Aug. 29, 1933. T JOHNSON 1,924,557

CASEMENT WINDOW OPERATOR

Filed July 22, 1929

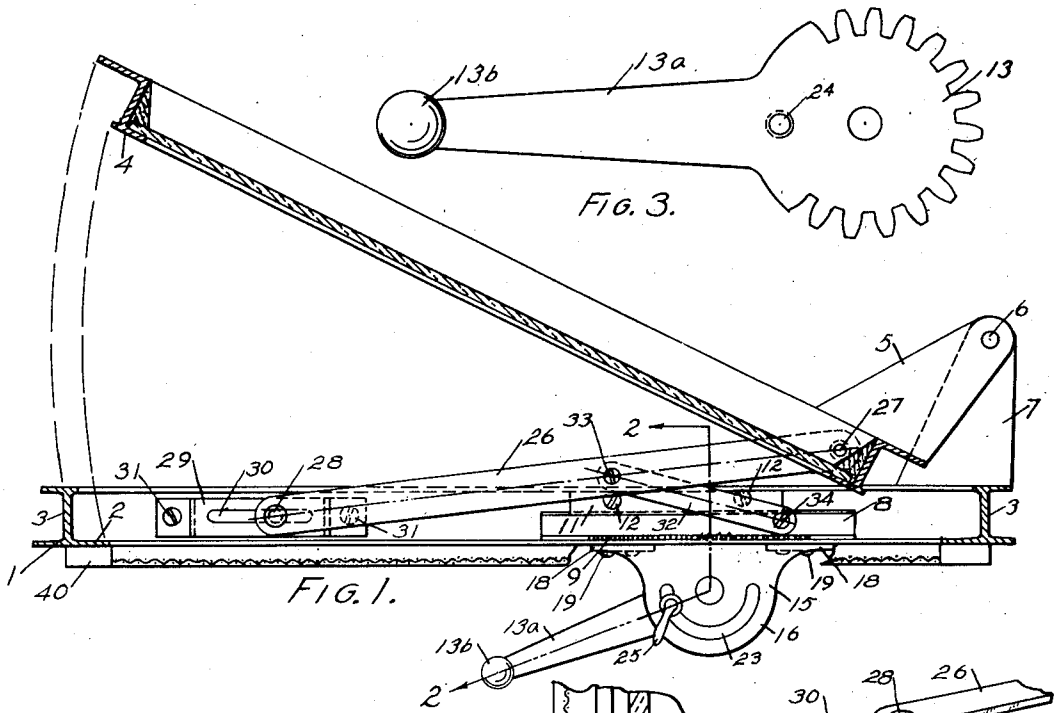


FIG. 3.

FIG. 1.

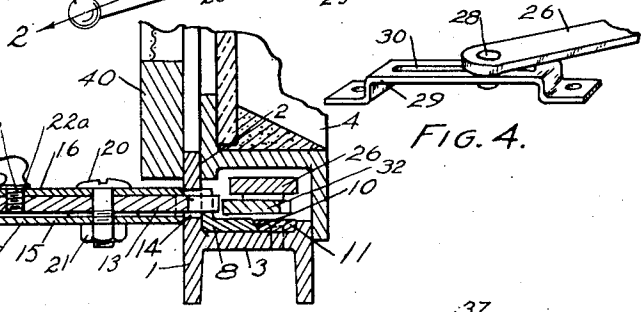
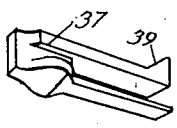


FIG. 4.

FIG. 2.



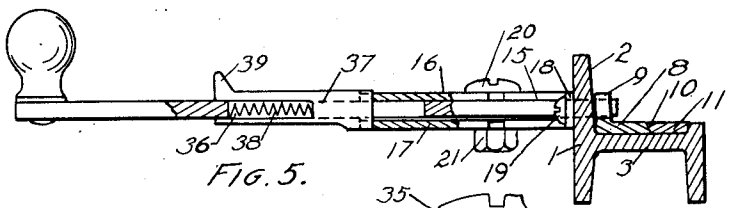


FIG. 7.

FIG. 5.

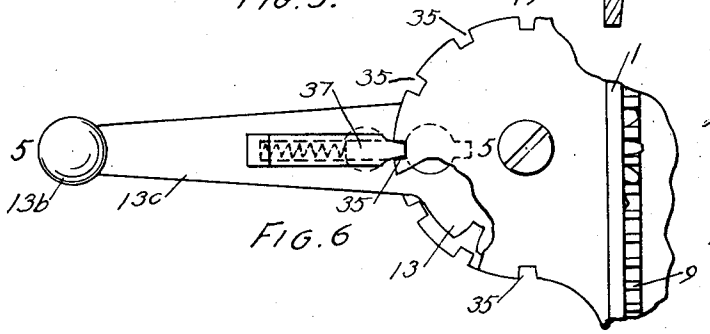


FIG. 6

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Patented Aug. 29, 1933 1,924,557

UNITED STATES PATENT OFFICE

1,924,557

CASEMENT WINDOW OPERATOR

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Application July 22, 1929. Serial No. 379,903

21 Claims. (Cl. 268—117)

Casement windows present a very definite problem as to the manner of actuating and locking them. This is particularly true if such windows are provided with screens. The present invention is designed to provide a very simple, efficient and secure actuating device for the window sash, one that occupies very little space, one that will permit of the ready application of the screen directly to the casement frame, and one that is entirely mounted upon the metal casement frame itself so that the structure is self-contained, or complete with the setting of the frame in the window opening. Features and details of the invention will appear from the specification and claims.

A preferred embodiment of the invention is illustrated in the accompanying drawing as follows:—

Fig. 1 shows a vertical section of the window, the sash being partly open.

Fig. 2 a section on the line 2—2 in Fig. 1, with the window closed.

Fig. 3 a plan view of the operating handle.

Fig. 4 a perspective view of the anchorage for the sash lever, or bar.

Fig. 5 a vertical section through the window frame, the actuator being partly in section on the line 5—5 in Fig. 6.

Fig. 6 a plan view of the actuator mechanism shown in Fig. 5.

Fig. 7 the locking pawl of the structure shown in Figs. 5 and 6.

1 marks the casement frame. This is of the usual angle section having an inner face member 2 which forms the stop for the window. The angle section has an outwardly extending member 3. A window sash 4 has a hinge projection 5 and is hinged by means of a pin 6 on a hinge projection 7 extending from the frame. Thus the hinge is off-set from the plane of the frame in the usual manner.

A rack bar 8 is slidingly mounted on the member 3 at the bottom of the window frame. It is provided with a rack 9 along an up-turned inner edge. The outer edge of the rack bar 8 is beveled at 10 and a guide plate 11 having a similar bevel is secured by screws 12 on the member 3. Thus the rack bar is slidingly mounted in the bottom of the window frame.

A gear segment 13 extends through an opening 14 in the member 2 and meshes with the rack 9. The gear segment is carried by a mounting 15 having the upper and lower plates 16 and 17 respectively. These plates are secured together and have the extending flanges 18 through which screws 19 extend for securing the mounting to the front of the face member 2. The gear segment is pivoted on a bolt 20 which extends through the plates 16 and 17. The bolt is provided with a nut 21 at the bottom. A screw 22 extends through a slot 23 in the plate 16 and is secured in a screw-threaded opening 24 in the gear segment. The screw is provided with a handle 25 and with a clamping shoulder 22*a*. As the segment is thrown to any position the screw 22 is operated clamping the plate 16 between the gear segment and the shoulders 22*a*, thus locking the handle in any adjusted position. A handle lever 13*a* extends from the gear segment and is provided with the ordinary handle 13*b*.

The sliding motion of the rack bar 8 is conveyed to the window sash through the following lever mechanism: A lever 26 is pivotally connected at 27 with the window sash and is slidingly mounted by means of a pin 28 on a plate 29, the plate being provided with a slot 30 through which the pin 28 extends. The plate 29 is secured to the member 3 of the window frame by screws 31. A thrust link 32 is pivotally connected by a pin 33 with the lever 26 and by a pin 34 with the rack bar 8.

The operation of the mechanism is as follows: With the window in closed position, the lever 26 and the thrust link 32 are arranged below the window sash and are in practically parallel relation. As the gear segment is actuated, it moves the rack bar toward the left, as shown in Fig. 1. The initial thrust on the link 32 is communicated to the bar, or lever 26 and makes almost a direct crosswise pull on the window sash and this by reason of the off-set pivot of the hinge acts on the window sash with its off-set as a bell crank and swings the window sash outwardly. As the rack bar proceeds, the link 32 gradually assumes a position more nearly at right angles to the frame and thus the thrust of the bar lever 25 on the sash is outwardly. By this time the off-set hinge piece 5 is more nearly crosswise of the frame so that this outward force continues to swing the sash with ample leverage to move the window and control it. When the window reaches its ultimate position, the thrust link is nearly at a right angle so that very little locking force of the screw 22 will lock the window in this position.

It will be noted that this device involves a lever mechanism inside the window frame, and a second lever mechanism outside the window frame, these lever mechanisms having pivotal connections, the axes of which are parallel, and that the movement of the inside lever mechanism

is communicated to the outside lever mechanism without any moving shutter, or other device for maintaining a closure through the casement frame. It will also be noted that the device occupies a very slight space vertically on the member 2 of the frame. Thus the unobstructed portion of the inner face of the window frame is available for direct engagement by a screen frame, as 40. In this structure, the screen frame rests on the top plate 16 and is within the inside of the bolt 20. It will also be noted that by reason of this small space used vertically that the wall structure in which the casement frame is set may extend, if desired, up the face of the member 2 so as to make the proper finish.

In Figs. 5 and 6, an alternative construction for locking the gear segment is used. The plates 16 and 17 are notched at 35. A pawl 37 is slidingly mounted in a slot 36 in a handle lever 13c. A spring 38 urges the pawl forward and a shoulder 39 is provided by which the pawl may be readily retracted so as to swing the handle lever.

What I claim as new is:—

1. In a casement window, the combination with a frame and a sash hinged thereon, of an actuator comprising a lever pivotally connected to the sash and slidingly connected to the frame, said connection to the frame being remote from the hinge and locating the pivotal connection with the sash between said frame connection and the hinge with the sash in closed position and a link connected to the lever between its connections; and means actuating the link.

2. In a casement window, the combination with a frame and a sash hinged thereon, of an actuator comprising a lever pivotally connected to the sash and slidingly connected to the frame and a link pivotally connected to the lever intermediate the connection between the lever and the sash and the frame and the lever and slidingly connected to the frame; and means actuating the link.

3. In a casement window, the combination with a frame of angle section having an inner face member and a sash hinged and seating on the frame, said frame and sash having opposing surfaces in spaced relation with the sash in closed position affording an actuator space therebetween, of an actuator comprising a lever pivotally connected to the sash and frame and a link pivotally connected to the lever; a rack bar slidingly mounted on the outer face of the frame to which the link is pivotally attached, said lever, link and rack being disposed in said actuator space; and a gear segment mounted on the face member and actuating the rack.

4. In a casement window, the combination with a frame of angle section having an inner face member and a sash hinged and seating on the frame, said frame and sash having opposing surfaces in spaced relation with the sash in closed position affording an actuator space therebetween, of an actuator comprising a lever connected to the sash and frame and a link pivotally connected to the lever; a rack bar slidingly mounted on the frame in said actuator space and to which the link is pivotally attached; and a gear segment mounted on the face member and actuating the rack, said gear segment extending through the face member.

5. In a casement window, the combination with a frame and a sash hinged and seating on the frame, said frame and sash having opposing surfaces in spaced relation with the sash in closed position affording an actuator space therebetween, of an actuator comprising a lever pivotally connected to the sash and slidingly connected to the frame and a link connected to the lever, said link and lever being disposed in the actuator space; means actuating the link; and means locking the actuator in adjustment.

6. In a casement window, the combination with a frame and a sash hinged and seating on the frame, said frame and sash having opposing surfaces in spaced relation with the sash in closed position affording an actuator space therebetween, of an actuator comprising a lever connected to the sash and frame and a link connected to the lever and slidingly connected to slide along the face of the frame, said link and lever being disposed in said actuator space; means actuating the link; and means locking the actuator in various adjustments.

7. In a casement window, the combination with a frame and a sash hinged thereon, said frame being of angle section, one angle of the section having a face opposing the sash, of an actuator comprising a lever pivotally connected to the sash and slidingly connected to the frame and a link pivotally connected to the lever and slidingly connected to slide along the face of the frame, said link and lever being disposed between the sash and frame with the sash in closed position; means actuating the link; and means locking the actuator in various adjustments.

8. In a casement window, the combination with a frame and a sash hinged thereon, of an actuator comprising a lever connected to the sash and frame and a link connected to the lever; means actuating the link comprising a rack and right-hand pinion; and means locking the actuator in adjustment comprising a notched segment and a pawl operating on the pinion.

9. In a casement window, the combination of a casement skeleton metallic frame of angle section, one angle of the section forming an inner face member; a sash hinged on the frame and closing on said face member; and a sash actuator mounted on the face member of the frame comprising a gear segment, and a mounting for the gear segment on the inside of the face member of the frame, said frame having an opening therethrough through which the movement of said gear segment is communicated.

10. In a casement window, the combination of a casement skeleton metallic frame of angle section, one angle of the section forming an inner face member; a sash hinged on the frame and closing on said face member; and a sash actuator mounted on the face member of the frame, comprising a gear segment, and a mounting for the gear segment on the inside of the face member of the frame, the face member of said frame having an opening and said gear segment operating through the opening in the face member of the frame.

11. In a casement window, the combination of a casement skeleton metallic frame of angle section, one of the angles of the section forming an inner face member, and a sash hinged on the frame and seating on the frame with parts spaced therefrom to afford an actuator receiving space; and an actuator comprising a rack slidingly mounted on the outside of the frame in said actuator space, a connection between the rack and sash, a gear segment operating said rack, and a mounting for the segment having an axis parallel with the axis of the sash secured on the inside of the face member, said frame having

an opening through which the movement of the gear segment is communicated to the rack.

12. In a casement window, the combinaton of a casement skeleton metallic frame of angle section, one of the angles of the section forming an inner face member, and a sash hinged on the frame and seating on the frame with parts spaced therefrom to afford an actuator receiving space; and an actuator comprising a rack slidingly mounted on the outside of the frame in the actuator space, a connection between the rack and sash, a gear segment having an axis parallel with the axis of the sash operating said rack, and a mounting for the segment secured on the inside of the face member, said face member having an opening and said segment operating through the opening in the face member.

13. In a casement window, the combination of a casement frame of angle section having an inner face member, and a sash hinged on the frame; and an actuator comprising a rack slidingly mounted on the outside of the frame, a connection between the rack and sash comprising a lever connected to the sash and frame and a link between the lever and rack; a gear segment operating said rack, and a mounting for the segment secured on the inside of the face member, said frame having an opening through which the movement of the gear segment is communicated to the rack.

14. In a casement window, the combination of a casement frame of angle section having an inner face member, and a sash hinged on the frame; and an actuator comprising a rack slidingly mounted on the outside of the frame, a lever connected with the sash and slidingly connected with the frame, a link pivotally connected with the lever and rack, a gear segment operating said rack, and a mounting for the gear segment secured on the inside of the face member, said face member having an opening therethrough and said gear segment engaging said rack through the opening in the face member.

15. In a casement window, the combination with a frame and a sash hinged thereon with the pivot of the hinge outwardly off-set from the sash, of an actuator for said sash comprising an actuator bar having operative connection with the sash; and means operating on the bar to exert initially a maximum opening force on the sash in a direction crosswise of the frame and away from the sash pivot followed by a maximum force in a direction outwardly from the frame as the movement of the bar progresses.

16. In a casement window, the combination with a frame and a sash hinged thereon with the pivot of the hinge outwardly off-set from the sash, of an actuator for said sash comprising an actuator bar having operative connection with the sash; and means operating on the bar to exert initially a maximum opening force on the sash in a direction crosswise of the frame and away from the sash pivot followed by a maximum force in a direction outwardly from the frame as the movement of the bar progresses comprising a lever outside the frame, a lever inside the frame, and a driving connection between said levers.

17. In a casement window, the combination with a frame and a sash hinged thereon, of an actuator for said sash comprising an actuator bar having operative connection with the sash; and means operating on the bar to exert initially a maximum opening force on the sash in a direction crosswise of the frame and away from the sash pivot followed by a maximum force in a direction outwardly from the frame as the movement of the bar progresses comprising a lever outside the frame, a lever inside the frame, said levers swinging on parallel axes, and a driving connection between said levers comprising a rack and pinion.

18. In a casement window, the combination with a frame and a sash hinged thereon, of an actuator comprising a lever positioned outside the frame, said lever being pivotally connected to the sash and fulcrumed on the frame, said fulcrum being remote from the hinge of the sash, placing said pivotal connection between the fulcrum and the hinge with the sash in closed position; a lever inside the frame terminating at the frame, said levers swinging on parallel axes; and a driving connection between the levers whereby the lever outside the frame may be actuated by the movement of the lever inside the frame.

19. In a casement window, the combination with a skeleton metallic frame having a face member forming a window stop and a sash hinged on the frame, of an actuator comprising a lever outside the frame pivotally connected with the sash and fulcrumed on the frame, said fulcrum being remote from the hinge of the sash placing said pivotal connection between the fulcrum and the hinge with the sash in closed position; a lever inside the frame terminating at the frame, said levers swinging on parallel axes; and a driving connection between the levers, said connection being arranged adjacent to the face of the member.

20 In a casement window, the combination with a frame and a sash hinged thereon, of an actuator comprising a lever connected to the sash and frame and a link arranged outside the frame and located between the frame and sash with the sash in closed position, said link being connected to the lever; and means actuating the link comprising a rack and pinion, the rack being arranged outside the frame and the pinion being journaled inside the frame.

21. In a casement window, the combination with a frame and a sash hinged and seating on the frame, said frame and sash having opposing surfaces in spaced relation with the sash in closed position affording an actuator space therebetween, of an actuator comprising a lever connected to the sash and frame and a link connected to the lever; means actuating the link comprising a rack, said link, lever and rack being arranged in the actuator space, and a pinion mounted on the inside of the frame communicating movement to the rack; and means locking the actuator in various adjustments.

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