

June 10, 1941.

C. M. PETERSON

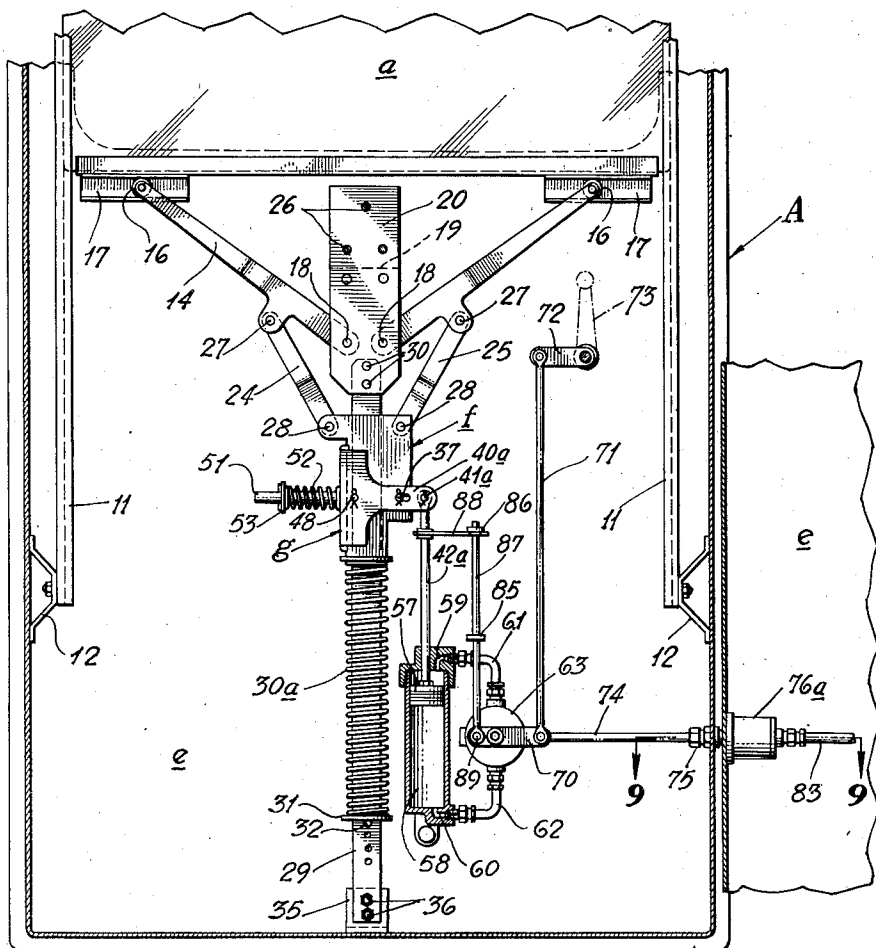
2,244,801

AUTOMATIC WINDOW OPENER

Filed Dec. 14, 1938

5 Sheets-Sheet 4

Fig. 7



INVENTOR:
CARL MILTON PETERSON;
BY *Raymond H. Black*
ATTORNEY.

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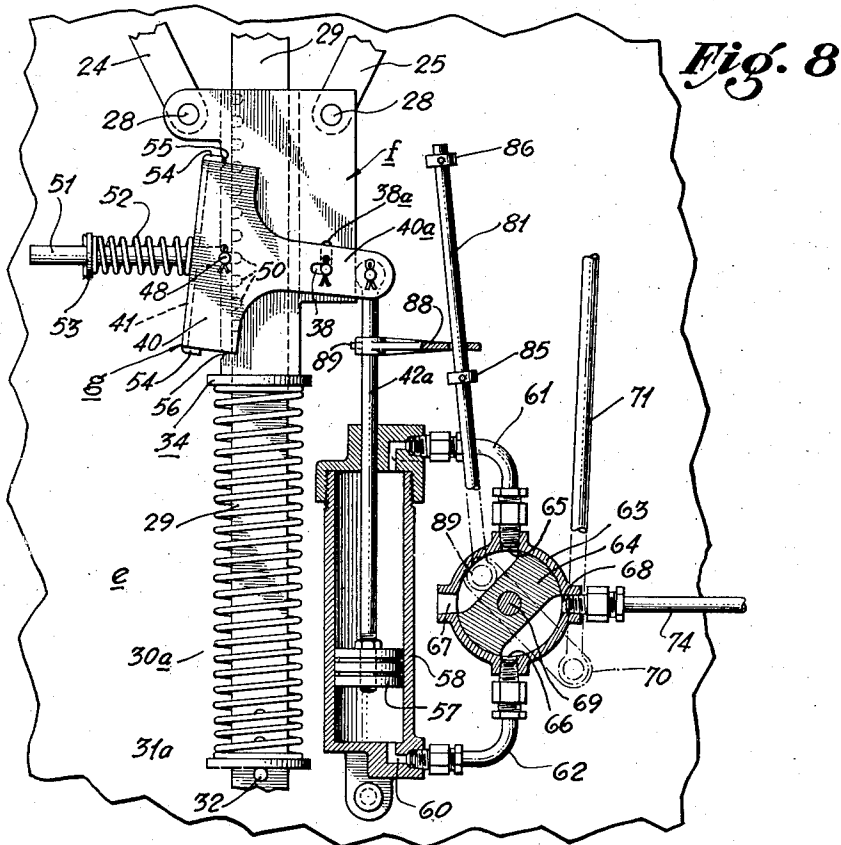
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INVENTOR:
CARL MILTON PETERSON:
BY *Raymond J. H. [Signature]*,
ATTORNEY.

UNITED STATES PATENT OFFICE

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AUTOMATIC WINDOW OPENER

Carl Milton Peterson, Huntington Park, Calif.

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6 Claims. (Cl. 268—125)

This invention relates to window-operating means, and more particularly to means for operating the windows of automobiles and like vehicles; and the invention has among its objects the provision of improved means of this character which will be relatively inexpensive and simple taken in connection with positiveness of operation, convenience and positiveness and effectiveness in use, and will be generally superior in efficiency and serviceability. The invention contemplates the use of either entire manual or like operation, or partial or main operation through the use of suitable power or pressure medium, preferably utilizing, in the latter case, convenient and suitable source of power or energy available in connection with the functioning of the vehicle.

With the above and other objects in view, the invention consists in the novel and useful provision, formation, construction, combination, association and interrelation of parts, members and features all as hereinafter described, shown in the drawings, and finally pointed out in claims.

In the drawings, in which like parts are designated by similar reference characters:

Fig. 1 is a partial perspective and outer view of an automobile, the front door member having double walls, both of which are shown broken away to disclose the operating mechanism;

Fig. 2 is a view upon an enlarged scale showing operating means, the same being observed from a direction inwardly of the car, the inner wall of the double front door being removed to disclose the mechanism;

Fig. 3 is a vertical sectional view taken upon the line 3—3 Fig. 2, and looking in the direction of the appended arrows, the window being shown in raised and locked position;

Fig. 4 is a similar view, looking in the same direction, the window being shown in lowered and locked position;

Fig. 5 is an enlarged fragmentary view of parts shown and as viewed in Figs. 2 and 4, showing particularly the operating and locking means in their association, partly broken away;

Fig. 6 is a sectional view taken upon the line 6—6, Fig. 5, and looking in the direction of the appended arrows;

Fig. 7 is a view similar to Fig. 2, but illustrating the use of pressure produced in the functioning of the vehicle as means for actuating the operating means, under manual control, the window being shown in raised and locked position;

Fig. 8 is a view similar to Fig. 7, showing, how-

ever, the window being lowered and in unlocked condition;

Fig. 9 is an enlarged fragmentary sectional view of part of the door structure of the vehicle with a hinge thereof, showing the door in closed position for the utilization of pressure in accordance with the showing in Figs. 7 and 8, with the line open so that negative pressure, as from partial vacuum in the car installation, can permit atmospheric pressure to actuate the window-operating means; and

Fig. 10 is a view similar to Fig. 9 showing the door partly open and the line to the negative pressure source closed.

Referring with particularity to the drawings, I have shown partially the exterior of an automobile, in Fig. 1, with a forward door A with its window *a*, and the usual side running board *b* and vehicle top *c*. The window *a* is shown as a vertically slidable panel operating at its edge-portion in ways or guides 11 mounted upon brackets, as 12, disposed between the inner door wall *d*, and the outer door wall *e*, shown broken away for purpose of better illustration in Fig. 1, and the latter omitted in other figures for similar purpose.

The operation of the window, up or down, is primarily produced through a pair of toggle arms 14 and 15 having rollers 16 at their outer ends which play in elongated slotted housings 17 fixed beneath the window *a* at opposite sides thereof, and pivotally connected at their other or inner ends as at 18 between spaced plates 19 and 20 which are bolted together, on a flange 21 upon the plate 19, and in turn bolted to the inner door wall structure, as at 26, and accommodating between them the pivotal play of said toggle arms 14 and 15. These toggle arms are in turn connected with a slidable housing *f* including spaced side plates 22 and 23, by means of link arms 24 and 25, in turn pivotally connected with the toggle arms 14 and 15 each at one end as at 27, and with and between the spaced plates 23 and 24 as at 28, said slidable housing embracing and adapted to move lengthwise of a vertical bar 29 which is bolted or otherwise secured at its upper end, as at 30, to and between the lower portions of the plates 19 and 20. The slidable housing *f* is urged in a direction to cause the raising or closing of the window by coiled compression spring 30a which surrounds the elongated bar 29 bearing at the lower end upon an adjustable collar 31 which may be plurally positioned with respect to adjustment and so held by pin 32 adapted to be positioned in

one of a plurality of openings 33 in the bar 29; and bearing at its upper end similarly against a collar 34 at the lower end portion of the housing *f*. The spring 30 acts as a counterpoise for the weight of the window *a* and attached parts, the potential energy stored therein upon lowering of the window becoming kinetic upon the raising thereof. The lower end of the bar 29 is also secured to a bracket 35, mounted between the inner and outer walls *d* and *e* of the door, as at 36.

The slidable housing *f* is operated in opposite directions to cause respectively the raising and the lowering of the window, by and through a locking member *g* which is pivotally connected with the side plates 22 and 23 of the slidable housing *f*. A cross pin 37 accommodated in irregularly shaped slots 38 and 38a in such side plates 22 and 23 and 39 and 40, as more particularly shown in Figs. 5 and 6 for limiting swing of said locking member *g* which in turn comprises connected side plates 39 and 40, joined by a web 41 at one side edge of each and the other side edges of which have extended portions 39a and 40a, between the outer ends of which is pivotally received, by pin 41a, a link arm 42, pivotally connected at its lower end portion, as at 43, with a lever arm 44 pivoted at 45 in a supporting bracket 46 between the door walls, and with which is fixedly connected an operating lever 47 ranging generally upwardly, for swinging of the lever arm 44 to move the link 42 and rock and then actuate the locking member *g*. This latter actuation, in the pivotal swing of the locking member *g*, serves to first unlock and then lock the locking member with respect to the slidable housing in connection with which it is pivotally mounted by means of the detents 54. The locking member has a transverse locking pin 48 spanning the space between the space plates 39 and 40 of the slidable housing *f* and accommodated in slots 49 in the plates 22 and 23 of the slidable housing *f*, in its play to enter one of a plurality of notches 50 in the adjacent side of the fixed bar 29, to lock the housing *f* against further movement along said bar. Such cross pin 48 is mounted forward of the inner end of a bolt 51 which is slidably mounted through an enlarged opening in the web 41, and fixed at one end to the plates 22 and 23 of the member *f*; and to urge into locking position the locking member *g*, there is a coil compression spring 52 bearing against a collar 53 surrounding the bolt 51 and in turn bearing against the web 41. When the operating lever 47 is thrown in a suitable direction, the locking member *g* is swung or tilted to retract the locking pin 48 from the notch in which it is stationed in locking relation, such relation being shown in Fig. 2, the swinging in one direction taking place as shown in Fig. 5, having a detent 54, there being two at the ends of the web 41, in a notch 55 or 56, in the slidable housing *f*, the latter being moved lengthwise of the fixed bar 29, in one direction or the other, as in a window-opening direction as shown in Figs. 5 and 8, through the agency of the pin 37. When the window has been partially or wholly opened or closed, and the lever is released, the locking member *g* will swing so that the transverse locking pin 48 enters one of the notches 50 and the window is maintained in either partial or wholly opened or closed position, both detents 54 being in their notches.

In Figs. 7, 8, 9 and 10, the link 42 is shown as replaced by a piston rod 42a having a piston

57 disposed within a cylinder 58. This cylinder has ports 59 and 60 at its upper and lower ends respectively, with which communicate pipes 61 and 62 leading to opposed sides of a valve housing 63 within which is mounted a rotating four-way valve 64 controlling opposed ports 65 and 66 respectively communicating with the pipe 61 and 62, and likewise controlling opposed ports 67 and 68 each of which is approximately 90 degrees from both of the ports 65 and 66. The valve 64 is mounted upon a shaft 69, provided outside of the housing 63 with a lever arm 70, which in turn is connected by a link arm 71 with a crank arm 72 similar to the lever or crank arm 44 in the other figures, and similarly provided with an operating lever or arm 73, whereby the valve may be thrown. The port 68 communicates with a pipe 74 mounted, together with the parts just recited, in connection with the door and between the walls thereof, (save and except the operating lever 73), and which extends to and is coupled with a nipple 75 adapted to be engaged with the tubular terminal portion 76 of a poppet valve 77, the tubular portion of which is slidably mounted within a fitting 76a secured to the body of the car between the walls *d* and *e* thereof, as at 80, such slidable part having ports 81 which are closed when the door is open, but which are open within the chamber 76b of the fitting 76a so that said chamber may communicate through said tubular portion 76 with the nipple 75 and the pipe 74. The poppet valve 77 is normally urged to closed position by a compression spring 82 between it and one wall of the fitting. A pipe 83 is coupled to the fitting to communicate with a port 84 therein so that continuous communication may be had between the pipe 74 and the low pressure or vacuum side of a line utilized in operating the vehicle. When the valve 64 is so positioned that the port 64 is open, with the door closed, the ports 65 and 66 will be open, the ports 67 will be open to the outer air and the other port 65 or 66 will open to port 68. Due to a given valve 64 position, either the port 69 or the port 60 will communicate through the housing 63 with the low pressure line 74, and the other port will receive atmospheric pressure to move the piston one way or the other for raising or lowering the window as aforesaid. Spaced adjustable stops 85 and 86 are mounted upon a lever arm 87 mounted to play through an eye or opening in a guide arm 88 fixed to the piston rod 42a as at 89, whereby, when the piston has executed a sufficient window-opening or window-closing travel, or just before such accomplishment, one of the stops will be acted upon to throw the valve arm 70, with which one end of the lever 87 is connected as at 89, into position to close the open air ports 67 and 68, terminating piston movement and the consequent movement of the locking member *g* and attendant parts.

The general operation of parts and features is the same as previously described and the general mode of operation of the entire device will be readily understood from the foregoing description and the statement of operation of the parts as such description proceeded.

A feature of particular importance in the invention is the provision of the two toggle arms 14 and 15 and the two link arms 24 and 25 respectively connected therewith which impart an uniform uplift or downhaul at opposite sides of the central portion of the window, the window actuating parts being disposed as shown, pref-

erably, in such intermediate position that the actuation is thus uniform at both sides. This prevents jamming or clogging of the window and facilitates an easy window movement.

Having thus disclosed my invention, I claim 5 and desire to secure by Letters Patent:

1. Improved window operating means, including toggle arms for applying force to said window to raise or lower same, a slidable member, and said toggle arms being operatively connected 10 with said slidable member; actuating means being provided to move said slidable member; and a locking member cooperating with said slidable member and with a fixed member to hold said slidable member locked during assumed window position, said locking member being pivotally 15 disposed in connection with said slidable member, and having detents cooperating with notches therein for alternate use in the movement of said slidable member in opposite directions.

2. Improved window operating means, including toggle arms for applying force to said window to raise or lower same, a slidable member, and said toggle arms being operatively connected with said slidable member; actuating means being 20 provided to move said slidable member; and a locking member cooperating with said slidable member and with a fixed member to hold said slidable member locked during assumed window position, said locking member being pivotally disposed in connection with said slidable member, 25 and having detents cooperating with notches therein for alternate use in the movement of said slidable member in opposite directions, said slidable member including a pin adapted to engage with one of a plurality of recesses in said fixed 30 member.

3. Improved window operating means, including toggle arms for applying force to said window to raise or lower same, a slidable member, and said toggle arms being operatively connected with said slidable member; actuating means being 35 provided to move said slidable member; and a locking member cooperating with said slidable member and with a fixed member to hold said slidable member locked during assumed window position, said locking member being pivotally 40 connected with said slidable member, and having detents cooperating with notches therein for alternate use in the movement of said slidable member in opposite directions, said slidable member including a pin adapted to engage with one 45 of a plurality of recesses in said fixed member, there being means yieldingly urging said locking member into normal position with said slidable member locked.

4. Improved window operating means, including toggle arms for applying force to said window to raise or lower same, a slidable member, and

said toggle arms being operatively connected with said slidable member; actuating means being provided to move said slidable member; and a locking member cooperating with said slidable member and with a fixed member to hold said slidable member locked during assumed window position, said locking member being pivotally 5 assembled with said slidable member, and having detents cooperating with notches therein for alternate use in the movement of said slidable member in opposite directions, said locking member including a pin adapted to engage with one of a plurality of recesses in said fixed member.

5. Window operating means comprising a fixed, 10 notched bar, a slide member mounted on said bar for sliding movement therealong, connecting means between said slide member and the window whereby sliding movement of the former actuates the latter, a locking member having a 15 front portion disposed outwardly of one edge of said slide member and side arms extending across opposite side faces of said slide member, respectively, detents at the ends of the front portion of said locking member for engagement with 20 the related edge of said slide member, means mounting said locking member on said slide member for rocking movements with respect thereto and requiring the two members to move as a unit along said notched bar, yieldable means 25 tending constantly to urge said locking member to a position with both of its said detents engaged with said edge of said slide member, a pin on said locking member for engagement with a notch of said bar to hold said members against 30 sliding movement along said notched bar when both detents are engaged with said slide member, said locking member being rockable about the point of engagement of either of its detents with the said edge of said slide member to disengage 35 said pin from a notch in said notched bar, and means connected with the arms of said locking member for rocking the same to release said slide member for sliding movement along said bar and also for moving same to move said slide 40 member along said bar to actuate the window.

6. Window operating means as set forth in claim 5 in which the means mounting the locking member on the slide member and the means 45 tending constantly to urge the locking member to a position with both of its detents engaged with the edge of the slide member, comprises a stud extending from the slide member through the front portion of the locking member, a stop on said stud, spring means on said stud between said 50 stop and the front portion of said locking member, and a pin and slot connection between said slide member and the arms of said locking member.

CARL MILTON PETERSON.