March 16, 1943. H. LARSON 2,313,827

AUTOMATIC MULTIPLE SASH WINDOW

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FIG. 1

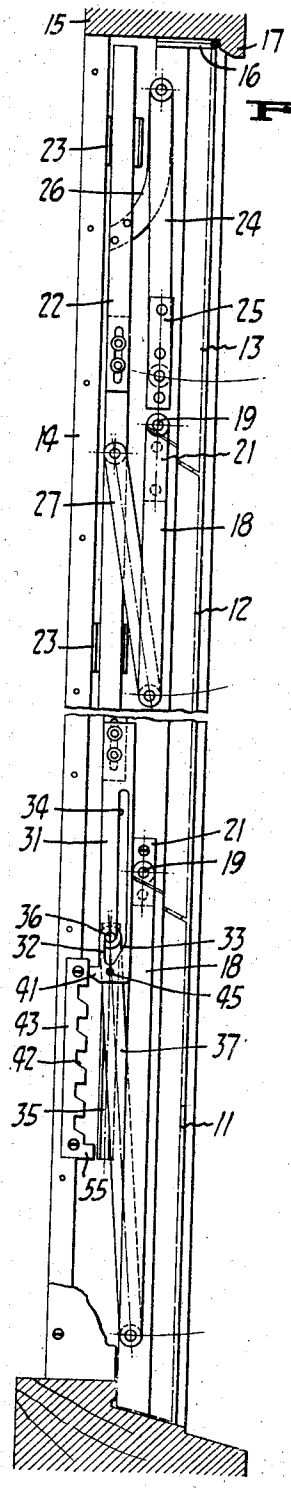
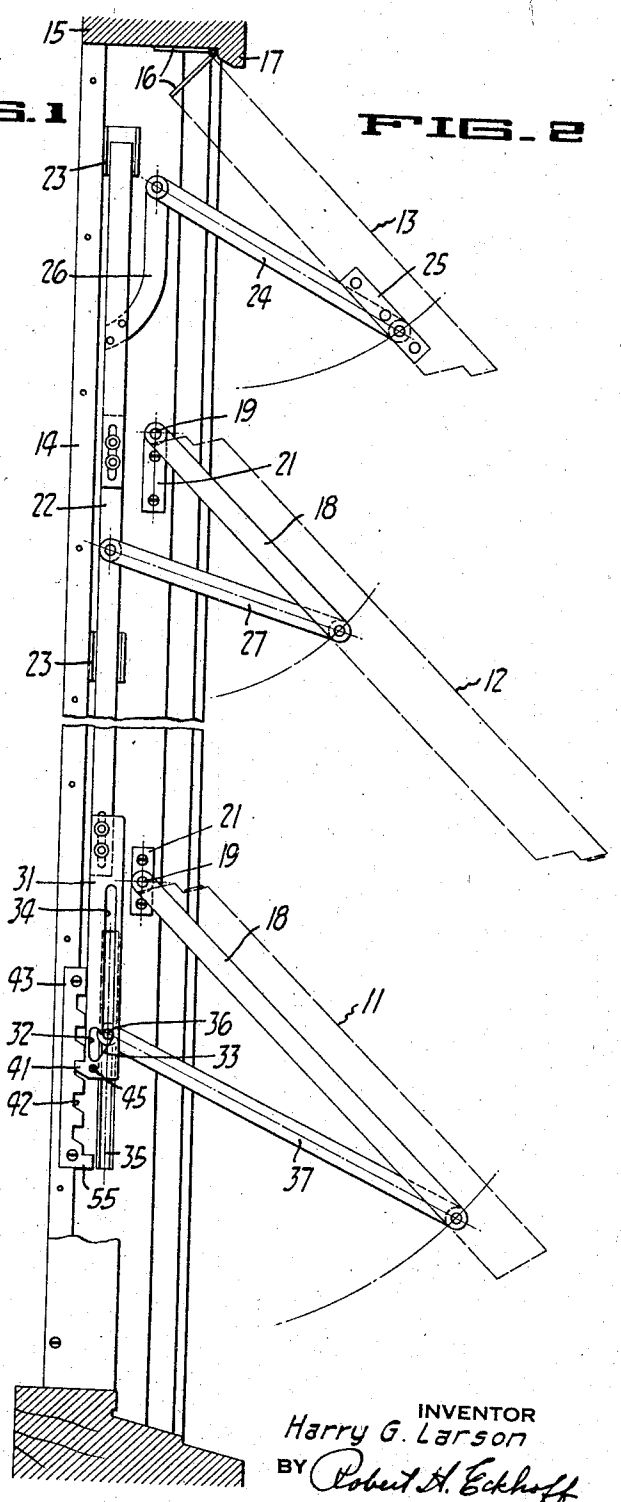


FIG. 2



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FIG. 3

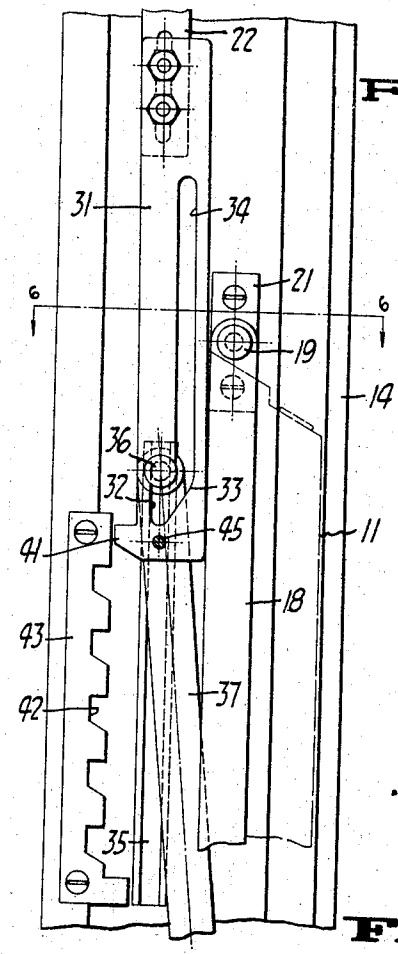


FIG. 4

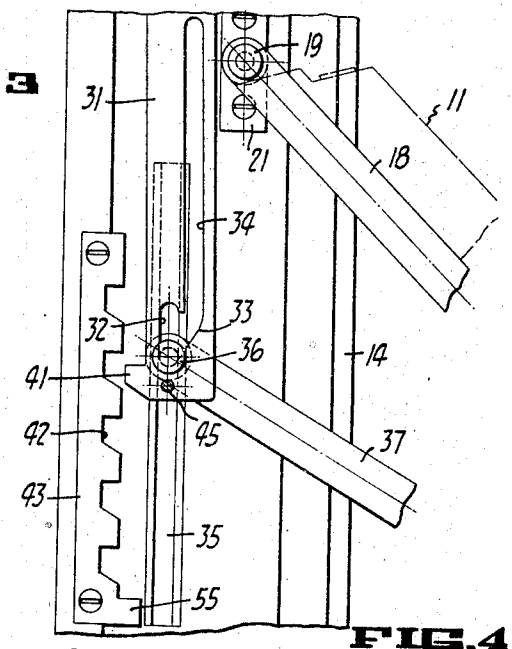
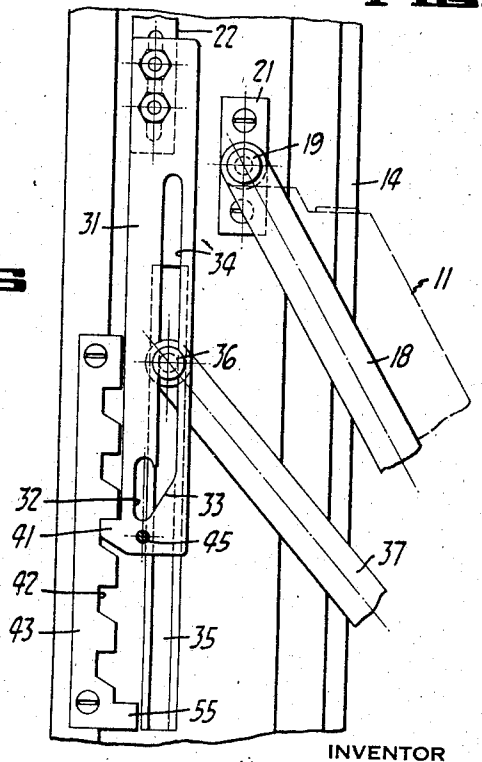


FIG. 5



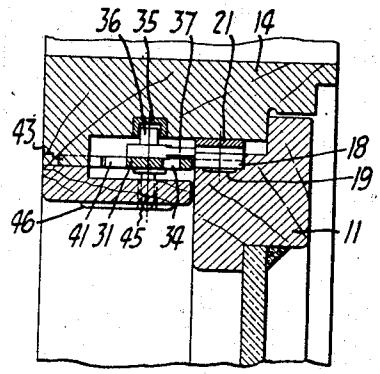


FIG. 6

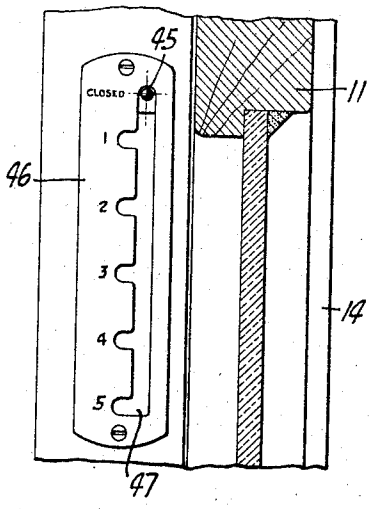
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FIG_7_



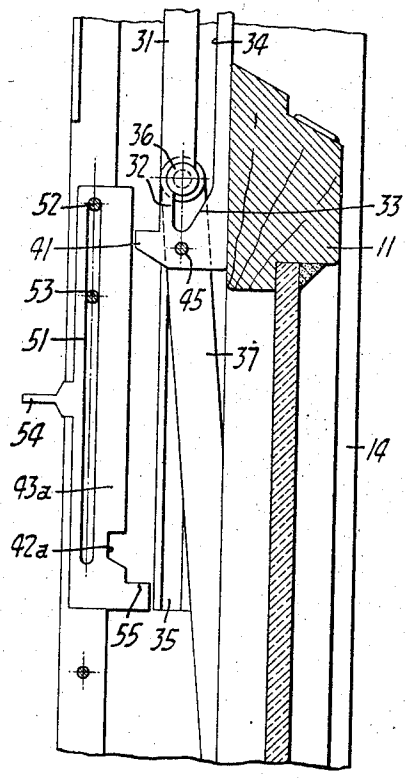


FIG_8_

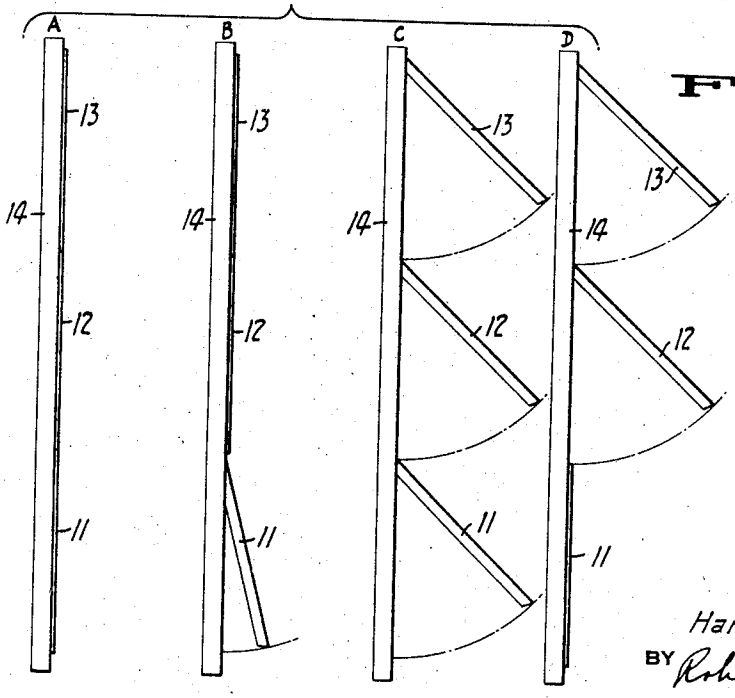


FIG_9_

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Patented Mar. 16, 1943

2,313,827

UNITED STATES PATENT OFFICE

2,313,827

AUTOMATIC MULTIPLE SASH WINDOW

Harry Larson, Oakland, Calif.

Application April 21, 1941, Serial No. 389,484

8 Claims. (Cl. 20—42)

This invention relates to windows of the multiple sash type in which one sash is employed as a manipulating and control sash. Sashes of this general type are well known and have been widely employed. However, as commercially made and installed, they have been subject to certain disadvantages and failings; more particularly, they have been relatively expensive due to complex and intricate construction details; the windows have been difficult to install, requiring special fittings and considerable labor on each installation.

One of the major items of expense involved in a window of this type is the operating mechanism. These have heretofore been complicated in nature; in fact, one window of this type is so constructed that painting of the window frequently renders it inoperative.

In accordance with this invention it is generally the object to provide an improved window sash construction and operator.

The invention includes other objects and features of advantage, some of which, together with the foregoing, will appear hereinafter wherein the present preferred form of multiple sash and the multiple sash operator construction of this invention are disclosed.

In the drawings accompanying and forming a part hereof, Figure 1 is a side elevation through a window embodying the present invention.

Figure 2 is a view similar to Figure 1 but with the multiple sash moved outwardly by means of the manipulating sash and locked in position.

Figure 3 is an enlarged side elevation illustrating details of the sash operator, the several sashes being in closed position.

Figure 4 is an enlarged view illustrating the position of the operating mechanism during opening movement of the sash.

Figure 5 is another enlarged side elevation, the upper sash being open and the bottom of adjusting sash being in an intermediate position.

Figure 6 is a section taken along the line 6—6 of Figure 3.

Figure 7 is a fragmentary side elevation of a sash position indicator.

Figure 8 is a schematic showing of the sash positions.

Figure 9 is a side elevation, partly in section, through a modified selector mechanism.

In accordance with this invention I provide a plurality of sashes 11, 12 and 13 in a suitable window frame 14. The several sashes can be made of wood or steel as is desired, 11 being the lowermost sash and 12 the intermediate sash and 13 the uppermost sash. The invention can be applied to any number of sashes and for convenience I have illustrated three.

In accordance with this invention, each sash is mounted directly in the window frame 14 in a relatively simple manner. Preferably the uppermost sash 13 is mounted from upper frame member 15 in the window frame 14 by hinge butts 16. This enables the sash to be positioned close to a depending lip 17 on member 15 whereby protection against sunlight or weather entering between the window and the member 15 is assured.

The lower sash is hinged on the frame by arms 18 secured on each side of the sash and positioned by pins 19 on supports 21 secured to each frame. This is a simple, strong construction as compared to those in which the upper sash end is supported by a sliding shoe in a track. By having each sash hinged at a fixed point in the frame, its weight can be cared for more adequately and with less expense.

In accordance with this invention I provide travel bars 22 one on each side of the window frame and loosely mounted in channel members 23 secured to each side of the frame 14. These guide each travel bar as it is moved up and down in the window frame. Sash 12 is directly connected by links 27 hinged on the sash and on each travel bar. Sash 13 carries links 24 hinged thereon by brackets 25 and arms 26 secured to each travel bar. This construction is employed to maintain the same vertical center spacing between the upper end of sash 13 and the pivotal connection point between links 27 and arm 26 as exists in the other sashes and their connection to the travel bars.

Adjacent the lower end of each travel bar is secured a plate 31. This plate preferably includes a slot 32 formed therein and connected by an opening defined along one side by an upwardly sloping face 33 to a longer vertically extending slot 34. A pin 36 carried on one end of a link 37 and riding in vertical channel 35 is adapted to ride in the slot 32, across the angular face 33 and to move vertically in the slot 34 as sash 11 is manipulated.

The operation of sash 11 and the movement of the pin 36 to move the travel bar will be further apparent upon a discussion of Figures 3, 4, 5 and 9. In Figure 3 I have shown the travel bar in an extreme upper vertical position with the pin 36 at the upper end of the slot 32. In this position all the sashes are closed as in A of Figure 8. Upon initial outward movement of sash 11 the pin 36 moves downwardly in the slot, the win-

dow moving outwardly until the pin engages the bottom portion of the slot. Depending on the length of the slot, sash 11 can be opened selectively without opening the upper sash. This opening of the lower sash can be quite extensive and I have successfully opened the lower sash 40° without opening the other sashes. This is shown in B of Figure 8. The length of arms 37 is usually greater than the length of arms 27 and 24 to ensure that the upper sash can be moved outwardly at a rate greater than the rate of the lower sash to the end that finally all sashes assume the same angular position when open as in C of Figure 8. If pin 36 has no lost motion, all the arms should be equal in length; in this case any outward movement of sash 11 moves sashes 12 and 13 as well. The extent of free motion of sash 11 is controlled primarily by the length of the slot 32. When pin 36 engages the bottom of the slot continued outward movement of the sash 11 will pull the travel bar downwardly whereby the upper connected sashes are moved. In Figure 4 the pin is shown in the lowermost portion of the slot and the travel bar has moved down slightly, while in Figure 5 the tooth 41 is shown in locking engagement with one of the notches 42 in plate 43 corresponding generally with position C in Figure 8. The tooth can engage any one of the notches, the final opening of all sashes being limited by stop 55. When it is desired to retain the sashes in a selected position and to lock them in this position, sash 11 is moved inwardly toward closed position whereupon pin 36 is moved upwardly in channel 35. Now the travel bar end is so provided in its guides that face 33 is kept in engagement with the pin 36. This is because in that position shown in Figures 1, 3, and 9, the travel bar is sprung slightly. As the pin moves up, face 33 slides past the pin and in engagement. The end of the travel bar is thus permitted to move to the left, in Figures 1 through 6 until tooth 41 engages one of the notches 42 and plate 43 secured on the side of the frame. As the sash 11 continues to move inwardly the pin 36 moves into the slot 34 until the sash 11 is in closed position as in D of Figure 9. Thus the several upper sashes can be locked in selected open position while sash 11 is closed. When it is desired to open the upper sashes further, sash 11 is moved outwardly. This pulls the pin 36 down in the slot 34. When it reaches the face 33, the pin rides across this face as it moves down in its slot and thus forces the end of the bar to the right in Figures 2 and 5. Continued outward movement of sash 11 causes the travel bar to move downwardly until tooth 41 rides on or abuts a portion of the plate 43 beyond one of the notches. If the sash 11 is then pulled inwardly, the pin 36 will move upwardly to engage the upper portion of slot 32 wherein it is retained so long as the sash is moved inwardly.

While many persons are able to operate the window successfully by feel of the movement of the projecting teeth 41 over the notched plates 43 and to judge as to the position of the sash by a visual examination thereof during movement, a suitable visual indicating mechanism can be provided quite readily. To this end a pin or pointer 45 is provided on the end of the plate 31. The pin or pointer 45 cooperates with a plate 46 secured upon the side of the frame. The plate includes a suitable plural notched slot 47 therein corresponding to the movement of the pointer on the end of the travel bar under the control of the sash 11. By observing the pointer relation to the slot, one operating the sash can readily determine to what extent the upper sash had been opened by the lower sash and the condition in which the sash had been left for if the lower sash has been locked, then the pointer 45 is in one of the notches.

In Figure 9 I have shown a simplified form of notched plate designated as 43*a* and including a slot 51 therein serving to position the plate slidably on pins 52 and 53 which position, support and retain the plate 43*a* in the window frame. The position of the plate 43*a* is under the control of an adjusting and locking means generally indicated at 54, the plate being selectively moved up or down to any desired position of adjustment and locked in this position by utilization of the locking means, the details of which are not shown but which can be readily provided by those skilled in the art.

In operation, the notched plate 43*a* being set in a definite position, the operator can open sash 11 to that extent permitted by the length of slot 36 and providing that plate 43*a* is not set at such a point that tooth 41 first engages the stop 55 on plate 43*a*. If it be desired to open all the sashes, continued outward movement of sash 11 is effective, as previously explained, to this end. However, when the sash reaches its limit of movement, depending on the setting of plate 43*a*, inward movement of the sash 11 is effective to move the end of the travel bar to the left in Figure 9, against the normal spring tension in the travel bar, whereupon the tooth 41 comes to rest in the notch 42*a* and the upper sashes are locked in position with the lower sash closed, as in D of Figure 9. In this position, with sash 11 closed, one can also manipulate the other upper sashes 12 and 13 by moving plate 43*a* for, in this position, pin 36 is riding in slot 34 in the travel bar, sash 11 is closed while, due to the engagement between the tooth 41 and the notch 42*a*, the travel bar is directly connected to the other sashes.

From the foregoing I believe it will be apparent that I have provided certain advantageous features in the sash construction disclosed. The various sashes are positioned by hinges or hinged arms directly on the frame, thus providing a stronger and cheaper type of connection as well as one that is easier to install and maintain.

As between the various sashes, the bottom sash can be opened independently and to a desired degree or, with the bottom sash closed, the outer sash can be moved independently. Further, with the sashes hinged on the frame of the window and connected directly to the traveling bar, a strong leverage on each sash is provided, thus making the installation simpler to install, cheaper to manufacture and maintain, and easier to operate.

I claim:

1. In a window having a frame and a plurality of sashes, means hinging one end of each sash in said frame at a fixed point thereon for an outward swinging movement in said frame, a travel bar movable longitudinally in said frame, guides secured on said frame for said bar, a stop on said frame adjacent an end of said travel bar, a link hinged to each sash and to said bar and serving with said bar to interconnect said plurality of sashes for movement, said travel bar having a first slot extending substantially longitudinally along said bar adjacent said end thereof, a second slot adjacent to said first slot

and extending generally parallel to said first slot, and a third slot connecting said first and second slots and having a side thereof extending angularly to the longitudinal axis of said bar, the link associated with one sash including a pin, a guide for said pin extending longitudinally of said frame, said pin being movable, upon movement of said one sash, in said guide and in said slots (1) to move said travel bar longitudinally in said guides or (2) move said end of said travel bar transversely in a selected position of said travel bar.

2. In a window having a frame and a plurality of sashes, means hinging one end of each sash in said frame at a fixed hinge point thereon for an outward swinging movement in said frame, a travel bar movable longitudinally in said frame, guides secured on said frame for said bar, a link hinged to each sash and to said bar and serving to interconnect said plurality of sashes for movement, the link associated with one sash including a pin movable selectively and under control of said one sash back and forth over a substantially straight line path in a guide extending longitudinally of said frame, said travel bar including an aperture therein for said pin, said aperture being defined by two parallel longitudinal slots adjacent an end of said travel bar and a third slot interconnecting said slots and extending angularly across said bar, said slots cooperating with said pin to (1) move said travel bar longitudinally in said guides or (2) move said end of said travel bar transversely of said frame.

3. In a window as defined in claim 1, means supporting said stop for movement along said frame whereby the position wherein said stop can engage said travel bar end can be varied.

4. In a window having a frame and a plurality of sashes, means hinging one end of each sash in said frame at a fixed hinge point thereon for an outward swinging movement in said frame, a travel bar movable longitudinally in said frame, guides secured on said frame for said bar, a link hinged to each sash and to said bar and serving to interconnect said plurality of sashes for movement, a stop secured on said frame and providing a plurality of predetermined sash open positioning means for the travel bar when said stop in engaged with an end of said bar, said travel bar having a first slot extending substantially longitudinally along said bar adjacent said bar end, a second slot extending adjacent said first slot and generally parallel to said first slot, and a third slot connecting said first and second slots and having a side thereof extending angularly to the longitudinal axis of said bar, the link associated with one sash including a pin, a guide for said pin extending longitudinally of said frame, said pin being movable, upon movement of said one sash, in said guide and in said slots to (1) move said travel bar longitudinally in said guides or (2) move said end of said travel bar transversely in a selected position of said travel bar.

5. An operator for a multiple sash window comprising a travel bar adapted to be moved longitudinally in a frame for said window, a guide adjacent an end of said bar and extending longitudinally of said frame, a link adapted for attachment to a sash of said window, said bar having a first and a second slot extending along said bar, generally parallel to each other and connected adjacent one end thereof by a third slot extending angularly with respect to said slots, and a pin on said link movable in said guide to engage one or the other of said first and second slots.

6. An operator for a multiple sash window comprising a travel bar adapted to be moved longitudinally in a frame for said window, a guide adjacent an end of said bar and extending longitudinally of said frame, a link adapted to be attached to a sash of said window, said bar having a first and a second slot extending along said bar adjacent one end of said bar, said second slot extending beyond said first slot, said slots being generally parallel to each other and connected adjacent one end thereof by a third slot extending angularly with respect to said slots, and a pin on said link movable in said guide to engage one or the other of said first and second slots.

7. An operator for a multiple sash window comprising a travel bar adapted to be moved longitudinally in a frame for said window, a guide adjacent an end of said bar and extending longitudinally of said frame, a link adapted for attachment to a sash of said window, said bar having a first and a second slot extending along said bar, generally parallel to each other and connected adjacent one end thereof by a third slot extending angularly with respect to said slots, and a pin on said link movable in said guide selectively to engage one or the other of said first and second slots whereby said bar is movable by said link, said second slot being of a length sufficient to permit said pin to move therein without moving said travel bar when the sash moving said pin is moved from open position to closed position.

8. An operator for a multiple sash window comprising a travel bar adapted to be moved longitudinally in a frame for said window, a guide adjacent an end of said bar and extending longitudinally of said frame, a link adapted to be attached to a sash of said window, a pin on said link and movable thereby in said guide, a first slot for said pin extending longitudinally of said bar and engaged by said pin to move said bar longitudinally in said frame, a slot extending angularly to said first slot from an end thereof and engaged by said pin to force said bar end to move transversely in said frame, and a second slot adjacent the other end of said angularly extending slot and providing a lost motion connection between the pin and the bar.

HARRY LARSON.