April 11, 1939. B. S. FLORADAY 2,153,689

WINDOW REGULATOR

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FIG. 1.

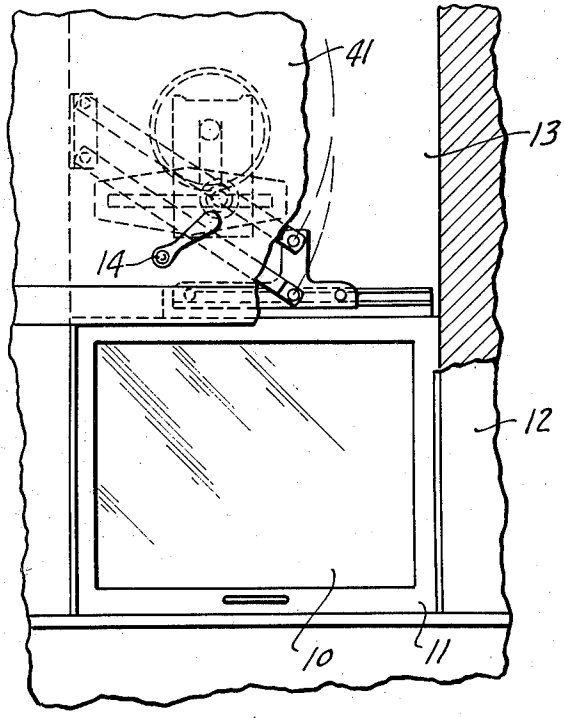


FIG. 2

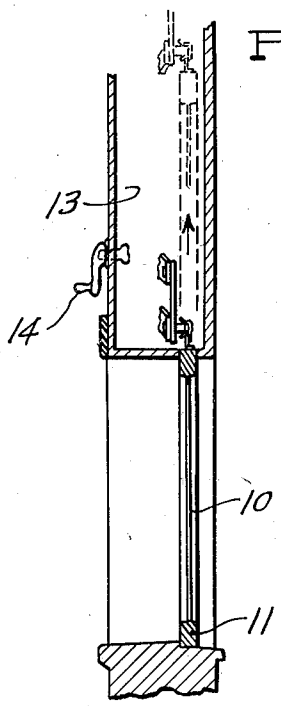


FIG. 3.

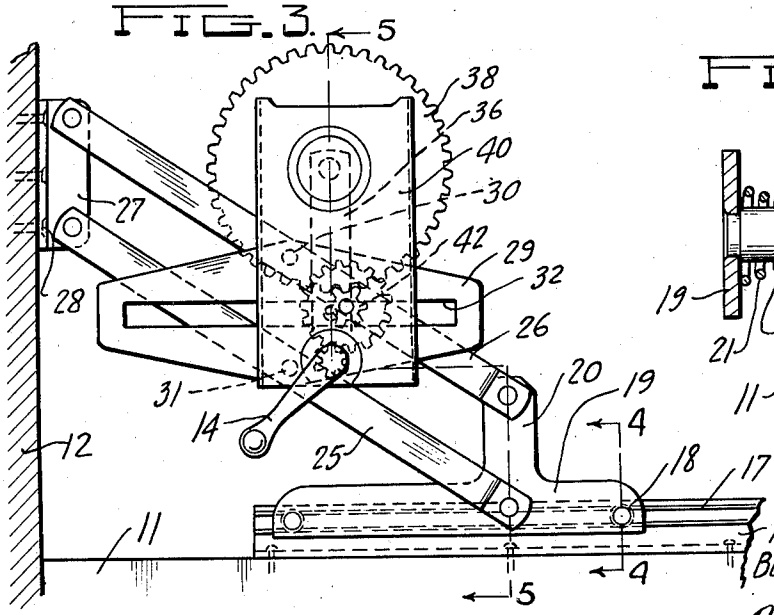
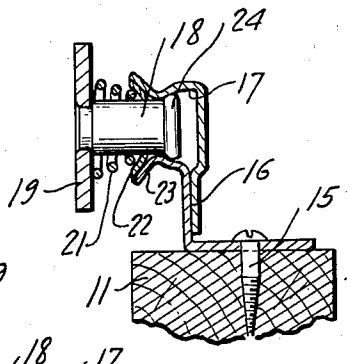


FIG. 4.



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FIG. 5.

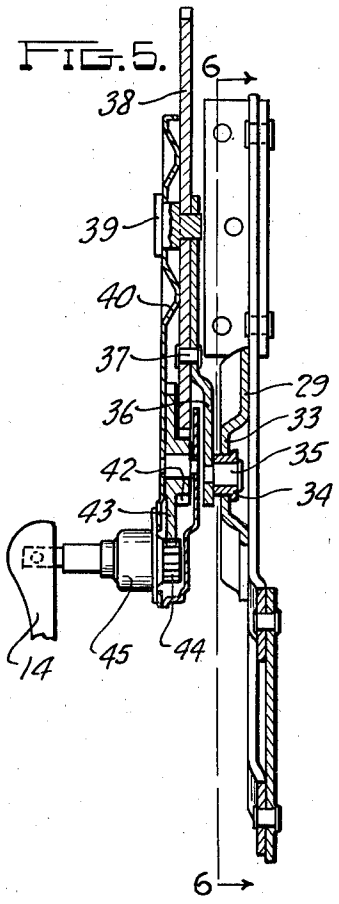


FIG. 6.

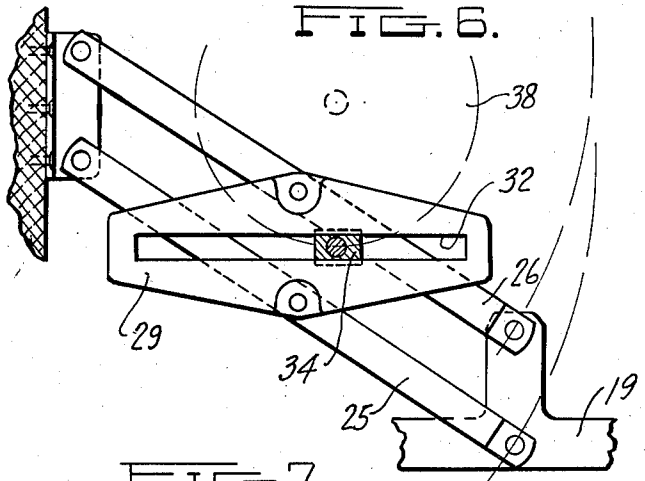


FIG. 7.

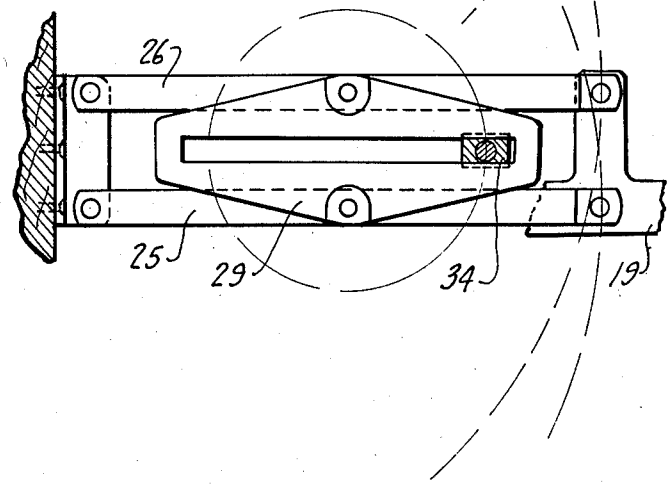


FIG. 8.

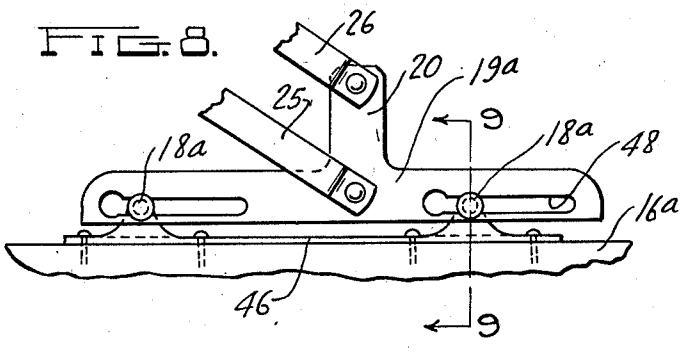
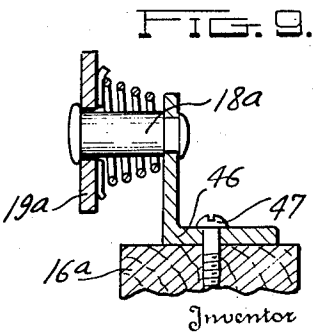


FIG. 9.



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WINDOW REGULATOR

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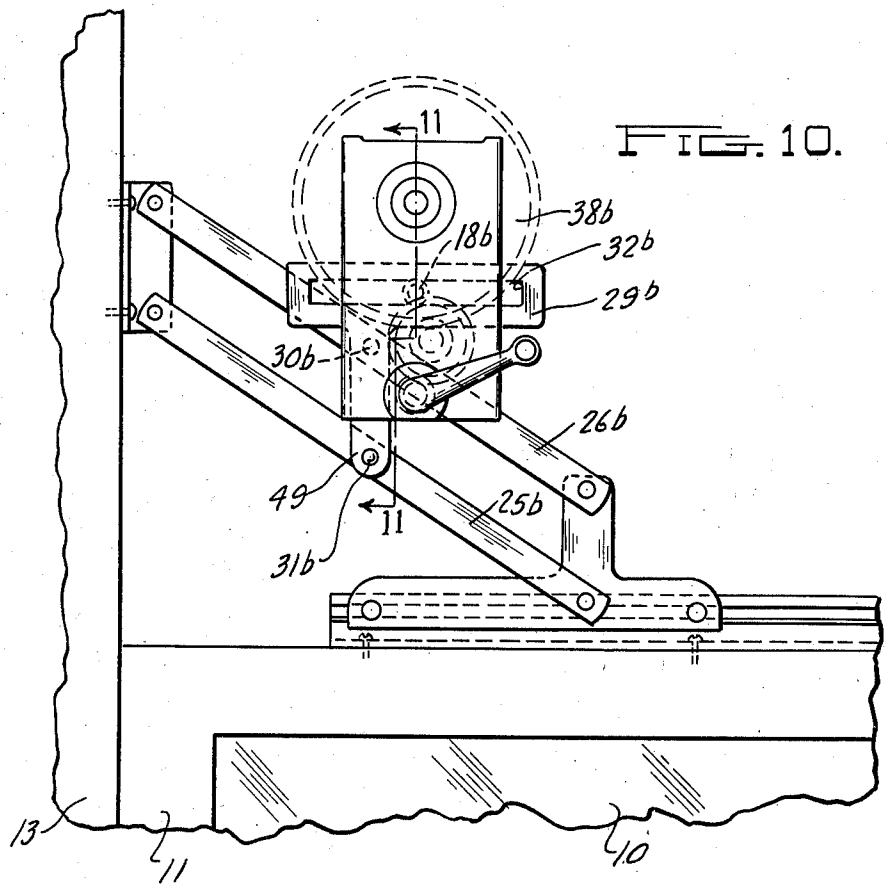


FIG. 10.

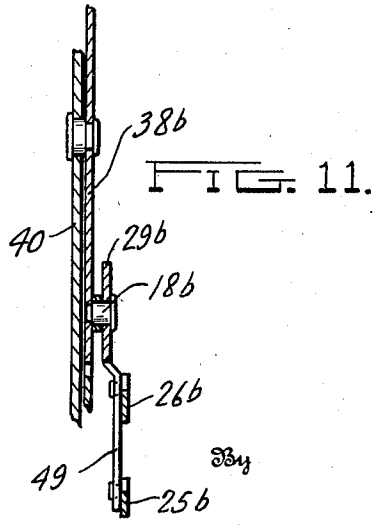


FIG. 11.

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UNITED STATES PATENT OFFICE

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WINDOW REGULATOR

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Application December 18, 1936, Serial No. 116,497

8 Claims. (Cl. 268—126)

This invention relates to window regulators but more particularly to regulators for the windows of automotive vehicles such, for example, as automobiles and busses, and an object is to produce a regulator mechanism having the new and improved features of construction, arrangement and operation hereinafter described, the same being designed to raise and lower the window without tilting it, thereby affording a convenient, easily operable and fool-proof device for accomplishing the purpose intended.

Another object is to produce a regulator mechanism of this character which can be inexpensively manufactured and assembled as a unitary structure, enabling it to be installed in the vehicle without any great amount of skill, the mechanism being such that upon turning the handle or crank continuously in one direction, the window is moved in one direction of movement, thereby militating against occupants of the vehicle forcing or straining the parts which not infrequently results in breaking parts or other damage to such mechanism.

For purposes of illustration, but not of limitation, embodiments of the invention are shown on the accompanying drawings in which

Figure 1 is a fragmentary sectional elevation of a portion of a bus body showing the regulator mechanism in position and operatively connected to the window frame;

Fig. 2 is a vertical sectional elevation of the structure shown in Fig. 1 with some of the parts broken away for purposes of clarity;

Fig. 3 is an enlarged elevation of one face of the regulator mechanism showing in greater detail the structure and arrangement of the parts;

Fig. 4 is an enlarged sectional view on the line 4—4 of Fig. 3;

Fig. 5 is an enlarged vertical sectional elevation on the line 5—5 of Fig. 3;

Fig. 6 is an elevation of a portion of the regulator mechanism showing the parallel arms, the slotted plate connected to an intermediate portion of the arms, and indicating the position the parts assume when the window is in its lowered position;

Fig. 7 is a view similar to Fig. 6 showing the position of the parts when the window has been raised from the position shown in Fig. 6;

Fig. 8 is a fragmentary elevation showing an alternate connection between the T-bar and the window frame in which the slot or stud members are secured to the window frame and extend into horizontal slots formed in the T-bar;

Fig. 9 is an enlarged sectional view on the line 9—9 of Fig. 8;

Fig. 10 is a vertical elevation of an alternate form of regulator mechanism showing the parts mounted in position of use, this form having a slide or stud fixed to the gear and extending into the horizontal slot of the plate which is connected to the parallel arms; and

Fig. 11 is a sectional elevation on the line 11—11 of Fig. 10.

The illustrated embodiment of the invention shown on Figures 1 to 7 comprises a window 10 having a frame 11 which is suitably guided for opening and closing movements in a vertical direction in the body frame 12. The body frame 12 in this instance is that of a bus in which the regulator mechanism is preferably mounted in a well 13 disposed above the window, being actuated by a crank handle 14 which is disposed on the inside of the body in an accessible position above the window. Secured in any suitable manner as by screws 15 is a channel member 16 having a horizontal channel or guideway 17 to receive a pair of horizontally spaced studs, rollers or slides 18 which are spaced horizontally from each other a substantial extent, and are carried by an inverted T-shaped bar 19 having an upward extension 20. Conical coil springs 21 on the studs 18 urge washers 22 against the outwardly flared portion 23 of the channel to hold the enlarged head 24 of the stud against inner bearing surfaces of the channel.

Pivoted to a lower portion of the bar 19, intermediate the ends thereof, is an oscillating arm 25 and pivoted to the upper end of the extension 20 with the pivot points in vertical alignment is another oscillating arm 26. The arms 25 and 26 are at all times disposed in parallel relation and their upper ends are pivoted at fixed points spaced vertically from each other on a bracket 27 which is secured by screws 28 to the body 12. It will be seen that the arms 25 and 26 are arranged one above the other and the pivotal connections of these arms to the brackets 27 and the bar 19 and extension 20 are spaced the same distance apart.

Arranged transversely with respect to the parallel arms 25 and 26 is a plate 29 disposed in horizontal position, the upper portion of the plate being pivoted at 30 to the arm 26 and the lower portion of the plate being pivoted at 31 to the arm 25. The pivots 30 and 31 are positioned midway between the ends of the arms 25 and 26. Formed in the plate 29 between the pivots 30 and 31 is a horizontal elongate slot 32, that portion 33

of the plate in which the slot 32 is formed being embossed outwardly, as indicated on Fig. 5. Disposed in the slot 32 is a roller or slide 34 which is mounted on a stud 35 secured to the outer end of an arm 36 which is secured as by a rivet 37 to a gear 38, the inner end of the arm 36 fitting over a stud 39 on which the gear 38 is mounted. The gear 38 is mounted on a supporting plate 40 which is suitably secured to a panel 41 forming a part of the vehicle body 12. The gear 38 meshes with a relatively small gear 42 with which a larger gear 43 is integral. The larger gear 43 meshes with a pinion 44 which is driven by the crank handle 14 through a clutch or brake mechanism 45 of the type well-known to those skilled in this art.

The operation of the above described mechanism will be readily apparent. The window 10 may be raised and lowered by continuous rotation of the crank handle 14 in the same direction so that after the window has been moved to its open position, continued rotation of the handle 14 in the same direction will lower the window or move it to its closed position. Turning of the crank handle 14 through the gears described, imparts rotation to the large gear 38 to which the arm 36 is secured. The swinging or oscillatory movement of the arm 36 moves the roller 34 in one direction or the other along the horizontal slot 32 and at the same time causes the plate 29 to be raised or lowered. Movement of the plate 29 in one vertical direction or the other imparts upward or downward swinging movement to the parallel arms 25 and 26 which, through the bar 19, raises or lowers the window 10. It will be understood that the bar 19 can slide horizontally in the channel 17 and in view of the fact that a true rectilinear force is applied through the parallel arms 25 and 26 to the bar 19, tilting of the window frame 11 in its guide ways is avoided. The operation of the parts will be clearly understood from an inspection of Figures 6 and 7 in which the slide 34 is shown to move horizontally in the slot 32 according to the rotation of the gear 38 and at the same time, the plate 29 is raised or lowered. Since the arms 25 and 26 are always maintained in parallel relationship to each other, there is no tendency to tilt the bar 19, thereby greatly facilitating the movement of the window 10.

An alternate form of connecting the regulator to the window frame is shown in Figures 8 and 9, in which studs, rollers or slides 18^a are fixed to a bracket piece 46 secured by screws 47 to the window frame 16^a. The studs 18^a are spaced horizontally from each other and extend respectively into horizontally elongate slots 48 in the bar 19^a. One end of each of the slots 48 is enlarged to enable the bar 19^a to be removed from the studs 18^a as well as to permit the assembly of the parts. As in the regulator above described, it will be apparent that the bar 19^a can slide horizontally relative to the window frame 16^a during the raising and lowering movements of the window. The remaining mechanism may be as above described so that further description is not considered necessary.

The alternate form shown in Figures 10 and 11 differs from the mechanism hereinabove described in that the roller or stud 18^b is secured directly to the gear 38^b. The roller 18^b is disposed in the horizontal slot 32^b in the plate 29^b. In order to provide suitable clearance, the plate 29^b is raised above the parallel arms 25^b and 26^b, and is provided with a depending leg 49 which is pivotally connected to the parallel arms 25^b and 26^b at points 31^b and 30^b respectively midway of the length of each arm. The remaining mechanism operates in accordance with the description above given and further description of this form is not considered necessary.

It will be understood that numerous changes in details of construction, arrangement and operation may be effected without departing from the spirit of the invention especially as defined in the appended claims.

What I claim is:

1. In a window regulator, the combination of a support, a pair of swinging arms pivoted to the support at spaced fixed points one above the other, a bar pivoted to the outer ends of said arms at correspondingly spaced fixed points, a slidable connection between said bar and a horizontal edge portion of the window, and manually operable means for swinging said arms engageable therewith at correspondingly spaced intermediate points thereof.

2. In a window regulator, the combination of a support, a pair of swinging arms pivoted to the support at spaced fixed points one above the other, a bar pivoted to the outer ends of said arms at correspondingly spaced fixed points, a slidable connection between said bar and a horizontal edge portion of the window, and manually operable means for swinging said arms including a member separate from said support and engagable with said arms at correspondingly spaced intermediate points thereof.

3. In a window regulator, the combination of a support, a pair of swinging arms pivoted to the support at spaced fixed points one above the other, a bar pivoted to the outer ends of said arms at correspondingly spaced fixed points, a slidable connection between said bar and a horizontal edge portion of the window, and manually operable means for swinging said arms including a member having a horizontally disposed elongate guide pivotally connected to said arms at correspondingly spaced points intermediate the length thereof, a slide fitting said guide, and means to impart vertical movements to said slide.

4. In a window regulator, the combination of a support, a pair of swinging arms pivoted to the support at spaced fixed points one above the other, a bar pivoted to the outer ends of said arms at correspondingly spaced fixed points, a slidable connection between said bar and a horizontal edge portion of the window, and manually operable means for swinging said arms including a member having a horizontally disposed elongate guide pivotally connected to said arms at correspondingly spaced points intermediate the length thereof, a slide fitting said guide, and an oscillatory member carrying said slide for imparting vertical movements to said slide.

5. In a window regulator, the combination of a support, a pair of parallel swinging arms pivoted to said support at spaced fixed points one above the other, a laterally movable substantially horizontal bar pivoted to the outer ends of said arms at correspondingly spaced fixed points, a depending extension on said bar to which at least one arm is pivoted, a sliding connection between said bar and window, a plate member pivoted to said arms at correspondingly spaced points intermediate the ends thereof, said plate member having a horizontal guide, a slide movable in said guide, and manual means to impart oscillatory movement to said slide in a vertical plane.

6. In a window regulator, the combination of a support, a pair of parallel swinging arms pivoted to said support at spaced fixed points one above the other, a laterally movable substantially horizontal bar pivoted to the outer ends of said arms at correspondingly spaced fixed points, a depending extension on said bar to which at least one arm is pivoted, a sliding connection between said bar and window, a plate member pivoted to said arms at correspondingly spaced points intermediate the ends thereof, said plate member having a horizontal guide, a slide movable in said guide, a gear on said support carrying said guide adjacent the outer edge thereof, and manual means for operating said gear.

7. In a window regulator, the combination of a support, a pair of parallel swinging arms pivoted to said support at spaced fixed points one above the other, a laterally movable substantially horizontal bar pivoted to the outer ends of said arms at correspondingly spaced fixed points, a depending extension on said bar to which at least one arm is pivoted, a sliding connection between said bar and window, a plate member pivoted to said arms at correspondingly spaced points intermediate the ends thereof, said plate member having a horizontal guide, a slide movable in said guide, an arm on the outer end of which said slide is mounted, and manual means carried by said support for oscillating said last arm.

8. In a window regulator, the combination of a support, a pair of swinging arms connected at one end to the support at spaced fixed points one above the other, a connecting piece pivoted to the outer ends of said arms at correspondingly spaced fixed points, a slidable connection between a horizontal edge portion of the window and portions of the connecting piece located on opposite sides of the said points of connection with said arms, and manually operable means for swinging said arms to effect raising and lowering of said window, said means including an oscillatable member having its pivot point arranged in a vertical plane intersecting said pair of arms and in a horizontal plane which closely approaches the points of connection between the support and the pair of arms, a crank member fixed with respect to the oscillatable member, and at least one of said arms having an elongated slot associated therewith intermediate its ends in which said crank member rides.

BURTON S. FLORADAY.