

Dec. 28, 1943.

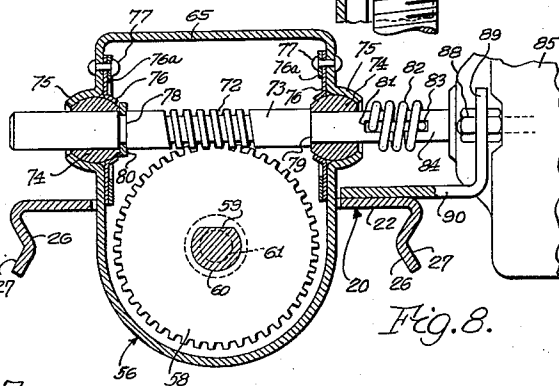
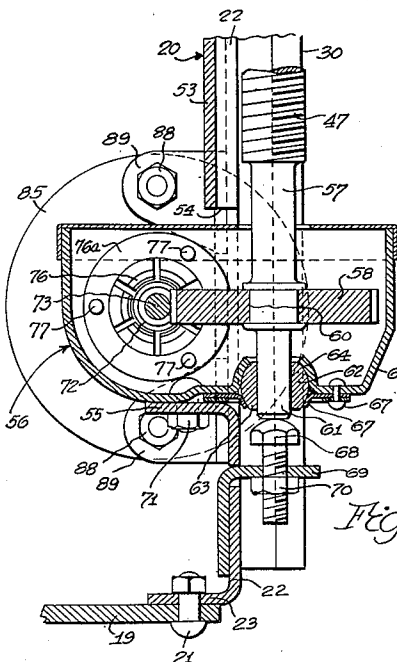
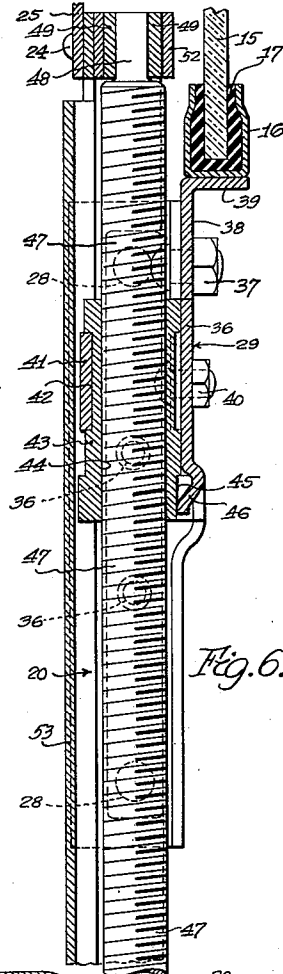
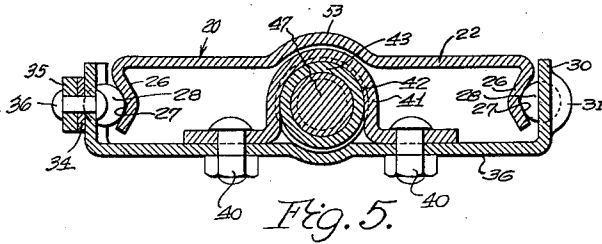
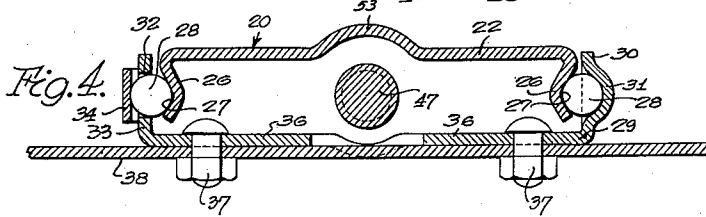
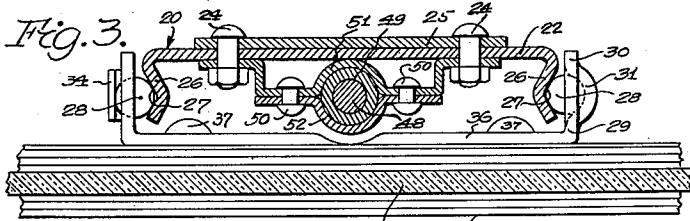
H. D. BROTMAN ET AL.

2,337,867

POWER OPERATED WINDOW LIFTING DEVICE

Filed Dec. 27, 1941

2 Sheets-Sheet 1



Inventor
Hyman D. Brotman
Frederick J. Westrope, deceased
by Isabel D. Westrope, Administratrix
Attorneys

Dec. 28, 1943.

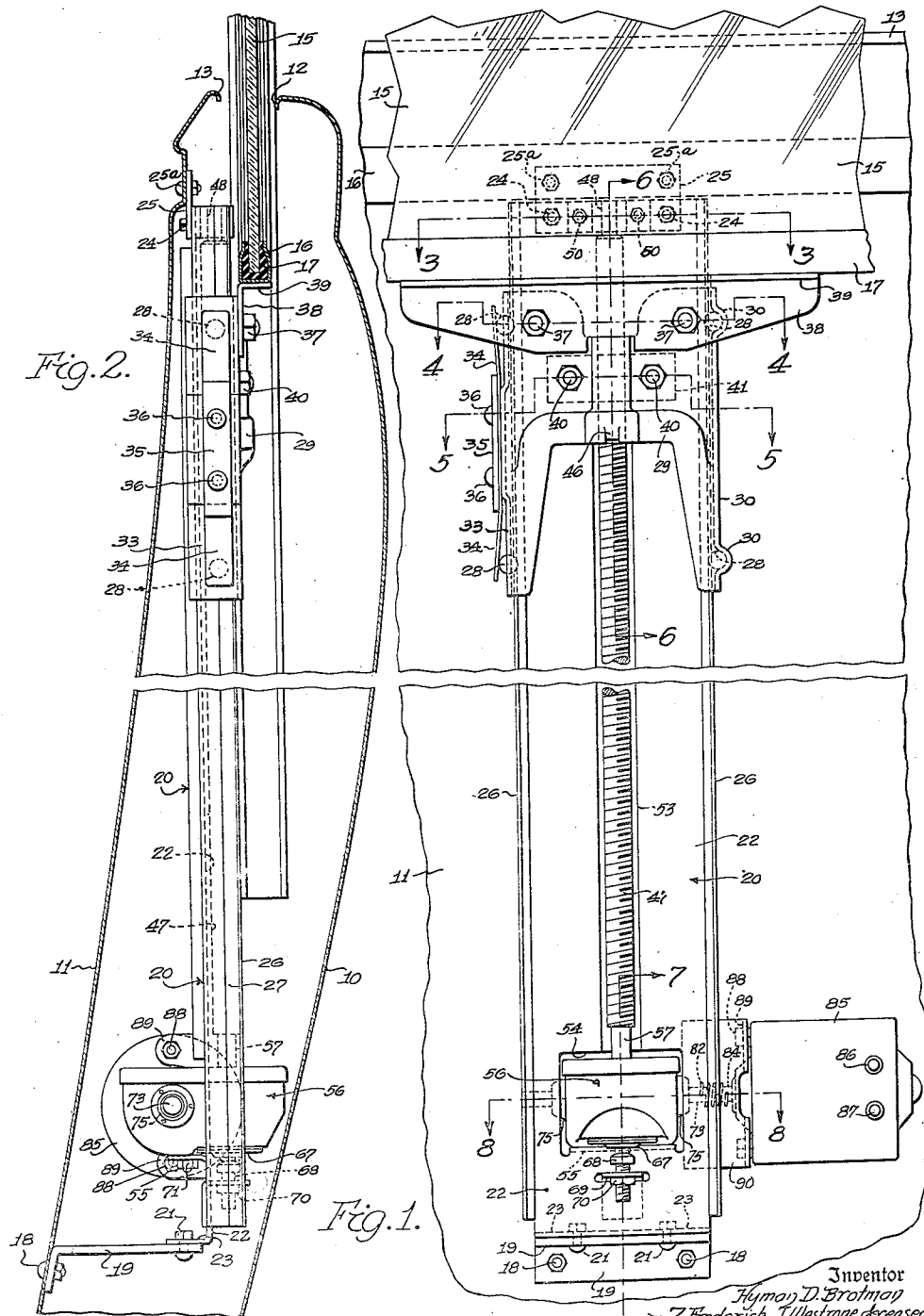
H. D. BROTMAN ET AL

2,337,867

POWER OPERATED WINDOW LIFTING DEVICE

Filed Dec. 27, 1941

2 Sheets-Sheet 2



Inventor
Hyman D. Brothman
by Frederick J. Westrope, deceased
by Isabel D. Westrope, Administratrix
39
Patent Attorneys

UNITED STATES PATENT OFFICE

2,337,867

POWER-OPERATED WINDOW-LIFTING
DEVICE

Hyman D. Brotman, Traverse City, and Frederick J. Westrope, deceased, late of Pleasant Ridge, Mich., by Isabel D. Westrope, administratrix, Pleasant Ridge, Mich., assignors to F. L. Jacobs Company, Detroit, Mich., a corporation of Michigan

Application December 27, 1941, Serial No. 424,584

10 Claims. (Cl. 268—124)

This invention relates to window-lifting devices and in particular to power-operated window-lifting devices for motor vehicles.

One object of this invention is to provide a power-operated window-lifting device which may be easily and inexpensively manufactured by mass production methods and which may be optionally power-driven or hand-operated.

Another object of this invention is to provide a power-operated window-lifting device wherein the window pane is supported upon a carriage which is movable up and down on guideways.

Another object is to provide a power-operated window-lifting device as set forth in the preceding object wherein the carriage is raised and lowered by a screw shaft operated by a motor, preferably an electric motor.

Another object is to provide a power-operated window-lifting device wherein the window pane is supported upon a vertically movable carriage having anti-friction bearings between it and vertical guides, power-operated means being provided for moving the carriage up and down along the guides.

In the drawings:

Figure 1 is a front elevation of a preferred embodiment of the window-lifting device of this invention.

Figure 2 is a left-hand side elevation of the window-lifting device of Figure 1, with the window pane in section.

Figure 3 is a horizontal cross-section along the line 3—3 in Figure 1.

Figure 4 is a horizontal section along the line 4—4 in Figure 1.

Figure 5 is a horizontal section along the line 5—5 in Figure 1.

Figure 6 is a vertical section along the line 6—6 in Figure 1.

Figure 7 is a vertical section along the line 7—7 in Figure 1.

Figure 8 is a horizontal section along the line 8—8 in Figure 1.

In general, the window-lifting device of this invention consists of a pair of grooved vertical guide rails secured by brackets to the interior of the door or automobile body. The guide rails are preferably integral with a back plate, and serve as runways for anti-friction ball bearings mounted in a carriage which is movable vertically up and down along the guide rails, the ball bearings reducing friction therebetween. The carriage is provided with a threaded bore serving as a nut threadedly engaged by a screw shaft which is rotated by an electric motor through a

reduction gear box. The upper end of the carriage is provided with a support for the lower edge of the window pane. The motor is preferably a reversible electric motor so that the screw shaft is rotated in one direction or the other to raise and lower the carriage and window pane according to the position of a reversing switch which energizes the motor.

Referring to the drawings in detail, Figures 1 and 2 show the outer and inner panels 10 and 11 of an automobile door or body having spaced parallel edges 12 and 13 at the top thereof defining the opening for a window pane 15 which is mounted in an edge frame 16 with a resilient packing 17 therebetween. The resilient packing 17 is preferably of rubber or rubber-like material and serves to cushion the window pane 15 in its edge frame 16.

Secured as at 18 to the panel 11 is a horizontal bracket 19 to which a guiding member generally designated 20 is secured as at 21. The guide member 20 consists of a back 22 terminating at its lower end in a bent portion 23 by which it is secured to the bracket 19. At its upper end the guide member 20 is secured as at 24 to a straight bracket 25 which in turn is secured as at 25a to the inner panel 11.

The guide member 20 is provided with vertical grooved guide rails 26 formed integral with the back 22 and extending like vertical flanges therealong. The guide rails 26 are provided with vertical grooves 27 (Figure 3) which serve as raceways for antifriction ball bearings 28.

Slidable up and down along the guideways 26 is a carriage 29 having on one side 30 recesses 31 for receiving the ball bearings 28 on one side and having apertures 32 (Figure 4) through which the ball bearings in the other side 33 project and are held in position by spring fingers 34 secured by the bar 35 and rivets 36 to the side 33 of the carriage 29. The carriage sides 30 and 33 are formed substantially at right angles to the carriage back 36, and approximately parallel with the guide rails 26. Secured as at 37 to the upper end of the carriage 29 is an angle bracket 38 having a horizontal portion 39 which serves as a shelf for supporting the edge frame 16 of the window pane 15 (Figures 1 and 6). Also secured as at 40 to the carriage back 36 (Figure 5) is a strap 41 which encircles an annular groove 42 in a nut 43 (Figures 5 and 6), the latter having an internally threaded bore 44 and a notch 45 (Figure 6) which is engaged by an inwardly bent finger 46 struck out of the car-

riage 29 and serving as a detent to prevent rotation of the nut 43.

Threaded through the nut 43 is a screw shaft 47 having a reduced diameter upper portion 48 rotatably supported in a bearing bushing 49 which is held as at 50 between a bracket 51 and a bent strap 52 (Figure 3), the bracket 51 being likewise secured as at 26 to the back 22 of the guide member 20. To accommodate the screw shaft 47, the back 22 is provided with a vertical slot 53 (Figure 1), this slot terminating in an aperture 54 formed in part by an inwardly bent portion 55 serving as a shelf for supporting the reduction gear set generally designated 56, of which the lower portion 57 of the screw shaft 47 serves as the output shaft. The screw shaft portion 57 carries a gear 58 (Figures 7 and 8), the shaft portion 57 being provided with a flattened part 59 and the gear 58 with a flat sided aperture 60 to provide a positive driving connection. The lower end 61 of the shaft portion 57 is still further reduced in diameter and passes through a self-aligning bearing bushing 62 (Figure 7) having a spherical outer portion 63 seated in a spherical socket 64 formed in the lower wall of the gear box 65 and held in place by an annular retaining member 66 secured thereto as at 67. The end portion 61 of the shaft 57 engages the rounded head of a thrust screw 68 threaded through an L-shaped bracket 69 which is secured as by welding to the back 22 of the guide member 20 and is locked in position by a lock nut 70. The gear box 65 is anchored as at 71 to the shelf 55 (Figure 7).

Meshing with the gear 58 is a worm 72 forming a portion of the worm shaft 73 (Figure 8) and having its opposite ends mounted in the self-aligning bearings 74 seated in spherical recesses 75 in the gear box 65 and held in position by the retaining members 76 and retaining rings 76a secured as at 77 to the casing 65. The worm shaft 73 is annularly grooved as at 78 and is also shouldered as at 79, the shoulder 79 and a retaining member 80 engaging the groove 78 preventing endwise motion of the screw shaft 73.

The worm shaft 73 is provided with an end slot 81 which receives one end of a spiral spring 82, the opposite end of which is seated in a similar slot 83 in the end of the motor shaft 84 leading to the electric motor 85. The latter is of a reversible type with terminals 86 and 87 for the connection of an energization circuit including a reversing switch (not shown) by which the direction of rotation of the motor shaft 84 may be reversed. The motor 85 is secured as at 88 (Figure 8) to the ends 89 projecting from an angle bracket 90 which is welded or otherwise secured to the back 22 of the guide member 20.

While a specific embodiment of the invention has been described and illustrated, it will be understood that various modifications may be made within the scope of the appended claims without departing from the spirit of the invention.

If hand operation becomes desirable or necessary, the motor 85, worm 72 and gear 58 may be omitted or removed and gearing operated by a hand crank substituted.

What we claim is:

1. In a window-lifting device, a vertical guide member having its lower end supported in spaced relation from said window, a bracket carried on the lower end of the guide member, a carriage vertically reciprocable along said guide member and having a portion supportingly connected to

the window pane, an internally threaded member connected to said carriage, a vertical screw shaft journaled at its ends at the top and bottom of said guide member and threadedly engaging said threaded member, a reversible electric motor mounted on said bracket, and reduction gearing located in an aperture in the lower end of the guide member operatively connecting said motor and drivingly connecting said screw shaft.

2. In a window-lifting device, an elongated vertical guide member having parallel oppositely-disposed edge guide flanges at each side thereof with bearing raceways thereon, a carriage connected to the window pane and having depressed bearing holders thereon, anti-friction bearing elements in said depressed bearing holders engaging said bearing raceways, an internally-threaded member connected to said carriage, a screw shaft threadedly engaging said threaded member having its ends journaled at the top and bottom of the vertical guide, and means wholly supported on the lower end of the guide member for rotating said screw shaft.

3. In a window-lifting device, an elongated vertical guide member having parallel oppositely-disposed edge guide flanges at each side thereof with bearing raceways thereon, a carriage connected to the window pane and having depressed bearing holders thereon, anti-friction bearing elements in said depressed bearing holders engaging said bearing raceways, an internally-threaded member connected to said carriage, a screw shaft threadedly engaging said threaded member, and a reversible electric motor wholly supported on the lower end of the vertical guide member drivingly and operatively connected to said screw shaft.

4. In a window-lifting device, a vertical guide member having vertically-extending grooved guide flange portions at each side thereof, anti-friction bearing elements slidably engaging within said grooves of said guide flange portions, a carriage having bearing element receiving depressions vertically reciprocable along said grooved guide flange portions and having a portion supportingly connected to the window pane, and means wholly supported by the guide member for vertically reciprocating said carriage.

5. In a window-lifting device, a vertical guide member having vertically-extending grooved guide flange portions at each side thereof, anti-friction bearing elements slidably engaging within the grooves of said guide flange portions, a carriage having bearing element receiving depressions for retaining said anti-friction bearing elements between said carriage and flanges during the vertically reciprocable movement of said carriage along said guide portions and having a portion supportingly connected to the window pane, means for vertically reciprocating said carriage, and power means wholly supported by the lower end of the vertical guide member for drivingly operating said carriage-reciprocating means.

6. In a window-lifting device, a vertical guide member having vertically-extending grooved guide flange portions at each side thereof, anti-friction bearing elements engaging said guide portions, a carriage having side flanges extending over said guide flange portions provided with bearing element receiving depressions, said carriage being slidable and vertically reciprocable along said guide flange portions and having a portion supportingly connected to the window pane, an internally threaded member connected

to said carriage, a screw shaft journaled at its ends to the upper and lower portions of the vertical guide member threadedly engaging said threaded member, and means wholly supported on the lower end of the vertical guide member drivingly connected to said screw shaft.

7. In a window-lifting device, a vertical guide member having vertically-extending grooved guide flange portions at each side thereof, anti-friction bearing elements engaging said guide portions, a carriage having side flanges with bearing element receiving depressions for retaining said bearing elements between said carriage and side flange portions during the vertically reciprocable movement thereof along said grooved guide flange portions, said carriage having a portion supportingly connected to the window pane, an internally threaded member connected to said carriage between the grooved side portions, a screw shaft threadedly engaging said threaded member, and power-operated means wholly supported on the lower end of the vertical guide member offset from the lower end of said guide member for rotating said screw shaft.

8. In a window-lifting device, a vertical guide member having vertically extending grooved guide flange portions at each side thereof, anti-friction bearing elements mounted in said guide portions, a carriage having side flanges engaging over said guide flanges and provided with bearing element receiving depressions, said carriage being vertically reciprocable along said guide flange portions and having a portion supportingly connected to the window pane, and means wholly supported on the lower end of the vertical guide member for vertically reciprocating said carriage.

9. In a window-lifting device, a vertical guide member having vertically extending grooved guide flange portions along each edge thereof, anti-friction bearing elements mounted in said guide portions, a carriage having side flanges overlapping said guide flanges provided with bearing element receiving depressions and recesses, said carriage being vertically reciprocable along said guide flange portions and having a portion supportingly connected to the window pane, means for vertically reciprocating said carriage, and power-operated means wholly supported on the lower end of the vertical guide member for operating said carriage-reciprocating means.

10. In a window-lifting device, a vertical guide member having vertically-extending grooved guide flange portions at each side thereof, anti-friction bearing elements mounted in said guide portions, a carriage having side flanges overlapping said guide flanges provided with bearing element receiving depressions, said carriage being vertically reciprocable along said guide portions with the bearing elements therebetween and having a portion supportingly connected to the window pane, means for vertically reciprocating said carriage supported at each end of the vertical guide, and a reversible electric motor wholly supported on the lower end of the vertical guide member drivingly and operatively connected to said carriage-reciprocating means.

HYMAN D. BROTMAN.

ISABEL D. WESTROPE,

35 *Administratrix of the Estate of Frederick J. Westrope, Deceased.*