins such as the pins 240 which serve to center respective springs 242 for bearing against the base 216 in such a manner so as to force shoe 234 away from the base. Thus, by properly positioning a detent 200 on each side of the window frame so as to bear against the side edges of the upper sash, which are rabbeted at 243 to accommodate the width of the detents, it will be seen that frictional forces may be utilized to maintain the upper sash in any desired position. It will be appreciated that the length of the surface of element 234 is such that it is always in full engagement with the edges of the upper sash regardless of any adjusted position of that sash. It may be further noted by reference to Figure 9 especially that the face of the shoe 234 is not parallel to the base portion 216.

In other words, the shoe 234 has a definite slant relative to the base portion 216 so that the assembled detent 200 is wider or thicker at the left hand end (as viewed in Figure 9) than at the right hand end. When the detent 200 is mounted on the window frame the thicker end is preferably uppermost as this tends to render the upper sash 206 harder to lower than to raise and helps keep the upper sash 206 in closed position during movement of the lower sash 208 by the crank member.

The description of the lower sash and the co-action between the two sashes is thought repetitious, since it would merely duplicate all that has been heretofore described, it being appreciated that by virtue of an arrangement of gears and racks the lower sash may be raised until it reaches its uppermost position at which point the driving gear for the upper sash meshes with the rack on the upper sash and the upper sash may then be forced downwardly, the cranking force overcoming the friction of the detent elements 200. The upper sash may be left in any adjusted position held by virtue of the force exerted by the detent elements 200. Preferably a detent arrangement such as shown by the sliding rods 54 and notched elements 70 would be utilized in conjunction with the frictional detents shown in Figure 6 for the purpose of holding the lower sash in uppermost position so that the gear thereof is maintained clear of its rack while driving the upper sash downwardly; otherwise, the gear of the lower sash would be constantly slipping past the topmost tooth of its rack and cause wear thereon.

It will be apparent that the arrangement shown in Figure 6 may be utilized to place the sashes in any desired position. The first position is obvious, this being the one where both sashes are uppermost; the second position will likewise be apparent wherein both sashes are lowermost, this being accomplished by raising the lower sash to the uppermost position then lowering the upper sash to lowermost position and finally reversing the rotation of the crank to lower the upper sash, it being noted that the two racks will have their teeth aligned for all practical purposes when the upper sash is in lowermost position to prevent interference. It will, of course, be understood that it is not absolutely essential that the teeth be aligned perfectly, but such a condition is preferable for effecting a smoothly operating mechanism. However, it should be noted that even if the teeth are misaligned, this would merely cause a slight motion of the upper sash in an upward direction to thereby automatically align the teeth. Such motion would, in all probability, be a small fraction of an inch and need not be considered seriously, particularly in view of the fact that the lowermost edge of the upper sash would in all probability still not clear above the sill of the window.

Should it be desired to adjust the sashes to intermediate positions, it would merely be necessary to raise the lowermost sash 208 to the uppermost position, then bring the lower sash down by continued rotation of the crank to any desired position, at which point it will be held by the detents 200 whereupon the lower sash may then have its motion reversed by reversing the crank and brought downwardly to any desired position.

While hereinabove stated that it would be preferable to have a locking detent for the lower sash it should be apparent that the provision of such a detent is not absolutely essential, but would serve to prevent wear on the lower sash driving gears due to the riding of these gears against the uppermost teeth of the fixed racks while the crank is being turned with the lower sash in uppermost position to lower the upper sash. By the choice of suitable tooth curvatures and heavy greasing such wear could be minimized as will be understood by persons skilled in the art.

The form of the invention shown in Figures 6 to 10 may readily be applied to conventional already-installed window frames as will be apparent to persons skilled in the art.

I claim:

1. A window comprising a pair of sashes and frame means, detent means carried by one of said sashes and comprising a movable latch element, a detent member carried by said frame means and engageable by said latch element at a pre-determined position of said one sash to lock said one sash, detent means for said other sash comprising a restraining pin carried by said frame means and an aperture in said other sash engageable by said restraining pin, a movable release pin carried by said frame means and movable by said latch element when said latch element engages said detent member, and means intermediate said release pin and said restraining pin whereby said restraining pin is disengaged from said aperture when said release pin is moved by said latch element.

2. A window as set forth in claim 1, said means intermediate said pins comprising a rockable shaft journaled on said frame means, a lever secured to said shaft and engaging said restraining pin, a second lever secured to said shaft and engaging said release pin, and means resiliently biasing said restraining pin toward restraining engagement with said aperture.

3. A window as set forth in claim 2, including means for journaling said shaft on said frame means comprising a lug secured to said frame means and having a slot therein comprising a substantially circular portion in which said shaft rests rotatively and being longitudinally slidable therein, a slot extending from the surface of said lug to said circular portion, said shaft having a reduced portion slidable in said slot for removal of said shaft from said lug, said shaft being normally disposed so that said reduced portion is spaced from said slot whereby said shaft is normally retained in said lug.

4. A window as set forth in claim 3, said pins being provided with notches, each lever having an edge normally engaged in the notch of a respective pin and being slidably removable with respect thereto when said shaft is slid longitudinally with respect to said lug to bring said reduced portion of said shaft into alignment with the slot in said lug, whereby said shaft and said levers may be integrally removed from said frame means.

5. A detent mechanism for a window having a pair of sashes and a framing panel at the side of said sashes, comprising a detent member having a notch therein secured to said panel, a latch means resiliently biased toward said notch and being carried by one of said sashes wherein said latch means is engageable with said notch at a pre-determined position of said one sash, detent means for restraining motion of said other sash against its own weight, and means engageable by said latch means and actuated thereby when said latch means is engaged in said notch for releasing said latter detent means.

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