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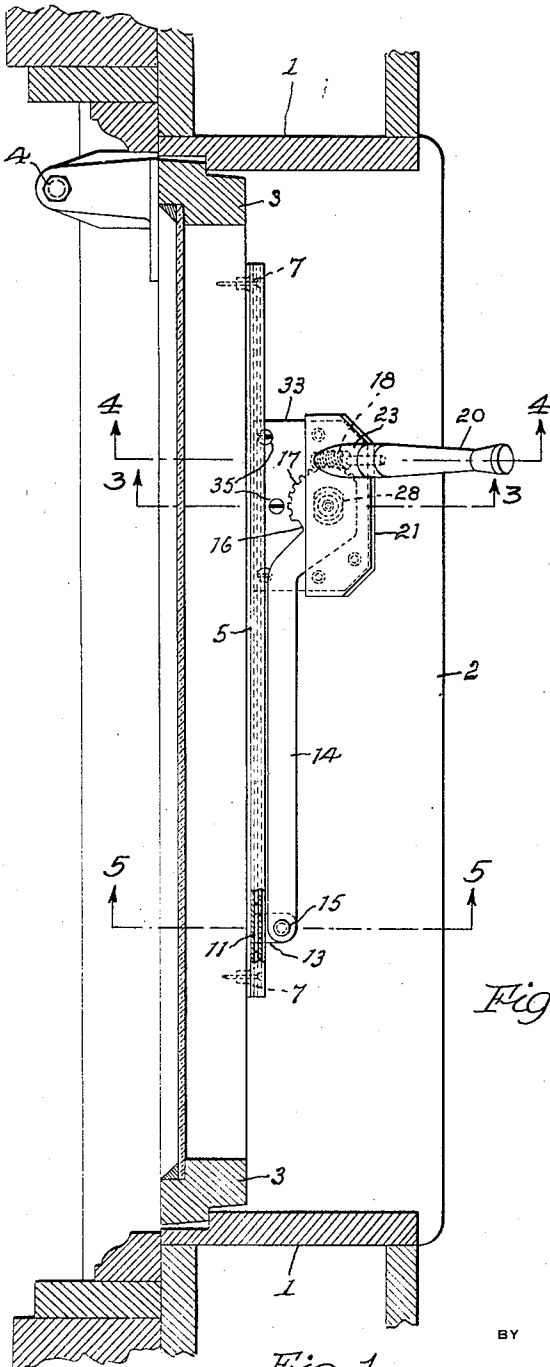
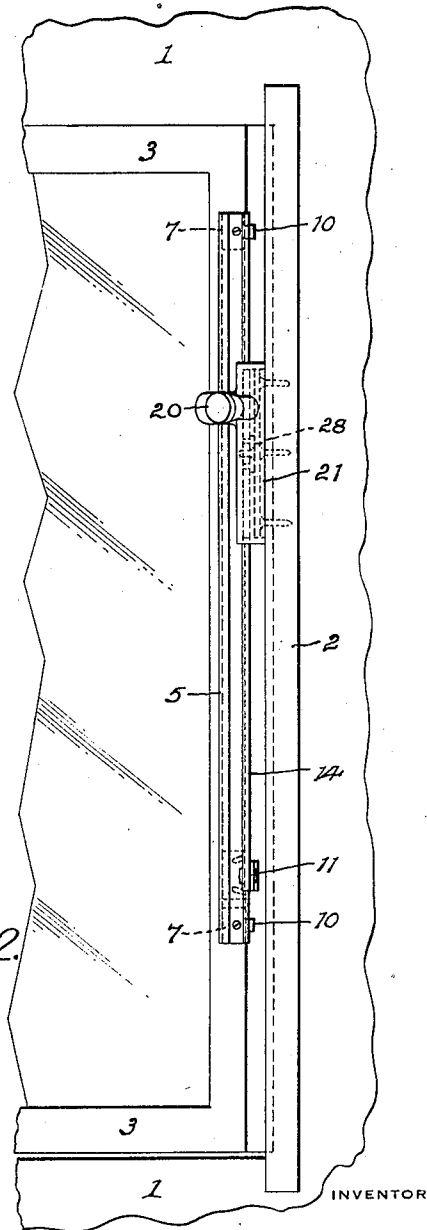
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2,050,403

WINDOW REGULATOR

Filed April 16, 1936

2 Sheets-Sheet 1



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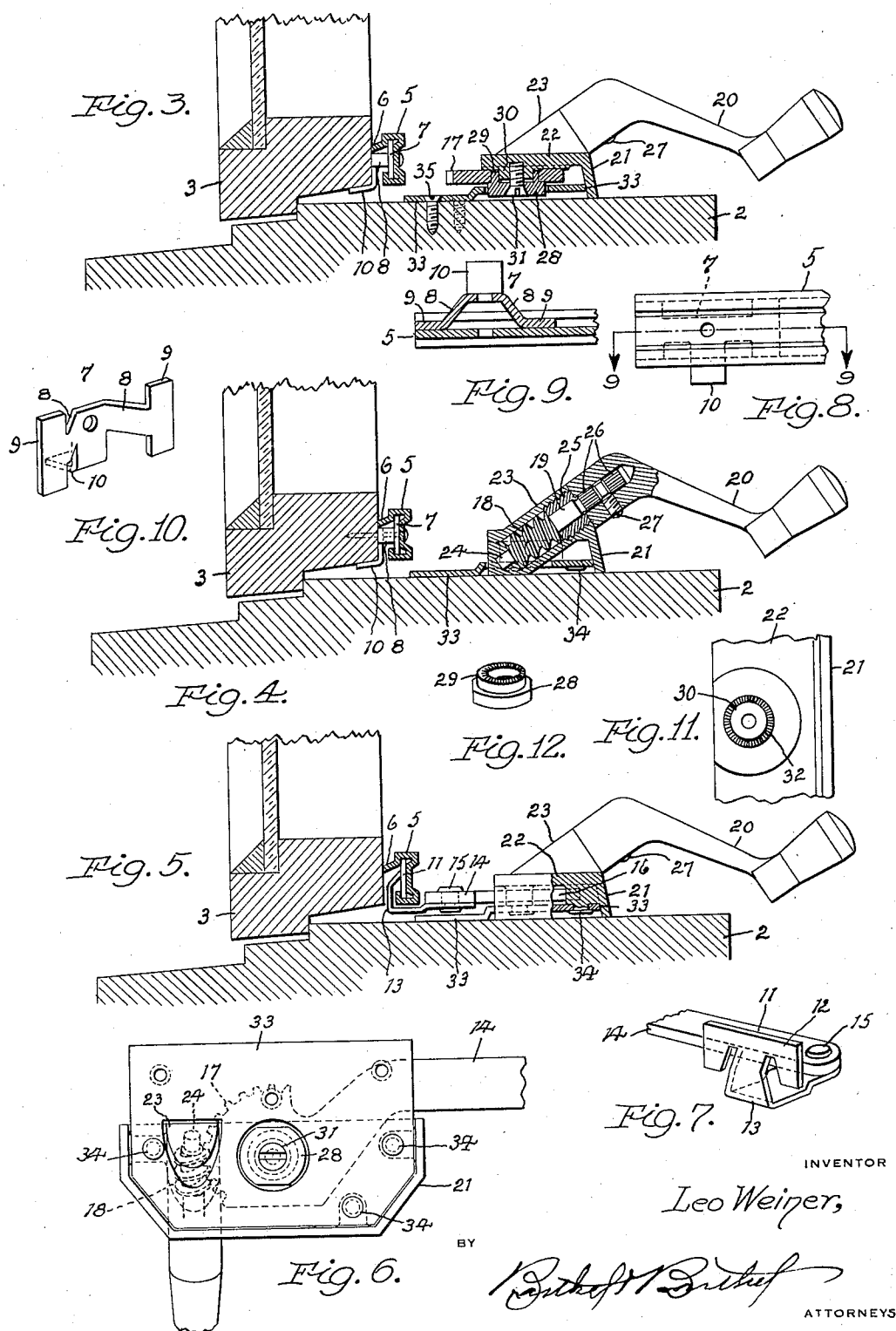
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2,050,403

WINDOW REGULATOR

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5 Claims. (Cl. 268—119)

This invention relates to an operating mechanism for swinging windows and more particularly to what is known as a window regulator for casement windows. An object of the present invention is to provide a mechanism for the purpose, which is simple, compact and efficient in construction having certain structural features whereby the cost of manufacture is reduced, adjustment facilitated, and ease of assembly secured.

With the above and other ends in view the invention resides in the matters hereinafter more fully set forth and shown in the accompanying drawings, wherein

Figure 1 is a view showing a window frame and sash in a horizontal section and a sill in plan view with sash swinging mechanism illustrative of an embodiment of the present invention in operative position thereon;

Fig. 2 is a side elevation of Fig. 1;

Figs. 3, 4, and 5 are transverse sections upon the lines 3—3, 4—4, 5—5 of Fig. 1, respectively;

Fig. 6 is a detail showing a worm and segment casing in inverted plan view;

Fig. 7 is a perspective view of a slide member detached;

Fig. 8 is a detail of an end portion of a channel way showing the same in elevation and a bracket for securing it to the sash;

Fig. 9 is a section upon the line 9—9 of Fig. 8;

Fig. 10 is a perspective view of the bracket detached;

Fig. 11 is an inverted plan view of the top wall of the casing shown in Fig. 6, and

Fig. 12 is a perspective view of an adjustment bushing detached.

In the drawings, 1 indicates a window frame and 2 the sill of this frame. 3 indicates the window sash which is pivotally attached in any suitable manner as at 4 to the window frame 1. To the lower rail of the sash 3, is attached a longitudinal channel way 5, this channel comprising a strip of metal folded to form a channel way with the upper flange 6 of the channel extended to abut the inner face of the lower rail of the sash 3 and to secure this channel way 5 firmly to the window sash, brackets 7 shown in detail in Fig. 10 are provided, each bracket comprising laterally extending offset arms 8 having transversely extending end portions 9 of a length to fit snugly within the end portion of the channel bar 5 and the central portion of this bracket providing an arm 10 which is laterally bent to provide a foot portion to extend beneath the lower edge of the lower rail of the window sash. The bracket and the end of the channel bar 5 are secured to the sash by providing an opening in the vertical web of the channel bar and an opening in the central portion of the bracket 7 to receive a screw which is screwed into the vertical face of

the sash. The two ends of the channel bar 5 are thus accurately positioned upon the lower edge of the sash and firmly secured thereto.

Within the channel of the bar 5 is mounted a slide 11 shown in detail in Fig. 7, this slide being formed of a strip of sheet metal with the flat head portion 12 of a thickness to fit loosely within the channel way of the bar 5 and of a width to fit between the upper and lower flanges of the bar within the channel to slide freely therein longitudinally thereof. The slide 11 is also formed with an integral arm 13 which is offset to extend toward the sash and then downward between the sash and the adjacent side of the channel bar, this arm being bent at right angles to extend outwardly beneath the channel bar or way 5 and to its end which extends inwardly away from the face of the sash and inner face of the bar, a connecting link 14 is pivotally attached at one end as at 15. This link arm or bar 14 is formed at its opposite end with a head 16 and this head is formed with a segmental gear 17 adapted to be engaged by a worm 18 to the stem 19 of which is secured an operating crank handle 20.

The head 16 on the long operating arm 14, and the worm 18, are mounted within a suitable casing indicated as a whole by the numeral 21 and the upper wall 22 of this casing is formed with an integral tubular member or bearing 23 for the worm 18 which is slipped endwise into this tubular bearing with a pilot member 24 on the inner or lower end of the worm, engaged within a bore to guide the worm, the stem 19 of the worm being mounted within a bore in a bushing 25 which is screwed into the screw-threaded outer or upper end of the bore of the bearing member 23 to engage the shoulder formed by the upper end of the worm and thus hold the worm in place within the bearing 23 and free to rotate therein. The outer end of the stem 19 is formed with spaced apart longitudinal ribs or serrations 26 to engage like serrations in the bore of the head of the handle 20 to adjustably secure the handle to the stem against rotation thereon and to secure the handle against longitudinal movement on the stem, a groove is provided between the portions 26 and a set screw 27 engages a screwthreaded opening in the handle and projects into said groove. The arm or bar 14 is pivotally supported within the casing 21, by means of a bushing 28, this bushing being formed with an upstanding circular flange 29 to engage over the boss 30 on the lower or inner side of the upper wall 22 of the casing 21 and a screw 31 passes through a central opening in the bushing and is screwthreaded into the boss 30. The head 16 of the operating arm is thus pivoted within the casing 21 to turn upon the outside of the flange 29 on the bushing 28 when the handle 60

20 is turned and the worm 18 rotated in engagement with the gear segment 17 the teeth of which are arranged concentrically about the axis of this turning movement as the arm 14 swings in the opening and closing movement of the window sash.

The worm 18 may not mesh properly with the gear segment 17 and in order to provide an adjustment of the segment toward and from the worm, the circular flange 29 of the bushing 28 is formed slightly eccentric to the axis of the boss 30 and therefore by rotating the bushing upon the boss 30, the segmental gear 17 may be adjusted toward or from the worm and thus any lost motion between the two may be taken up so that there will be no lost motion in the turning movement of the handle 20. In order to hold the bushing 28 in the position to which it is adjusted upon the boss 30, the end edge of the flange 29 is serrated or otherwise roughened to contact like serrations 32 on the surface of the upper wall of the casing around the boss 30. Therefore, the bushing 28 may be adjusted to take up any lost motion between the gear segment and worm and that adjustment is held by forcing the bushing over the boss by means of the screw 31.

In order to house the head 16 of the operating arm 14 and also the worm, within the casing 21 without the necessity for coring out the casing in the casting thereof, a bottom plate 33 preferably of sheet metal is fitted in between the edge flanges of the casing and is secured in place by means of screws 34 screwed into the screw-threaded openings in inward projections on the casing flange and this plate is formed with an opening to receive the bushing 28, and this plate is also offset at the open side of the casing to seat upon the window sill and to be secured thereto by means of screws 35, thus providing convenient means for rigidly attaching the casing 21 to the sill in proper relation to the channel bar 5 and the sash. Instead of the screws 34 for attaching the plate 33 rigidly to the casing 21, projections in the form of pins or rivets may be formed integral with the projections from the flange of the casing and these rivet formations may be riveted down upon the underside of the plate to firmly hold the plate in place.

By providing the eccentric bearing which forms the pivot for the head of the operating arm 14, a simple and quick adjustment is provided for this head to move it toward and from the worm engaged therewith and eliminate any lost motion between the two so that there will be no perceptible lost motion of the handle 20 and the parts operative to swing the sash will remain in the position to which they are adjusted by means of the handle. Further the whole construction is simple and compact and the assembly of the parts is greatly facilitated by the particular construction, the attachment of the channel bar 5 to the sash being quickly effected by means of the two brackets 7, one at each end of the bar, which are simply slipped into the ends of the channel and made fast thereto and to the sash, each by a single screw. Further by the particular construction of the slide 11, it may be quickly assembled with the channel bar 5 and when so assembled, will by reason of its construction, slide freely without binding within the channel as the sash is swung by power applied by means of the handle 20 to retain the worm in engagement

with the segment 17 and thus positively swing the operating arm 14.

While a specific construction of parts and arrangements thereof has been shown and described, changes in such construction, combination and arrangement are contemplated as falling within the scope of the invention and I do not therefore limit myself to the particular construction shown.

Having thus fully described my invention what I claim is:

1. In a device of the character described adapted to be secured to a window sill for swinging a window sash, said device including a channel bar for attachment to a sash and extending longitudinally thereof, a casing secured to the window sill and formed with a tubular bearing member, a worm within said bearing member having a stem, a handle secured to said stem, an operating arm having a segmental head formed with teeth to engage said worm, a bushing within said casing upon which said head is rotatable, said bushing being of eccentric formation to provide for adjustment of said head toward and from said worm, means for holding said bushing in adjusted position, and a slide movable longitudinally within said channel bar and to which an end of said operating arm is pivotally attached.

2. A device as characterized in claim 1 and wherein said casing is closed at its lower side by a plate secured within said open side of the casing and adapted to be secured outside of the casing to the window sill.

3. In a device as characterized in claim 1, and wherein said casing is formed with an integral tubular bearing within which said worm is mounted and held therein for free rotation by an externally screw-threaded bushing screwed into the bore of said bearing against the end of said worm and formed with a bore through which the stem of the worm extends, and a handle formed with a bore to receive the projecting end of said stem, said stem being serrated to engage the wall of the bore and prevent rotation of the handle relative to the stem.

4. A device as characterized in claim 1 and wherein said casing for housing said worm and segmental gear, is open at its lower side and its upper wall is formed with a downwardly extending boss, a bushing sleeved upon said boss and formed with a portion upon which the segmental gear is rotatable said bushing being eccentrically mounted upon said boss for effecting adjustment of said gear segment toward and from said worm.

5. A device for the purpose described comprising a channel bar secured to the face of a window sill, a slide formed of sheet metal shaped to provide a T-head to fit within the channel of said channel bar and slide freely longitudinally thereof, said head being formed with an arm bent forwardly beneath said bar and to which arm an operating bar is pivotally attached at one end, the opposite end of said operating bar being formed with a segmental gear head, a casing within which said head is pivotally supported, a worm mounted in said head in engagement with said segmental gear, said worm having an outwardly extending stem, a handle secured to the outer end of said stem, and a plate secured within said casing and projecting therefrom to form a place of attachment for the casing to a window-sill.

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