Aug. 30, 1938. H. J. HENDRICK 2,128,483

CASEMENT WINDOW OPERATOR

Filed Aug. 1, 1935

Fig. 1.

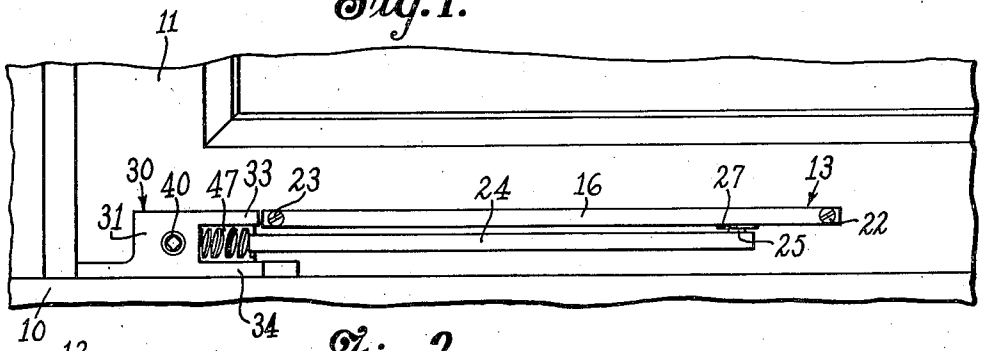


Fig. 2.

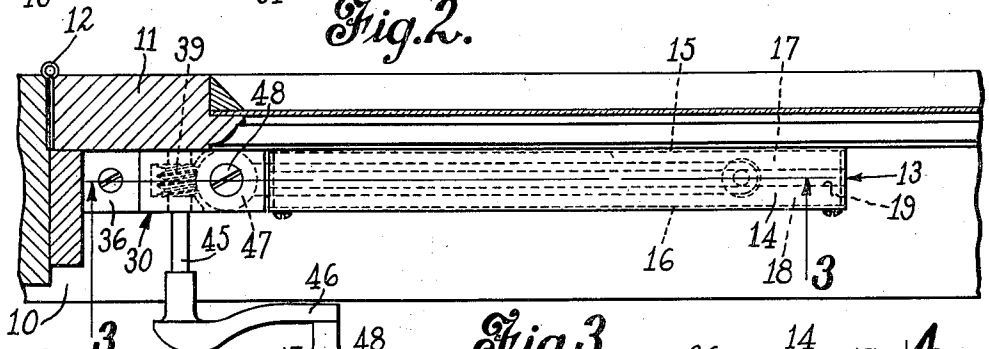


Fig. 3.

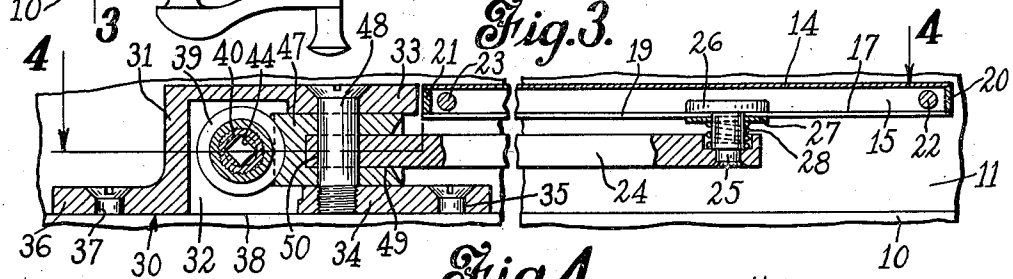


Fig. 4.

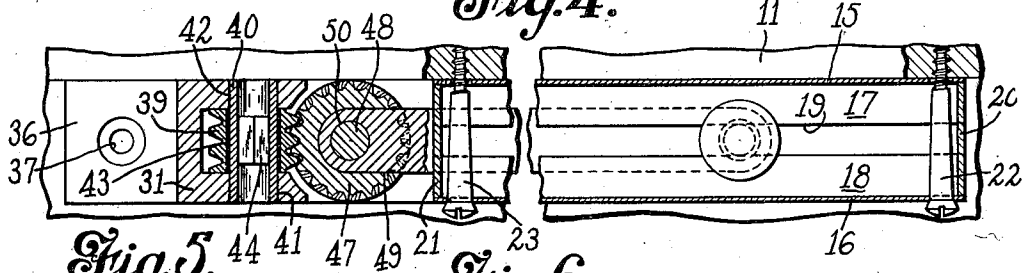


Fig. 5.

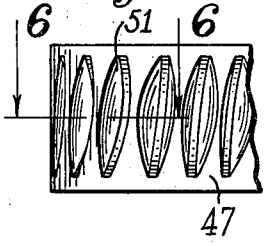
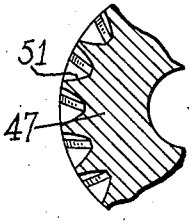


Fig. 6.



Inventor

Hobart J. Hendrick

By Rockwell & Bartholow

Attorneys

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UNITED STATES PATENT OFFICE

2,128,483

CASEMENT WINDOW OPERATOR

Hobart J. Hendrick, Hamden, Conn., assignor to The H. B. Ives Company, New Haven, Conn., a corporation of Connecticut

Application August 1, 1935, Serial No. 34,125

2 Claims. (Cl. 268—119)

This invention relates to casement window operators, and more particularly to a device of this character operated by a crank, so that if desired it may be used in connection with a casement window having a screen upon the inner side of the window.

In the usual form casement windows are hinged at their side edges to swing outwardly, and it is, therefore, usually impractical to place a screen upon the outside. The usual practice in such cases is to place the screen within the window frame upon the inner side of the window, and the window operator must be so arranged that it can be actuated from the inner side of the screen or else the latter must be removed or swung out of the way.

The present invention has for one of its objects the provision of a casement window operator which may be actuated from the inside of the screen.

Another object of the invention is the provision of a casement window operator of this character which shall be simple in construction and economical to manufacture.

A still further object of the invention is the provision of a casement window operator having an operating arm so connected with the swinging window sash that irregularities in the position of the sash due to sagging, for example, are allowed for.

Another object of the invention is the provision of a crank-operated casement window operator which operates smoothly and easily without play or lost motion between the parts.

To these and other ends the invention consists in the novel features and combinations of parts to be hereinafter described and claimed.

In the drawing:

Fig. 1 is a front elevational view of a casement window provided with an operator embodying my improvements;

Fig. 2 is a sectional view of the window sash showing the operator in top plan view;

Fig. 3 is a sectional view of the operator on line 3—3 of Fig. 2;

Fig. 4 is an irregular section on line 4—4 of Fig. 3;

Fig. 5 is a fragmentary detail elevational view of the worm wheel; and

Fig. 6 is a fragmentary sectional view on line 6—6 of Fig. 5.

To illustrate a preferred embodiment of my invention I have shown in the drawing a window frame 10 provided with the usual casement window sash 11, hinged to the frame at 12 to swing outwardly.

Secured to the lower part of the window sash is a guide member 13, this member having a top portion 14 with depending sides 15 and 16, the sides being turned inwardly below the top member, as shown at 17 and 18, where their edges are separated by the slot 19. This guide member may be considered as of hollow rectangular shape in cross-section, except that the rectangle is broken by the slot 19, which extends throughout the length of the guide member and provides access to the interior thereof. At its ends the hollow guide member 13 may be closed by the plates 20 and 21, and the member may be secured to the sash by means of screws or suitable securing members 22 and 23, passing through the depending sides 15 and 16, and entering the lower portion of the sash.

An operating arm 24 extends below the guide member 13, and secured to the end of this arm is a stud 25, which extends upwardly through the slot 19 and has an enlarged head 26 upon its upper end which is slidably disposed within the hollow guide member, and normally bears at its lower surface upon the upper surfaces of the parts 17 and 18. A washer 27 loosely surrounds the stud 25 and is urged upwardly by a spring 28 also surrounding the stud, so that the parts 17 and 18 are held between this washer and the lower surface of the stud. It will be apparent that due to the action of these parts the stud will be resiliently maintained in contact with the guide member so as to avoid looseness or play therebetween, but at the same time the spring 28 will allow the washer 27 to move downwardly to some extent so that there will be no binding between the parts in case the window sash should sag.

A casing 30 is secured upon the lower sill of the window frame 10. As shown, this casing may be conveniently made in one piece, and comprises a portion 31 having a hollow interior 32 and vertically spaced arms 33 and 34 projecting forwardly from the portion 31. The lower arm 34 may be longer than the upper to provide a screw opening 35, and at the other end of the casing a flange 36 is provided with a similar screw opening 37 by means of which the casing is secured to the sill.

The hollow portion 31 of the casing is closed upon three sides and at the top, but is left open at the bottom, as shown at 38, to permit the insertion into the casing of the worm 39. The length of this worm provides a relatively snug fit

between the walls of the casing, the fit being such, however, that the worm will be permitted to rotate freely.

After the worm has been inserted in the casing, a hollow shaft or bushing 40 is inserted through openings 41 and 42 in the side walls of the casing portion 31, the bushing passing through the worm and being rotatably mounted in the casing walls. The intermediate portion of the bushing is knurled or provided with serrations 43 whereby when the bushing is driven through the worm these serrations will cut into the metal of the worm to some extent and thus secure the latter rigidly thereon. In this way the worm is definitely located within the casing and mounted to rotate therein upon bearings furnished by the ends of the bushing in the openings in the walls of the casing. The bushing may be provided with a squared or non-circular portion 44 upon its interior to receive the similarly shaped end of an operating shaft 45 having a crank arm 46 thereon. It will be understood that in practice the shaft 45 may be detachable from the bushing, or may, if desired, be secured therein.

The casing portion 31 is also open at its forward end to permit the teeth of the worm to engage with the teeth of a worm wheel 47 which projects within the forward end of the casing, as shown in Figs. 3 and 4. This worm is rotatably mounted between the arms 33 and 34 by means of the pin or stud screw 48. The worm wheel 47 is provided with an opening 49 at one side thereof, and within this opening is received the rear end of the operating arm 24. The opening 49 is sufficiently deep to permit this arm to extend therein beyond the axis of the worm wheel, and the arm is provided with an opening 50 through which passes the pin or stud 48, this member serving the double purpose of securing the arm to the worm wheel and acting as a pivot and retaining member for the wheel itself. Owing to the snug fit of the end of the arm within the worm wheel, these parts are rigidly secured together by the pin 48.

As shown in Fig. 5, the teeth of the worm wheel 47 are of particular formation. The grooves between the teeth are shown at 51, and it will be noted that these grooves are wider at their intermediate portion than at their ends, and are also deeper at their intermediate portions than at their ends, that is, they are wider and deeper adjacent the central portion of the worm wheel than at points adjacent the upper and lower surfaces thereof. The shape of these grooves not only provides for a longer bearing surface between each engaged tooth of the worm wheel and the worm, but also provides for the simultaneous engagement of a number of teeth of the worm wheel with the worm, and thus insures a smooth and regular operation of the parts without play or backlash between the engaging parts of the worm and worm wheel. It will be noted that the sides of the grooves 51, being curved as they are, will follow the shape of the worm, and therefore provide for engagement of each tooth with the worm over a considerable area, as contrasted with the usual single point engagement between the worm wheel and a worm having straight teeth. With such an arrangement the worm 39 may be of relatively short length, and the housing or casing 30 of correspondingly narrow width. It will be noted that this housing is of substantially the same width as the guide 13, and being narrow may be readily mounted upon the window sill without interfering with the screen, even if the sill itself be relatively narrow. In case a screen is employed, it will be understood that the shaft 45 will extend through an opening in the screen, to be inserted into the bushing 40.

In order that grooves of this character may be readily formed, it is desirable that the worm wheel be of such character that the grooves may be cut entirely around the same. For this reason it is not desirable to make the operating arm 24 as an integral part of the worm wheel, but to have the latter circular in shape to facilitate the cutting operation, and connect the arm to it after the cutting has been effected by inserting the end of the arm within an opening in the wheel, as illustrated.

While I have shown and described a preferred embodiment of my invention, it will be understood that it is not to be limited to all of the details shown, but is capable of modification and variation within the spirit of the invention and within the scope of the appended claims.

What I claim is:

1. In a casement window operator, a casing adapted to be secured to the window frame, said casing having a pair of vertically spaced superposed arms, a worm wheel snugly received between said arms and provided with peripheral teeth, said wheel having an opening extending through the toothed edge thereof between its upper and lower faces, said opening being of sufficient depth to extend beyond the axis of said wheel, a lever arm having one end snugly received in said opening, and a pivot pin passed through said casing arms, said wheel, and said lever arm to secure the lever arm to the wheel and rotatably secure the arm and wheel to the bracket, the other end of said arm being adapted for connection with the window sash, and means including a worm mounted in said bracket for rotating said wheel.

2. A casement window operator comprising a casing adapted to be secured to the window frame, said casing having a pair of vertically spaced superposed arms, a worm wheel snugly received between said arms and provided with peripheral teeth, said wheel having a centrally disposed opening therethrough and having a lateral opening extending through the toothed surface thereof between its upper and lower faces, said last-named opening being of a depth to intersect said centrally disposed opening, a lever arm having one end seated in said lateral opening and having in said end an opening registering with the centrally disposed opening of the wheel, a pin passed through said casing arms and the registering openings of said wheel and lever arm to secure the lever arm to the wheel and rotatably secure the wheel between the casing arms, the other end of said lever arm being adapted to be secured to the window sash, and means including a worm rotatably mounted in the casing to operate said worm wheel.

HOBART J. HENDRICK.