Sept. 27, 1955 J. J. DONOVAN, JR., ET AL 2,718,676

LATCH MECHANISM FOR MULTI-SASH WINDOWS

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Fig. 1.

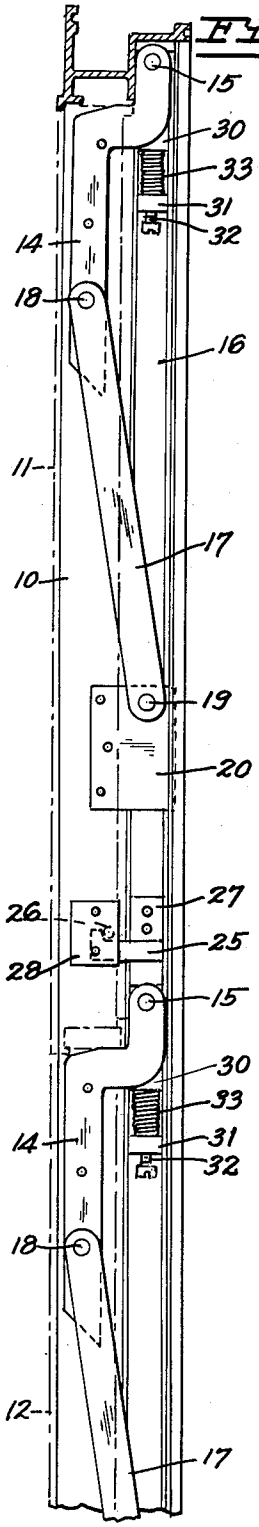


Fig. 2.

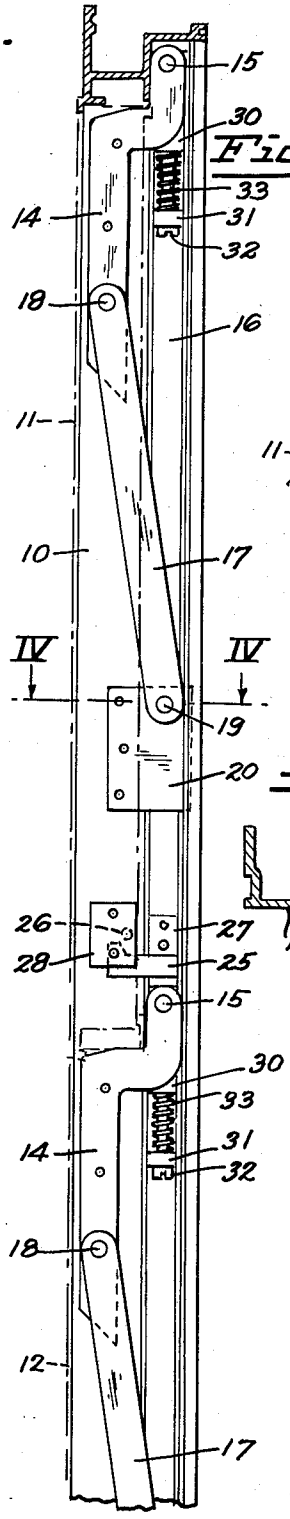


Fig. 3.

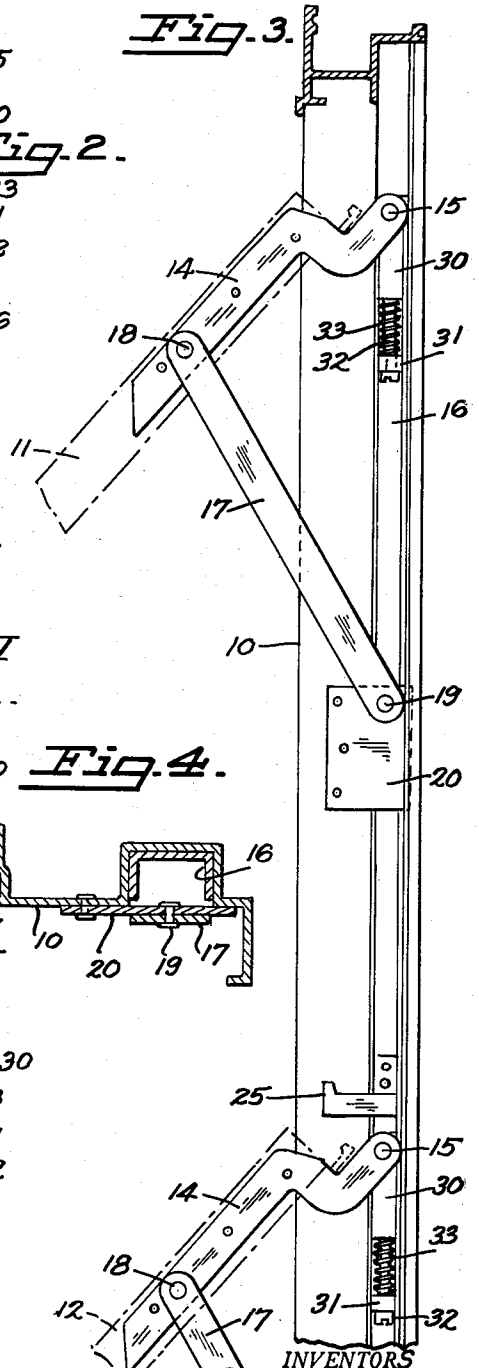


Fig. 4.

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LATCH MECHANISM FOR MULTI-SASH WINDOWS

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Fig. 1A.

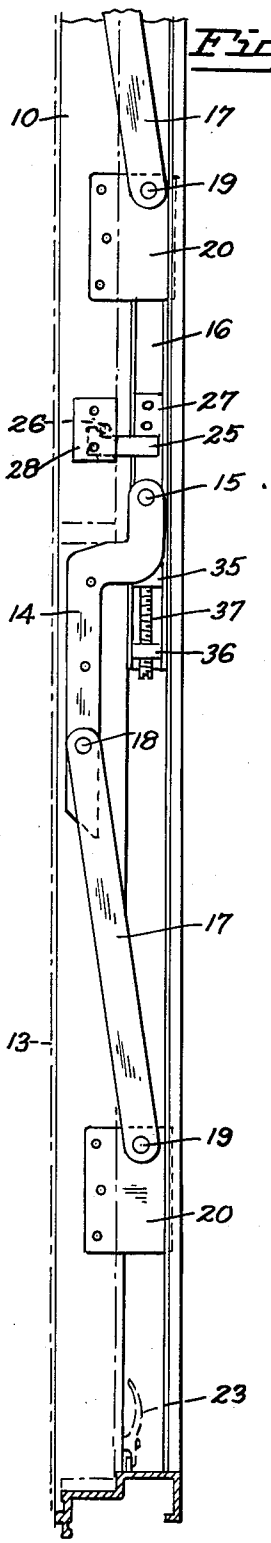


Fig. 2A.

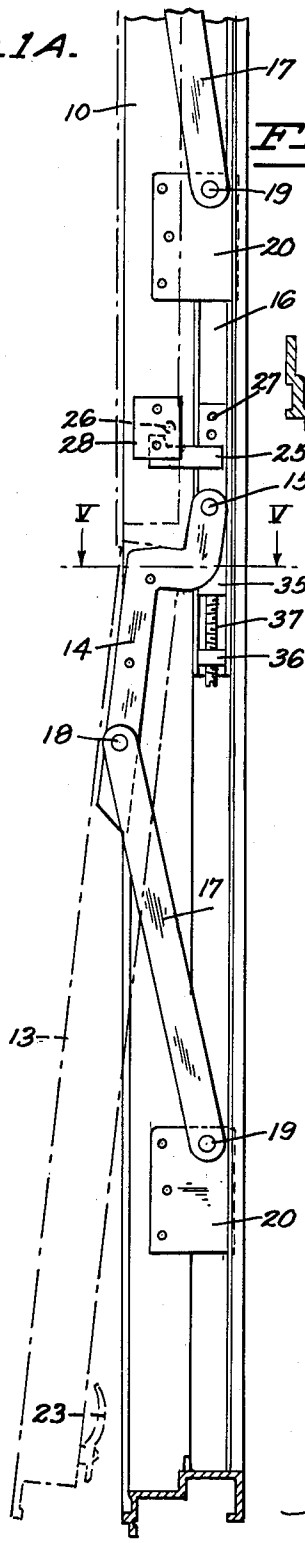


Fig. 5.

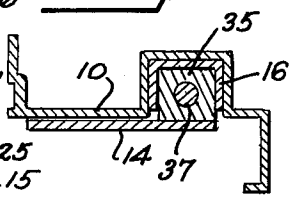


Fig. 3A

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LATCH MECHANISM FOR MULTI-SASH WINDOWS

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6 Claims. (Cl. 20—42)

This invention relates to latch mechanisms for multi-sash windows and particularly for windows of the awning type in which several sashes are mounted for outward swinging movement. The several sashes are mounted in super-imposed positions and are connected together for simultaneous operation so that opening and closing movement of one sash is accompanied by similar movement of the other sashes.

A particular sash, usually the lowermost in the window frame, is employed as a control sash and it has been customary to provide a latch to hold the control sash in its closed position. The other sashes are thus also held closed by means of the connecting mechanism which causes them to operate in unison. There are conditions, however, where it is desirable to latch each of the sashes individually in its closed position. For example in areas where strong winds prevail, the differential pressure between the interior and exterior of a closed building exerts forces tending to open the sashes and in some cases these forces overstress the connecting mechanisms between the sashes. Furthermore where a single latch is employed on one sash to hold connected sashes closed, the connected sashes may sometimes be pried open because of resiliency and lost motion in the connecting mechanism to admit unauthorized entrance to a building.

The present invention contemplates a single manually actuated latch for one of several connected sashes and latch means for each of the other sashes that is actuated automatically upon opening and closing of the one or control sash.

It is the object of the invention to provide a latch mechanism for multiple sash windows of the kind described and particularly to provide such a latch mechanism for a well-known type of sash connecting means with no more than simple and inexpensive variations to the structural parts thereof.

Further and more specific objects and advantages of the invention are made apparent in the following specification wherein the invention is described in detail by reference to the acompanying drawings.

In the drawings:

Fig. 1 is a transverse vertical section of the upper half of a window frame with the sash operating mechanism illustrated in the position it assumes when all sashes are closed and with the sashes illustrated in broken lines,

Figure 1*a* is a similar view of the lower portion of the same window frame,

Fig. 2 is a similar view of the upper portion of the same window frame and operating mechanism in the position assumed upon the first part of the opening movement of the lower or control sash,

Fig. 2*a* shows the lower portion of the window frame with the position of the operating mechanism corresponding to the position shown in Fig. 2,

Fig. 3 is a similar view of the upper portion of the same window frame with the sash operating mechanism shown in its open position,

Fig. 3*a* is a view of the lower portion of the frame illustrated in Fig. 3 with the sash operating parts also in their open position,

Fig. 4 is an enlarged sectional view taken on the line IV—IV of Fig. 2, and

Fig. 5 is an enlarged sectional view taken on the line V—V of Fig. 2*a*.

The general construction of a typical multi-sash window operating mechanism is shown in Figs. 1 to 3, inclusive, and 1*a* to 3*a*, inclusive, wherein a window frame **10** is illustrated as made of a specially designed metal section. It is to be understood, however, that the frame may be constructed of wood or other material. The frame illustrated has three sashes supported in super-imposed relationship for outward swinging movement and these sashes are illustrated in broken lines as an upper sash **11**, an intermediate sash **12**, and a lower sash **13**, all most clearly shown in the open position illustrated in Figs. 3 and 3*a*. The operating mechanism for one side of these sashes is illustrated in the drawings and usually identical mechanism is provided for the opposite side of the sashes to equalize the stresses imposed upon the mechanism and the sashes during opening and closing movement.

The operating mechanism for each sash comprises a hinge arm **14** secured as by screws, rivets or the like to the upper outer edge of the sash and having an offset upper end pivotally connected as by a pin **15** with an elongated member vertically slidable with respect to the side members of the window frame, usually termed a travel bar, and shown in the drawings at **16**. The details of the connections between the hinge arms **14** and the travel bar **16** will be hereinafter described. Each of the sashes is also connected with the window frame as by a link or arm **17** pivoted at one end by a pin **18** to the hinge plate **14** on the side of the sash and pivoted at its other end by a pin **19** to the window frame through the medium of a plate **20**. The plate **20** is secured to the window frame as by rivets or the like and serves to fix the position of the pivotal connection **19** with respect to the frame centrally of the position of the travel bar **16**. However the plate overlies the travel bar as illustrated in Fig. 4 thus permitting free sliding movement of the travel bar.

Since the hinge plates **14** of all sashes are connected with the travel bar **16** and since opening movement of any sash is accompanied by downward movement of the hinge plates as may best be seen in Fig. 3, this downward movement is transmitted to the hinge plates of all sashes through the travel bar when any single sash is swung to its open position and consequently all sashes open simultaneously. Through the same linkage, closing movement of any single sash is accompanied by simultaneous closing movement of the other sashes.

Any one of three sashes may be used as a control sash but usually and in the present illustration, the lowermost sash **13** is that which is manually operated and which controls the position of the other sashes. A manually actuated latch of any suitable type may be employed for holding the controlled sash in its closed position, a typical latch for this purpose being shown at **23** in Figs. 1*a* and 2*a*. The upper sash **11** and intermediate sash **12** are each provided with a latch which comprises a hook **25** carried by the travel bar and a pin **26** secured to the window sash. Such latch may be provided either on one or both sides of each sash. The hook **25** is secured to the travel bar in any suitable manner and is shown as welded or otherwise suitably secured to a block **27** which fills the interior of the channel-shaped travel bar and is suitably secured thereto. The pin **26** is carried by a plate **28** secured by rivets or screws to the side element of the sash.

Since the travel bars move upwardly upon closing movement of the sashes, the hook **25** comes into latching engagement with the pin **26** as shown in Fig. 1 and Fig. 1*a* when the sashes are in their closed positions. When the sashes are swung toward their open positions the travel bar slides downwardly carrying with it the hooks **25** to disengage them from the pins **26**. This, however, requires some lost motion connection between the sashes and the travel bar in order to enable the first part of the opening movement of the lower sash to draw the travel bar downwardly a short distance to release the latches on the upper and intermediate sashes before they commence to swing outwardly with the opening of the lower or control sash. This lost motion connection between the travel bar and the upper and intermediate sashes is shown in Figs. 1, 2 and 3 and particularly in Fig. 3 where the pin **15** which connects the hinge plate **14** of each sash is shown as carried by a block **30** slidably mounted in the travel bar. A perforated block **31** is fixed in the travel bar and a screw **32** extends through the perforation in this block and is threaded into the block **30**. Interposed between the blocks **30** and **31** and surrounding the screw is a spring **33** normally expanding to slide the block **30** upwardly to properly position it and the pivot pin **15** with respect to the travel bar. During assembly of the several parts, the screw may be adjusted slightly to vary the position of the pin **15** to accommodate slight dimensional discrepancies in manufacturing or assembling so that all sashes will be tightly closed at the same time.

The connection between lower sash **13** and the travel bar is best illustrated in Figs. 1*a*, 2*a* and 3*a* and particularly in 3*a* wherein the hinge plate **14** of the lower sash is shown as connected by its pivot pin **15** to a block **35** slidable in the channel bar. A block **36** is fixed in the channel bar and a right and left hand screw **37** is threadedly received in the blocks **35** and **36**. Turning of the screw **37** adjusts the position of the pivot pin **15** with respect to the travel bar when the mechanism is first assembled. There is, however, no resilient connection between the control sash and the travel bar such as provided by the springs **33** in the connections of all of the other sashes therewith.

In operation, with all of the sashes in their closed positions as illustrated in Figs. 1 and 1*a*, the springs **33** are compressed because of the upward motion of the travel bar which swing the upper sash and the intermediate sash to their closed positions. Figs. 2 and 2*a* show the position of the parts when the lower sash **13** has moved through the first inch or two of its opening movement to slide the travel bar downwardly a short distance permitting the springs **33** to expand and causing release of the latch hooks **25** from their pins **26** without moving the upper and intermediate sashes. At the end of this initial movement the block **31** strikes the head of the screw **32** and forms a positive or non-resilient connection with the travel bar so that upon further outward swinging movement of the control sash **13**, the travel bar exerts a downward force on the pins **15** of the upper and intermediate sashes and they are swung as shown in Fig. 3 to their open positions.

With the mechanism herein described, the upper and intermediate sashes are automatically latched when they are closed and automatically unlatched during the initial opening movement of the control sash without attention by the operator who need only actuate the manual latch **23** and swing the control sash to its open or closed position as required.

We claim:

1. In a window having a control and controlled sashes mounted to swing in a common frame and connected by means including a sliding travel bar to effect simultaneous opening and closing of all of the sashes upon manipulation of the control sash, cooperating latch means on the travel bar and each controlled sash, and means effective during the first part of the opening movement of the control sash to move the travel bar and release said latch means before the controlled sashes start to open.

2. In a window having a control and controlled sashes mounted to swing in a common frame and connected by means including a sliding travel bar to effect simultaneous opening and closing of all of the sashes upon manipulation of the control sash, cooperating latch means on the travel bar and each controlled sash, and means effective during the first part of the opening movement of the control sash to move the travel bar and release said latch means before the controlled sashes start to open, said means including resilient connections between the controlled sashes and the travel bar, and stops for limiting the resilient action of said connections.

3. In a window having a control and controlled sashes mounted to swing in a common frame and connected by means including a sliding travel bar to effect simultaneous opening and closing of all of the sashes upon manipulation of the control sash, cooperating latch means on the travel bar and each controlled sash, the means connecting the controlled sashes and the travel bar including a resilient part whereby the control sash may swing a short distance to move the travel bar and actuate said latch means while the controlled sashes remain in their closed positions.

4. In a window having a control and controlled sashes mounted to swing in a common frame and connected by means including a sliding travel bar to effect simultaneous opening and closing of all of the sashes upon manipulation of the control sash, latch hooks secured to the travel bar, latch pins carried by the controlled sashes for engagement by said hooks when the controlled sashes are closed, and means to slide the travel bar a limited distance for disengaging said latch hooks when the control sash starts to open and before the controlled sashes start to open.

5. In the window having a control and controlled sashes mounted to swing in a common frame and connected by means including a sliding travel bar to effect a simultaneous opening and closing of all of the sashes upon manipulation of the control sash, a latch hook rigidly secured to the travel bar adjacent each controlled sash, a latch pin on each controlled sash for engagement by the corresponding hook, and means actuated by final closing movement of the control sash just after closing of the controlled sashes to move the travel bar to a position of latching engagement between the latch hooks and latch pins.

6. In a window having a control and controlled sashes mounted to swing in a common frame and connected by means including a sliding travel bar to effect a simultaneous opening and closing of all of the sashes upon manipulation of the control sash, a latch hook rigidly secured to the travel bar adjacent each controlled sash, a latch pin on each controlled sash for engagement by the corresponding hook, and means actuated by final closing movement of the control sash just after closing of the controlled sashes to move the travel bar to a position of latching engagement between the latch hooks and latch pins and resilient connections between each controlled sash and the travel bar to permit movement of the travel bar by the control sash prior to opening of the controlled sashes and a distance sufficient to release said latching engagement.

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