Jan. 6, 1953 W. L. DENNIS 2,624,570

WINDOW REGULATOR

Filed June 7, 1950 4 Sheets-Sheet 1

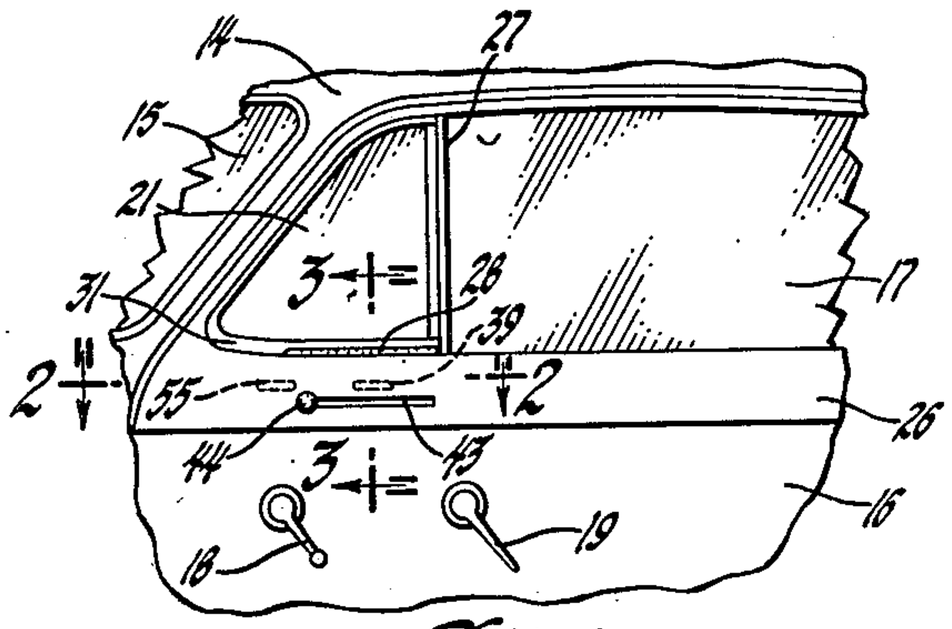

Fig. 1

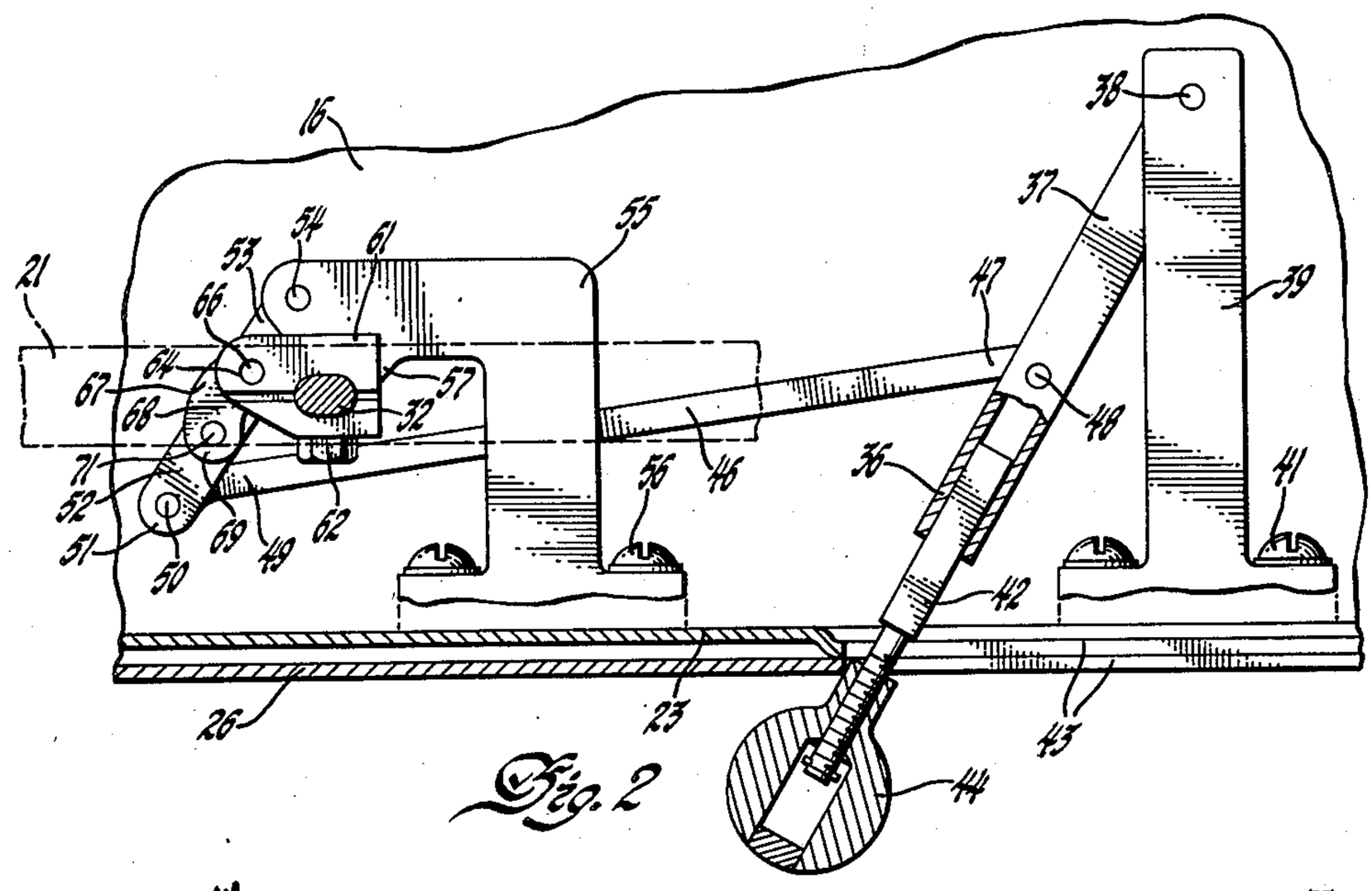

Fig. 2

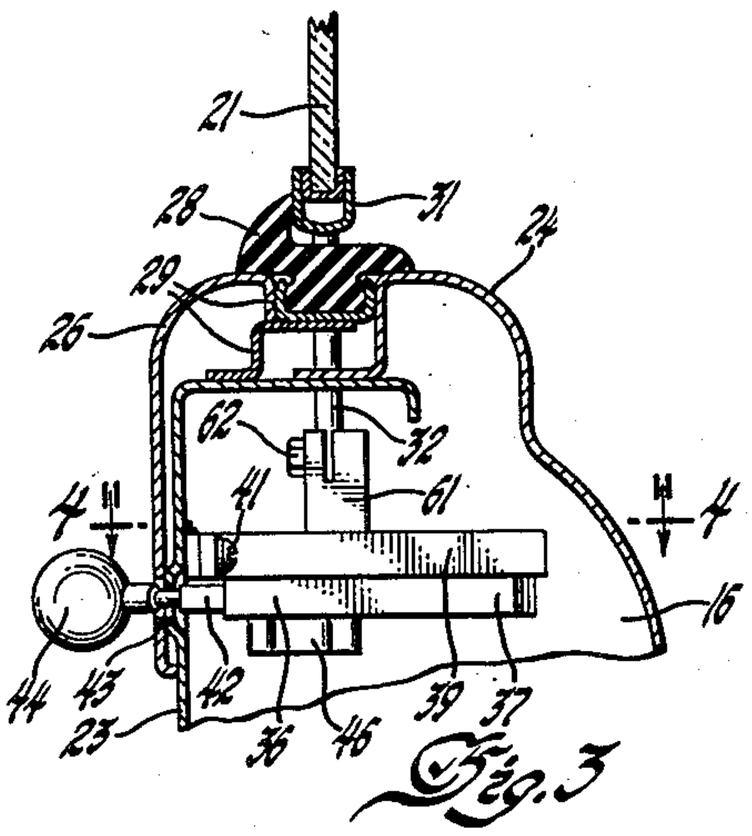

Fig. 3

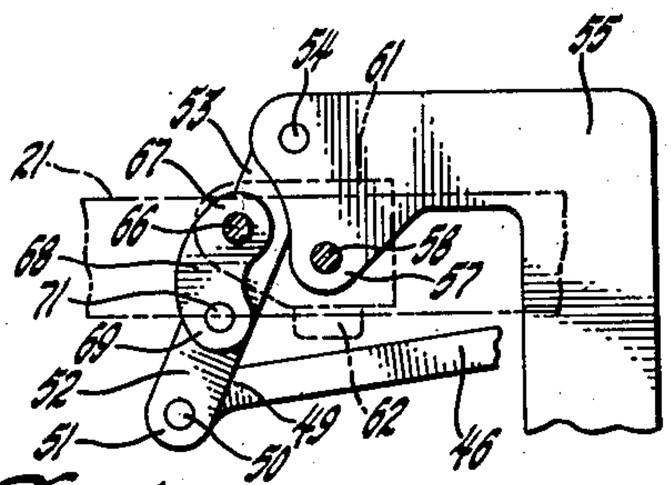

Fig. 4

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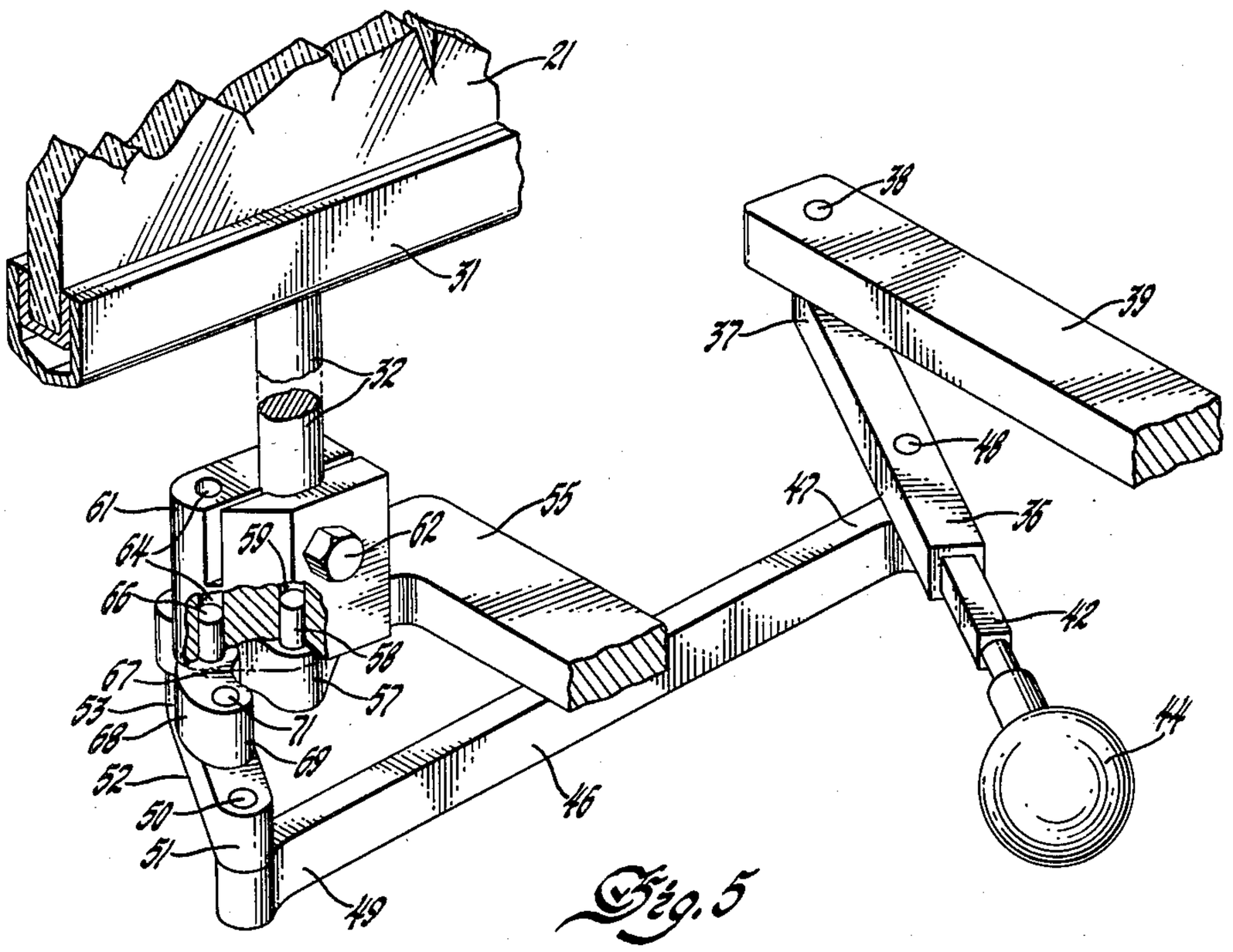

Fig. 5

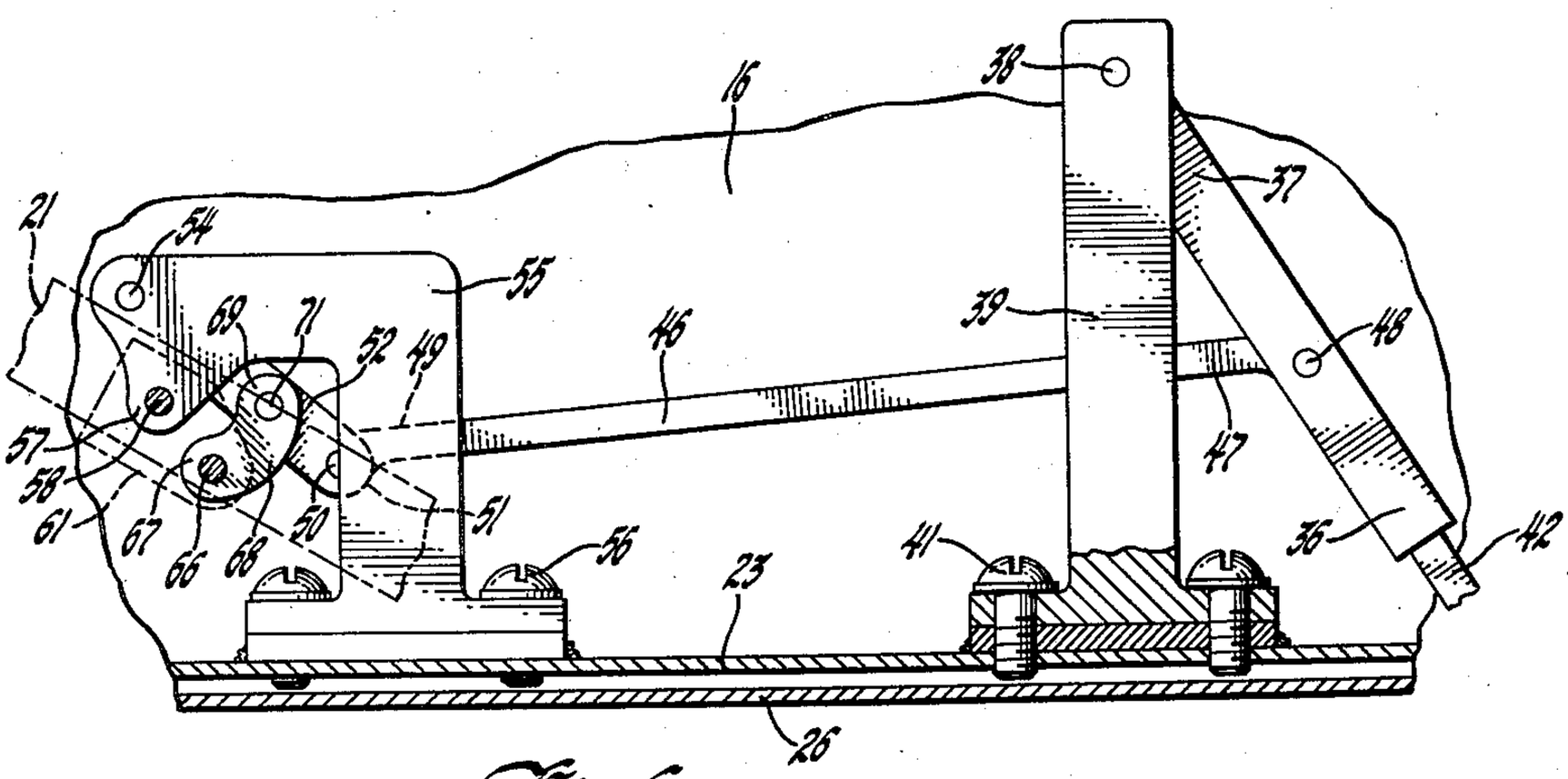

Fig. 6

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WINDOW REGULATOR

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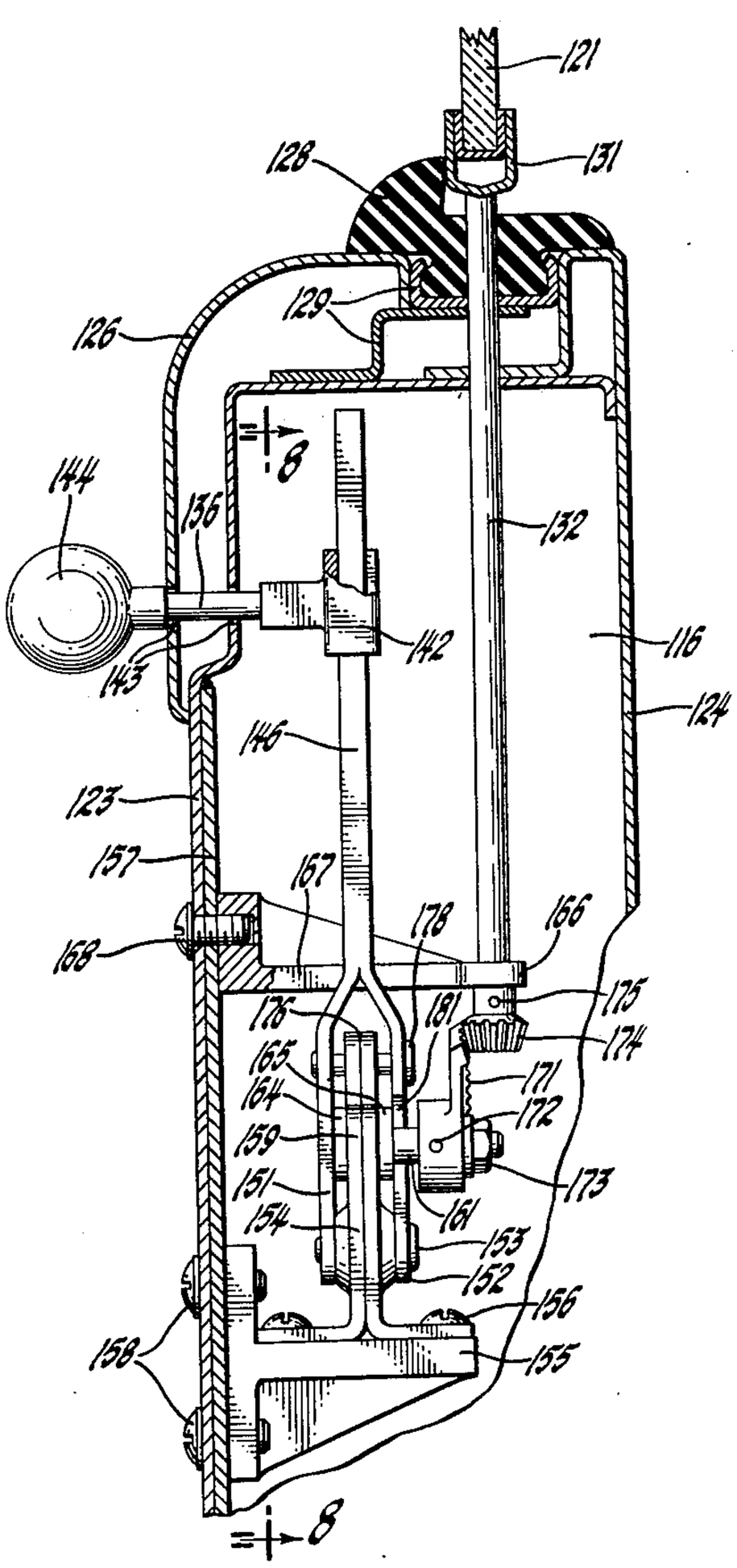

Fig. 7

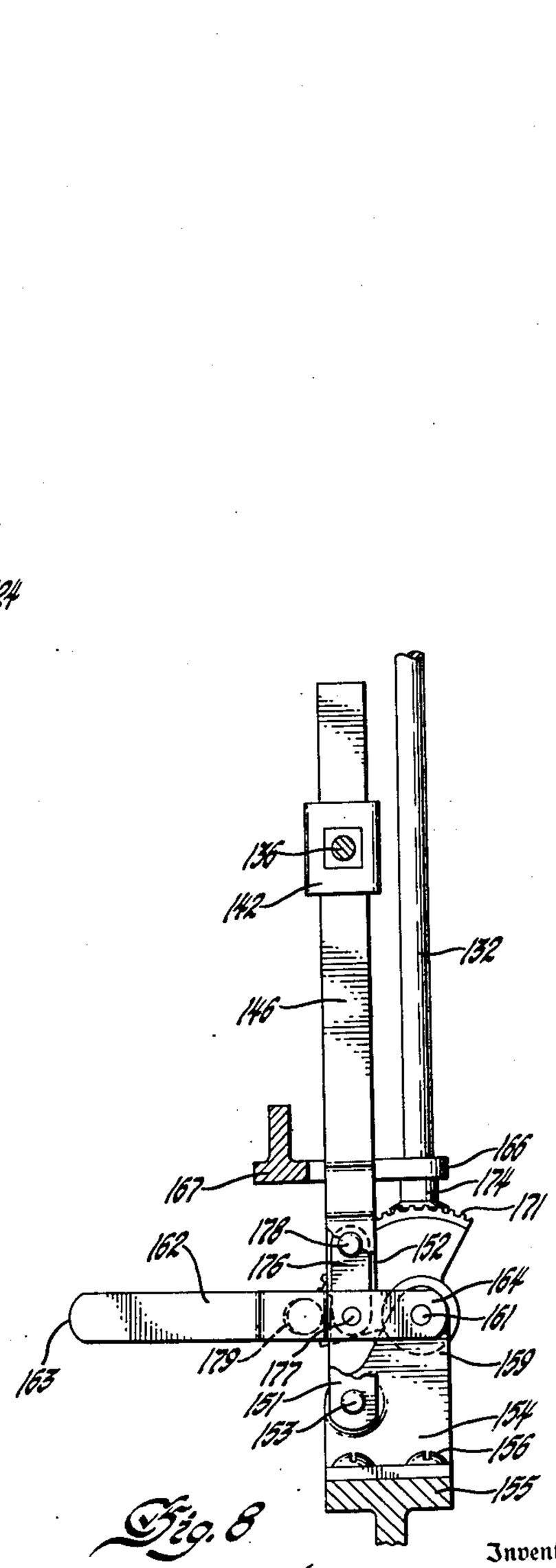

Fig. 8

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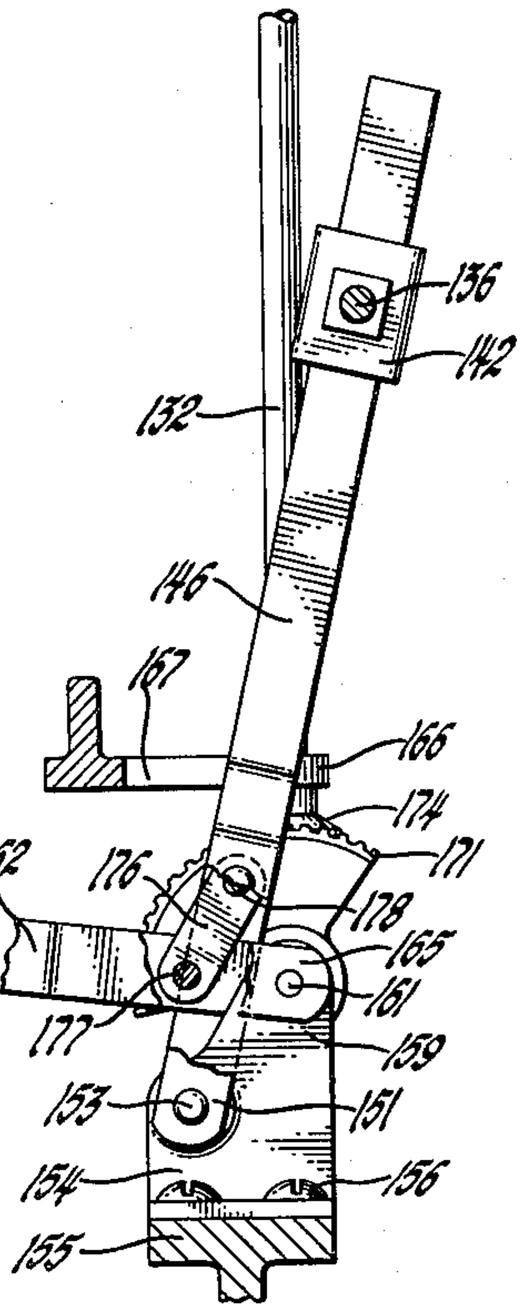

Fig. 9

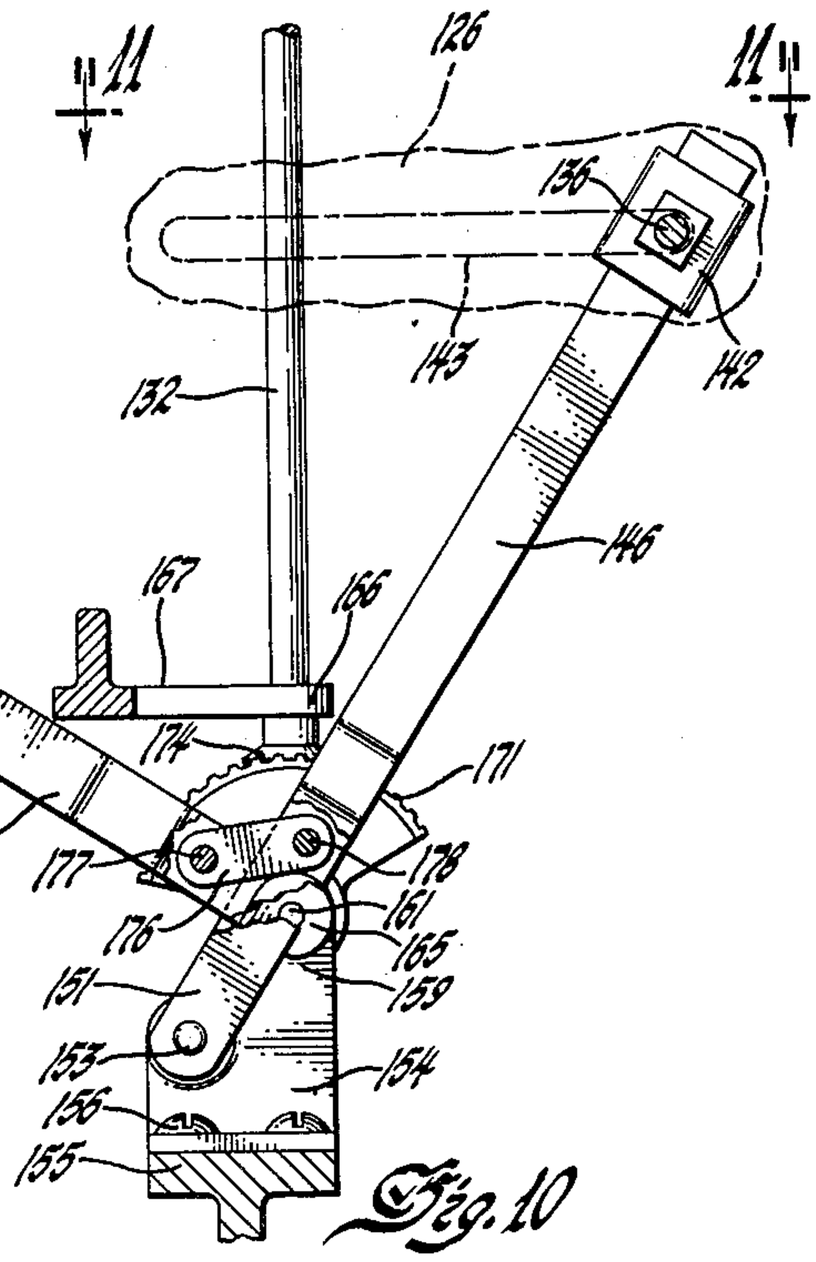

Fig. 10

Fig. 12

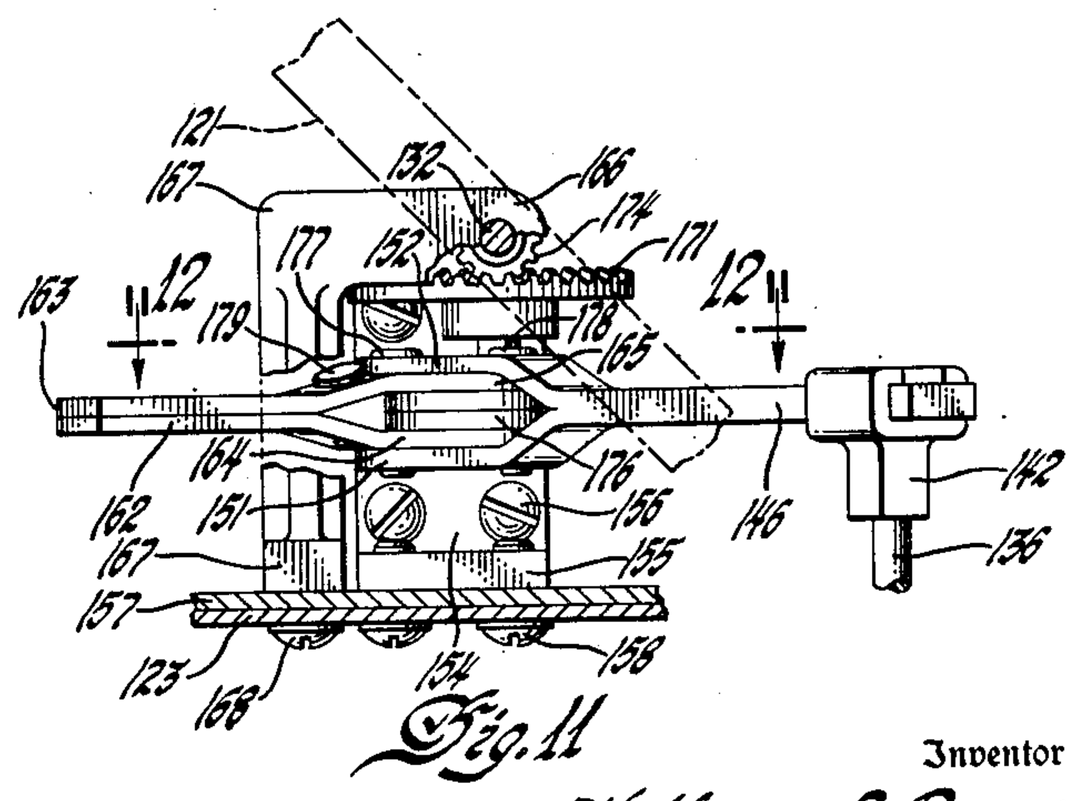

Fig. 11

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UNITED STATES PATENT OFFICE

2,624,570

WINDOW REGULATOR

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Application June 7, 1950, Serial No. 166,627

3 Claims. (Cl. 268—118)

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This invention relates to ventilators for vehicles and particularly to manually operated regulators therefor.

An object of my invention is to provide an improved mechanism for and method of regulating the position of a ventilating window mounted for movement about a vertical axis on an automobile.

Another object of my invention is to provide means whereby a ventilating window mounted in the door or in a wall of an automobile or similar vehicle for swinging movement about a vertical axis can be adjusted relative to the door or wall by a slide bar or operating member within the vehicle having a back and forth horizontal direction of movement along the door or wall.

A further object of my invention is to provide a regulating means for adjusting a ventilating window of a vehicle with a toggle-like connection or mechanism which is rendered effective by closing the window for locking same against movement from exteriorly of the vehicle.

A still further and more specific object of my invention is to combine the features enumerated in the foregoing objects to provide an improved practical ventilator window for a vehicle the operating member of which will more readily blend with certain interior trims in vehicles and which locking window regulating means eliminates the necessity of providing the window with a separate or additional locking device.

Further objects and advantages of the present invention will be apparent from the following description, reference being had to the accompanying drawings, wherein a preferred form of the invention is clearly shown.

In the drawings:

Fig. 1 is a fragmentary view of the interior of an automobile having my improved window ventilator embodied in the door thereof;

Fig. 2 is an enlarged fragmentary horizontal sectional view taken on the line 2—2 of Fig. 1 showing a toggle mechanism of the window regulating means in a position which locks the window closed;

Fig. 3 is an enlarged fragmentary vertical sectional view taken on the line 3—3 of Fig. 1 showing the window regulating means located between inner and outer wall panels of the automobile door;

Fig. 4 is a fragmentary sectional view taken on the line 4—4 of Fig. 3 and showing the toggle mechanism of the window regulating means released;

Fig. 5 is a fragmentary perspective view of

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the window regulating means with parts thereof broken away for illustrative purposes;

Fig. 6 is a view similar to Fig. 2 and shows the window regulating means in a position holding the window open;

Fig. 7 is a fragmentary vertical sectional view similar to Fig. 3 of a modified form of my invention;

Fig. 8 is a vertical sectional view taken on the line 8—8 of Fig. 7 showing a toggle mechanism of the modified window regulating means in a position locking the window closed;

Fig. 9 is a fragmentary sectional view similar to Fig. 8 and shows the toggle mechanism associated with the regulating means released;

Fig. 10 is a fragmentary sectional view similar to Figs. 8 and 9 showing the window regulating means in a position holding the window open;

Fig. 11 is a top view of the window regulating means taken in the direction of the arrows 11 in Fig. 10; and

Fig. 12 is a fragmentary sectional view taken on the line 12—12 of Fig. 11, showing a cut-out portion on one of the elements of the regulating means.

Referring to the drawings, for illustrating my invention, I have shown in Fig. 1 thereof a portion of the interior of an automobile which includes walls normally consisting of inner and outer panels and forming an enclosed body having doors providing entrance thereinto. Such doors also form wall portions of the automobile body. The body 14 is entirely enclosed by the walls thereof and by glass windows provided therein. The body 14 has the usual windshield 15 in the front portion thereof and the door wall part 16 of the body 14 includes a window 17 and suitable mechanism connected to a crank arm 18 for raising and/or lowering the door window 17. A handle 19 may operate a latching mechanism for releasing the door 16 to permit it to be swung open. The door wall 16 of the automobile body 14 also includes a wing-like glass window 21 which is pivotally mounted in the door for swinging movement radially about the vertical axis of its mounting as is conventional and now well-known. Window 21 is a ventilator for the interior of body 14 and when it is swung at an angle to door 16, to open the opening normally closed thereby, forward motion of the automobile creates a circulation of air into and out of the body 15. Such ventilators as window 21 in door 16 have heretofore been provided with a mechanism operable by a rotatable crank arm within the interior of the automobile body for open-

ing and closing the same. In addition a separate lock for this window was required to prevent illegal entrance into the automobile by way of the ventilator window. My invention is particularly directed to the provision of a locking device in a window ventilator adjusting means that will lock the window in closed position to thereby eliminate the necessity of providing a lock for the window separate from the adjusting means. I also provide a slide bar member movable in a horizontal direction from within the automobile for releasing the locking device and operating the window adjusting means.

Referring again to the drawings the door wall portion 16 of body 14 includes an inner panel 23 secured to and spaced from an outer panel 24 (see Fig. 3). A finish or trim strip 26 extends along door 16 at the top of panel 23. This strip 26 is secured to door 16 in any suitable or well-known manner and may extend entirely around the windows 17 and 21 of the door. A vertical channel 27 for window 17 in door 16 separates window 17 from the wing window sash 21 (see Fig. 1). A rubber or the like gasket 28 secured to door 16 extends part way along the bottom of wing window 21 and has a part thereof clamped in a groove formed in reinforcing metal members 29 forming portions of the door structure (see Fig. 3). Wing window 21, when in its closed position, seals against channel 27 and gasket 28 to prevent leakage of rain into the automobile body. The top edge of wing window 21 is pivotally mounted to door 16 in any suitable and well-known manner (not shown). A U-shaped member 31 is secured to the window sash 21 and is provided with an integral depending mounting shaft 32 (see Figs. 3 and 5). Shaft 32 is located in vertical alignment with the top pivotal mounting of window 21 and is journaled in suitable openings or bearings provided in the panels 23 and 24 and reinforcing members 29 of the door 16. The axis of supporting shaft 32 is vertically aligned with the pivotal mounting at the top of window 21 and therefore serves to permit a swinging movement of this window radially about a vertical axis relative to the door 16 of the automobile body 14. Such movement of window 21 relative to its closed position uncovers a part of the opening normally closed thereby and causes, particularly when the automobile is in motion, the interior of the automobile body to be ventilated. The ventilator window 21 is provided with a regulating means for adjusting its angular position from within the body 14 relative to the door 16 to increase or decrease the amount of ventilation and/or to swing the window 21 into a fully open or fully closed position.

The regulating means for wing window or ventilator 21 in the embodiment of my invention disclosed in Figs. 1 to 6 inclusive of the drawings includes an operating lever or slide bar member 36 having its one end 37 pivotally mounted by a pin or the like 38 to a supporting bracket 39 (see Fig. 2). The base of bracket 39 is secured to the inside surface of inner panel 23 of door or wall 16 by screws or the like 41. Operating member 36 has an end part 42 which projects through aligned horizontally elongated similar openings or slots 43 provided in the trim strip 26 and inner door panel 23 to permit actuation of the operating member of the window regulating means from within the body 15 of the automobile. A handle or knob 44 is secured in any suitable or conventional manner to the projecting end part 42 of member 36 for moving this slide

bar member back and forth in a horizontal direction about its fulcrumed mounting 38 along the door 16. A link or connector 46 has its one end 47 pivotally secured to member 36, intermediate the ends 37 and 42 thereof, by a pin or the like 48. This link 46 has its other end 49 pivotally secured, by a pin or the like 50, to one end 51 of a lever 52 which has its other end 53 pivotally supported, by a pin 54, upon a bracket 55. The bracket 55 has its base secured to the inside surface of inner door panel 23 by screws 56. Bracket 55 is provided with a part 57 offset relative to the part thereof which receives pin 54 (see Figs. 4 and 5) which offset part 57 carries an upstanding pin or the like 58. Pin 58 is received in a bore 59, provided therefor in a clamping element 61 (see Fig. 5). Shaft 32 of window ventilator 21 is received between jaws of the clamping element 61 so as to be in vertical alignment with the pin 58 on offset portion 57 of bracket 55. In other words the axis of rotation of shaft 32 is the center of pin 58 about which the clamping element 61 may be rotated. Shaft 32 may, if desired, be elongated or made into a somewhat oval shape in cross-section, particularly at the end thereof which is clamped between the jaws of clamping element 61, by a clamping bolt 62, so as to provide a better connection with the clamping element. Clamping element 61 is provided with a second bore 64 (see Fig. 5) spaced from the bore 59 and which receives a pin or the like 66 secured to and extending upwardly from one end 67 of a short link 68 disposed on substantially the same horizontal plane with bracket 55. This short link 68 has its other end 69 pivotally mounted to lever 52 by a pin 71 located intermediate the ends 51 and 53 of this lever. Link 68 and its pivotal mountings 66 and 71 cooperate with the pivot pins 50 and 54 of lever 52 and with the pin 58 to provide a toggle-like joint connection or mechanism within the window regulating means as will be hereinafter described. It is to be understood that all of the parts of the regulating means for window 21 are located between and concealed by the inner and outer panels 23 and 24 of the wall portion or door 16 of the vehicle with the exception of the slide bar operating knob 44 which is exposed to the interior of the automobile. Such a concealed toggle mechanism serves as means to lock the window 21 in closed position and prevents illegal access to the interior of the body 14 of the automobile.

In Figs. 1 to 3 and 5 of the drawings the window regulating means is shown in a position closing the window 21 and locking the same in this position against movement from exteriorly of the automobile. It will be noted that the vertical axis of pins 50, 71, 66 and 54 (see Fig. 2) are all in direct horizontal straight line alignment with one another and that when in this position any turning or swinging force applied to the window 21 from the exterior of body 14 and transmitted to pin 66, by way of shaft 32, element 61 and pin 58, is neutralized or rendered ineffective for moving toggle link 68 to release the same and cause movement of the regulating means. Thus window 21 remains in locked position until such time as the straight line horizontal alignment of the pins 50, 71, 66 and 54 is disturbed, which can occur only by manipulation of the regulating means from inside the body 14. In Fig. 4 of the drawings I show connector link 46 as having been moved, by the operating member or slide bar 36, a short distance to the right whereby lever 52 is

moved about its pivotal mounting 54 in a counterclockwise direction. This short distance of movement of lever 52 has been caused to take place without creating any movement of pin 66 relative to the pins 54 and 58 and without swinging the window 21 away from its closed position. However, further and additional movement of the operating member or slide bar 36 and connector link 46 to the right, as viewed in the drawings, will rotate lever 52 in a counterclockwise direction to cause link 68 to apply a pulling force to the pivot pin 66 whereupon the clamping member 61, shaft 32 and consequently window 21, will be swung or rotated about the vertical axis of pin 58. Thus the angle of window 21 may be selectively altered relative to door 16 to cause ventilation of the interior of the automobile body 14. If it is desired to swing or rotate window 21 throughout an arc greater than 135° as shown in Fig. 6 of the drawings, so as to cause the window to scoop air and direct it into the body 14, the operating member or slide bar 36 is moved horizontally within slot 43 to the back end of the slot. It is to be noted (see Fig. 6) that the clamping element 61 has been sufficiently rotated to swing the rear edge of the window 21 about its vertical axis, pin 58, into a forward position. When it is desired to lock the window 21 in its closed position the member or bar 36 is moved in a horizontal direction from within the automobile by knob 44 to its forward position, as shown in Figs. 1, 2 and 5. Such movement of the operating member rotates lever 52 in a clockwise direction and causes the vertical axis of pivot pins 50, 71, 66 and 54 to assume their straight line horizontal alignment so as to again render the toggle-like joint or mechanism effective to lock the window 21 closed and to prevent movement of its regulating means by force applied to the window from exteriorly of body 14.

The form of my invention disclosed in Figs. 7 to 12 of the drawings differs from that shown in Figs. 1 to 6 mainly in constructional details and arrangements which may be advantageous for mounting a window regulating means in a much thinner vertical space between inner and outer panels of a wall or door of an automobile. For example in the form of the device shown in Figs. 1 to 6 horizontally disposed bars, links and levers are joined together by connections having vertical axes, whereas in the form of the device shown in Figs. 7 to 12 vertically disposed links and levers have connections movable about horizontal axes. Referring now to Fig. 7 of the drawings I show an automobile door 116 provided with inner and outer panels 123 and 124 respectively, a trim strip 126, reinforcing metal pieces 129, sealing gasket 128 and a ventilating wing window 121. The window 121 has its top edge suitably mounted for rotation about a vertical axis and a rotatable shaft 132, provided with a U-shaped window receiving portion 131, forms the lower vertical axis of mounting for the window. Similar aligned horizontally elongated openings or slots 143 are provided in strip 126 and in the inner door panel 123 for receiving an operating slide bar member 136 projecting through the slots and provided with a knob 144 on its projecting end which is exposed to the interior of the automobile. The inner end of operating member or bar 136 is threaded into or secured to a C-shaped in cross section connector piece 142 which receives and slidably fits over the upper portion of a lever 146. The lower end of lever 146 has two substantially corresponding

spaced apart legs 151 and 152 which are pivotally mounted, by a pin 153, to a support 154 secured upon a bracket 155 by screws 156. The bracket 155 is mounted upon the inner door panel 123 and a reinforcing sheet metal member 157 cooperating therewith by screws 158. The support 154 includes an elevated part 159 offset horizontally relative to the mounting of the fulcrum pin 153 and a shaft 161 is journaled in suitable openings provided therein. A lever 162 has a free end 163 and spaced apart legs 164 and 165 (see Figs. 7 and 11) at its other end which are locked or rigidly secured to the shaft or pin 161 for rotating the same and consequently a segment gear secured thereto. Shaft 161 is drivingly connected to shaft 132, for rotating the latter about a vertical axis within its upper bearings, formed by openings in panels 123, 124 and reinforced pieces 129, and a lower bearing 166, provided in a bracket 167 which is secured to the inner panel of door 116 by screws 168. Rotation of shaft 132 will swing the ventilator window 121 radially about its vertical mounting axis to adjust the position thereof relative to the door for ventilating the interior of the automobile body as hereinbefore described. Motion is transmitted to shaft 132 from the window regulating means through a bevel gear arrangement comprising a segmental gear 171, keyed to shaft 161 by a pin 172 and a nut 173, and a bevel gear 174, keyed to shaft 132 by pin 175. The remainder of the window regulating means includes a link 176 having its one end pivotally mounted to lever 162, by a pin 177, and having its other end pivotally mounted to lever 146, by a pin 178 (see Fig. 10). A stop lug 179 is secured to leg 165 of lever 162 (see Figs. 8, 11 and 12) and leg 152 of lever 146 is provided with a cutout portion 181 (see Fig. 12) both for purposes to be presently described. The link 176 and its pivotal mountings 177 and 178 cooperate with the pivot pin mounting 153 of lever 146 to provide a toggle joint or mechanism in the window regulating means disclosed in Figs. 7 to 12 of the drawings. This toggle joint connection locks the window 121 against movement from exteriorly of the body of the automobile and prevents actuation of the window regulating means. In other words link 176 forms a movable or rocking connection between the operating lever 146 and the segmental gear 171 which connection cannot be moved or released except by moving the lever 146 to thereby pull lever 162 therewith through this toggle linkage connection therebetween.

Fig. 7 shows the window 121 in closed position and Figs. 7 and 8 both show the window regulating means in a position to render the toggle joint of the regulating means effective to lock the window against movement exteriorly of the automobile. Referring now to Fig. 8 it will be noted that the pivot pins 153, 177 and 178 have their centers in straight line vertical alignment with one another so that any twisting force applied to window 121 from outside the body of the vehicle, which would ordinarily rotate shaft 132, gears 174 and 171 and the shaft 161 about which lever 162 is rigidly secured, is neutralized or is ineffective to cause movement of the window regulating means. The shaft or bar 136 carrying knob 144 is, when the toggle link 176 is in the position disclosed in Fig. 8, at the left hand end of slot 143, illustrated in dot-dash lines in Fig. 10 of the drawings. If it is desired to break or release the toggle lock or mechanism to effect movement of the regulating means and conse-

quently window 121, about its vertical mounting axis, the knob 144 is moved in a horizontal direction toward the right hand end of slot 143 to cause lever 146 to pivot about its mounting pin 153. The initial movement of lever 146 away from the left hand end of slot 143 is illustrated in Fig. 9 of the drawings wherein it will be noted that pin 178, secured to lever 146, has been moved in a clockwise direction out of straight line vertical alignment with the pin 177 to break or release the toggle lock. Further horizontal sliding movement of bar 136 within slot 143 rotates lever 146 in a clockwise direction and the link connection 176 between the levers 146 and 162 rotates lever 162 to cause the same to turn shaft 161, segment gear 171 and gear 174 to rotate shaft 132 for adjustably swinging window 121 about its vertical axis into the desired angle relative to door 116. When the regulating means has been moved into the position shown in Figs. 10 and 11 the rear edge of window 121 is rotated toward the front of the automobile so as to scoop air into the body thereof (see Fig. 11). The leg 152 of lever 146 would normally strike the shaft 161 when this lever is moved into the position shown in Fig. 10, but the cutout portion 181 permits a part of this one leg side 152 of lever 146 to move past the center of shaft 161 as is shown in Fig. 12 of the drawings. The stop lug 179 secured to leg 165 of lever 162 is adapted to engage the edge of leg 152 of lever 146 opposite the cutout edge portion 181, to arrest any movement of lever 146 in a counterclockwise direction beyond the position thereof shown in Fig. 8. This prevents the link 176 from moving in a direction to render lever 146 inoperative while the regulating means is being repaired or adjusted.

From the foregoing it should be apparent that I have provided an improved manually actuated regulating means for adjusting the position of a wing type window radially about a vertical axis for effecting ventilation of the interior of an automobile or other vehicle. I have provided such a regulating means with a slide bar member which is operable back and forth in a horizontal direction from within the vehicle so as to eliminate conventional crank arms or the like and the problems involved in their use when simplifying the interior design and trim of automobiles. My improved window regulating means has incorporated therein a toggle connection or mechanism which in addition to locking the window closed and preventing movement of the window regulating means, by force applied to the window from the exterior of the automobile, also eliminates the necessity of providing a separate locking device for the window.

While the form of embodiment of the invention as herein disclosed, constitutes a preferred form, it is to be understood that other forms might be adopted, as may come within the scope of the claims which follow.

What is claimed is as follows:

1. A ventilating window mounted in a wall of a vehicle for swinging movement about a vertical axis relative thereto, regulating means concealed within inner and outer panels of said wall for opening and closing said window, said regulating means comprising a toggle-joint mechanism and means for operating the same, said operating means including a member extending through a horizontal slot in said inner wall panel and being movable back and forth therein along said wall from within said vehicle and a connector between said member and said mechanism, said toggle-joint mechanism including a lever having one end pivotally mounted upon a part of said wall and having its other end movable about the pivotal mounting by movement of said operating member, said toggle-joint mechanism also including a link having one end pivotally mounted upon said lever intermediate the ends thereof and movable therewith and relative thereto, the other end of said link being pivotally attached to a window swinging element, and the pivot point of said other end of said link being movable, when the window is swung by said operating member into closed position, between and into straight line alignment with the pivot point of the mounting of said lever and the pivot point of the mounting of said link upon said lever for locking said window against movement from exteriorly of the vehicle.

2. A ventilating window mounted in a wall of a vehicle for swinging movement about a vertical axis relative thereto, regulating means concealed within inner and outer panels of said wall for opening and closing said window, said regulating means comprising a toggle-joint mechanism and means for operating the same, said operating means including a member extending through a horizontal slot in said inner wall panel and being movable back and forth therein along said wall from within said vehicle and a connector between said member and said mechanism, said toggle-joint mechanism including a lever having one end pivotally mounted about a vertical axis upon a part of said wall and having its other end movable horizontally about the pivotal mounting by movement of said operating member said toggle-joint mechanism also including a link having one end pivotally mounted upon said lever intermediate the ends thereof and movable therewith and relative thereto about a vertical axis, the other end of said link being pivotally attached about a vertical axis to a window swinging element, and the pivot point of said other end of said link being movable, when the window is swung by said operating member into closed position, between and into horizontal straight line alignment with the pivot point of the mounting of said lever and the pivot point of the mounting of said link upon said lever for locking said window against movement from exteriorly of the vehicle.

3. A ventilating window mounted in a wall of a vehicle for swinging movement about a vertical axis relative thereto, regulating means concealed within inner and outer panels of said wall for opening and closing said window, said regulating means comprising a toggle-joint mechanism and means for operating the same, said operating means including a member extending through a horizontal slot in said inner wall panel and being movable back and forth therein along said wall from within said vehicle and a connector between said member and said mechanism, said toggle-joint mechanism including a lever having one end pivotally mounted about a horizontal axis upon a part of said wall and having its other end movable vertically about the pivotal mounting by movement of said operating member, said toggle-joint mechanism also including a link having one end pivotally mounted upon said lever intermediate the ends thereof and movable therewith and relative thereto about a horizontal axis, the other end of said link being pivotally attached about a horizontal axis to a window swinging element, and the pivot point of said other end of said link being movable, when the window is

swung by said operating member into closed position between and into vertical straight line alignment with the pivot point of the mounting of said lever and the pivot point of the mounting of said link upon said lever for locking said window against movement from exteriorly of the vehicle.

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