Dec. 26, 1944. H. M. BROOKS 2,365,742

WINDOW OPERATOR

Filed Oct. 15, 1941 2 Sheets-Sheet 1

FIG. 1.

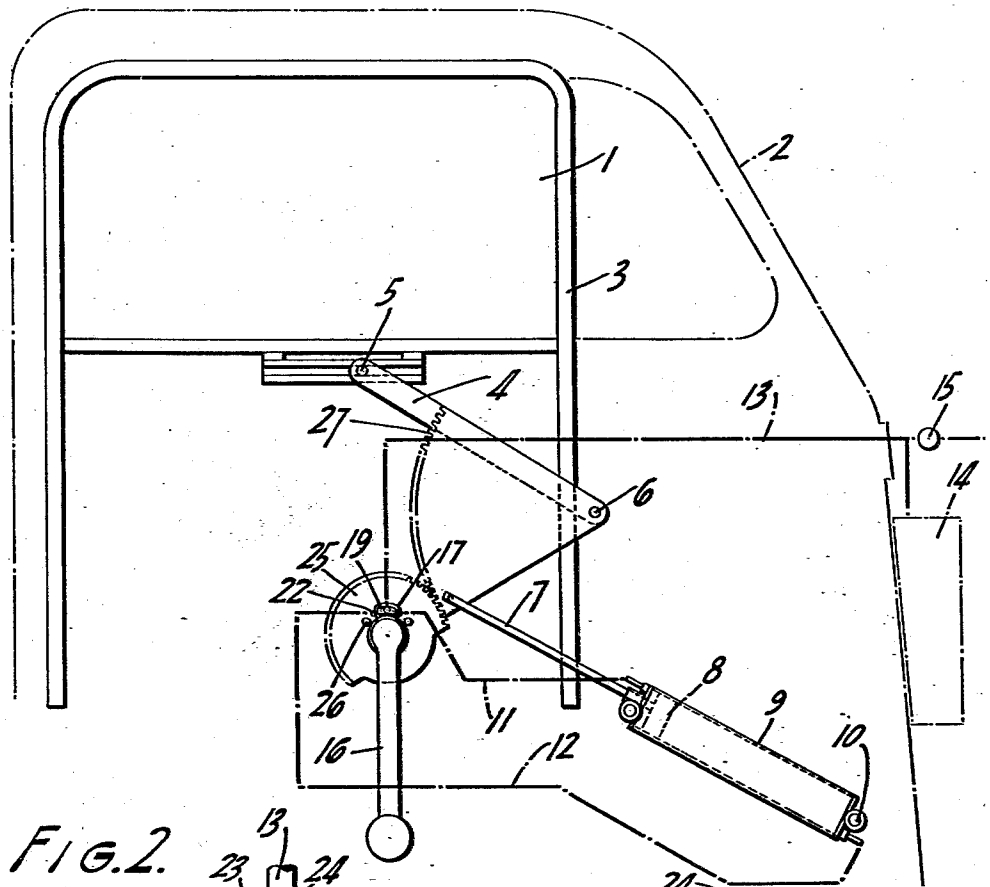

FIG. 2.

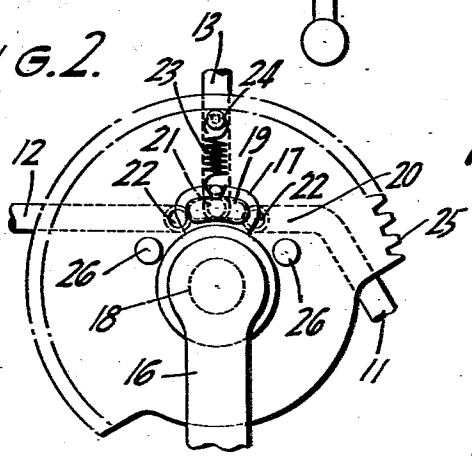

FIG. 3.

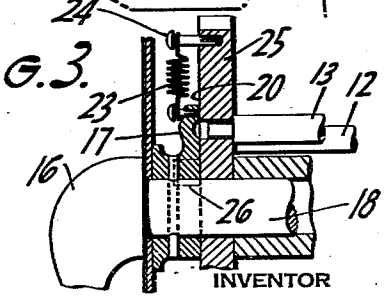

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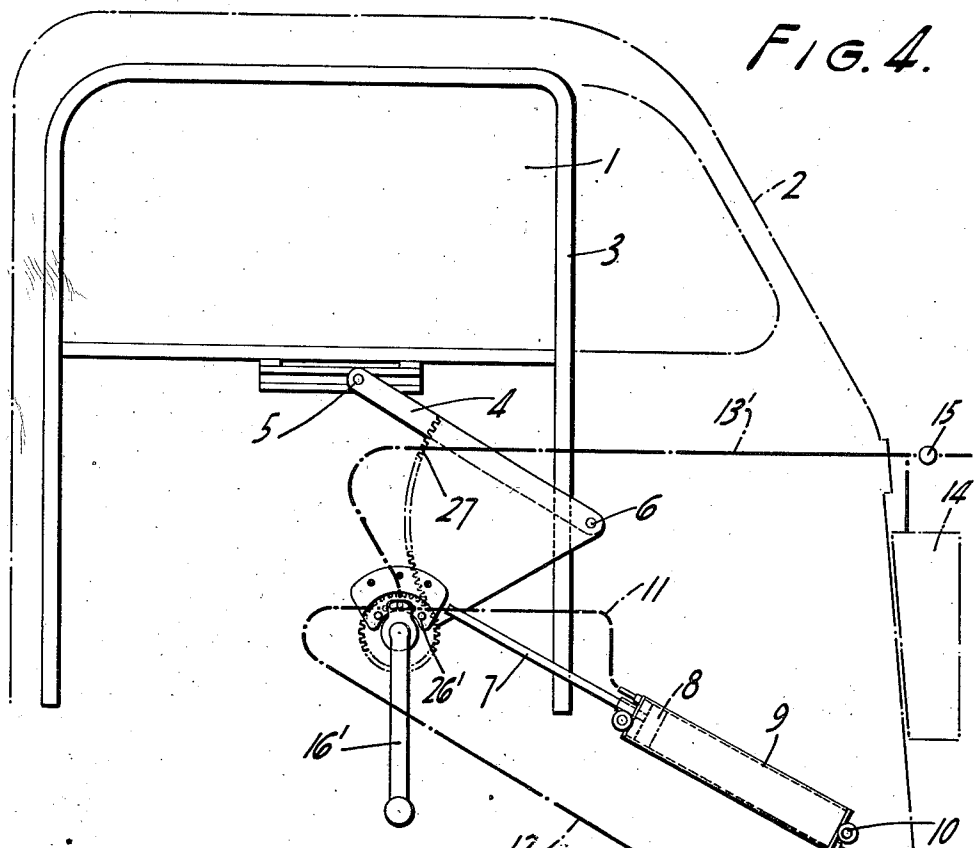
FIG. 4.



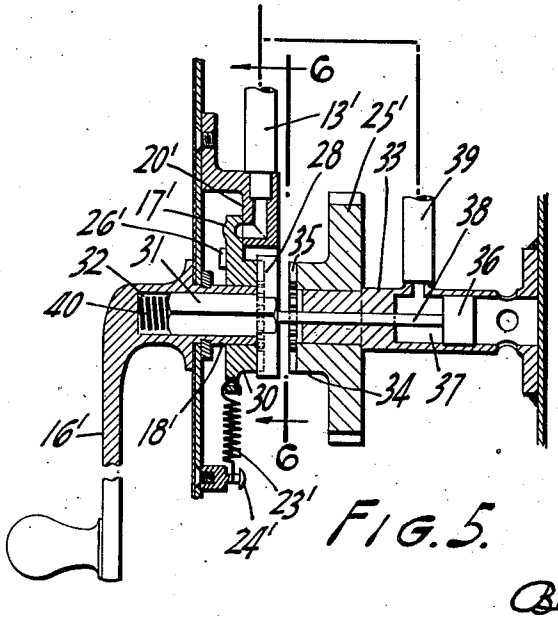


FIG. 5.

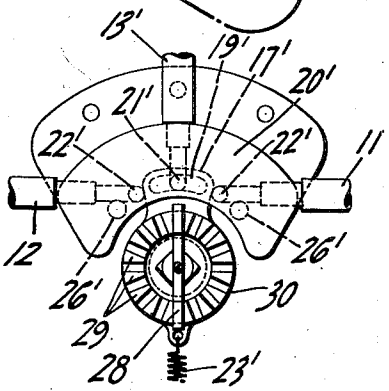


FIG. 6.

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WINDOW OPERATOR

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Application October 15, 1941, Serial No. 415,102

11 Claims. (Cl. 268—125)

This invention relates to a window lift or operating mechanism which is adapted for the adjustment of windows of motor vehicles. The present day automobile is equipped with some means by which the window may be manually raised or lowered. It has recently been proposed to open the window by fluid pressure, such as air, to facilitate the operation and also to enable the motorist to more quickly open the window for giving a signal in an emergency or as the urgency of the occasion may require.

The primary object of the present invention is to provide a combined manual and power type of window operating mechanism wherein a common control is provided to function in a manner which will automatically insure the manual operation of the window upon failure of the motive power. The invention further has for its object to provide a mechanism in which the manually operated mechanism for adjusting the window is preceded by a faster moving power drive and will only function when the power drive is non-responsive.

The mechanism involves the arrangement of parts by which the manual control will merge into the automatic or power drive through a common control and thereby avoid the necessity of utilizing separate controls or requiring any special readjustment on the part of the motorist in order to bring the manual control into play when the power drive fails.

In the drawings:

Fig. 1 is a fragmentary phantom view of a motor vehicle showing the present window operating mechanism applied thereto;

Fig. 2 is an enlarged detailed view showing the common control more clearly;

Fig. 3 is a sectional view lengthwise of the hand crank shaft;

Fig. 4 is a view similar to Fig. 1 depicting a modification;

Fig. 5 is a longitudinal sectional view through the control of the modification; and

Fig. 6 is a transverse sectional view about on line 6—6 of Fig. 5.

Referring more particularly to the drawings, the numeral 1 designates a closure such as the window in the door 2 of a motor vehicle, the window being slidable vertically in the guideways 3 through the instrumentality of the lever 4 operatively connected to the lower edge of the window as indicated at 5. The lever is pivotally mounted at 6 and is connected by piston rod 7 to the piston 8 of a fluid motor which has a cylinder 9 in which the piston operates. The motor is pivotally mounted at 10 so that it may rock to accommodate the swinging motion of the window operating lever 4. The opposite ends of the cylinder may be connected by conduits 11 and 12 to a fluid supply line 13 leading to a source of operating pressure, such as the intake manifold of the vehicle engine. A vacuum storage tank 14 may tend to conserve the supply of suction, this being aided by a check valve 15 acting to prevent air flow from the manifold to the tank. Obviously, should the fluid pressure fail the window will fail to move and such a condition is not desirable in an emergency. According to the present invention means are provided to automatically connect the manual operating mechanism upon failure of the automatic or power operating mechanism, as will now be described.

A handle 16 is suitably mounted on the door and is designed to be rotated clockwise or counterclockwise to regulate the window adjustment toward or from a fully closed position. In accordance with the present invention means are provided to set the power operated mechanism in motion during the initial movement of the handle and should the power mechanism fail to operate for any reason then by a continuation of the rotary movement of the handle the window adjustment will be effected through a mechanical transmission. To this end a control valve 17 is operatively connected to the shaft 18 upon which the handle 16 is fixed, such valve having a recess 19 slidable on a seat 20 to connect a pressure supply port 21 to either one of a pair of cylinder ports 22. The port 21 is connected to the supply line 13 while the cylinder ports 22, one on each side of the supply port 21, are connected to the opposite ends of the motor cylinder 9 as by means of the flexible conduits 11 and 12. Therefore when the handle is initially moved clockwise or counterclockwise the valve recess 19 will bridge the supply port 21 and one of the cylinder ports 22 to operate the motor in the desired direction. A reverse movement of the handle 16 will connect the supply port to the companion cylinder port 22 for reversing the motor. A spring 23, anchored at one end by the pin 24 and connected at its opposite end to the valve 17, tends to restore the valve to its neutral position, when the handle is released, to thereby vent the cylinder to the atmosphere.

Now let it be assumed that the source of pressure has failed so that during this initial movement of the handle 16 the positioning of the valve 17 over the corresponding cylinder port will have no effect on the fluid motor. This being the

case the motorist will continue his manual rotation of the handle to raise or lower the window. To this end the valve seat 20 may be provided on one face of a segmental gear 25 mounted coaxially of the shaft 18 for relative movement. At the opposite sides of the seat are stop shoulders 26 which are engageable by the valve 17 when in port bridging position so as to provide a mechanical connection between the shaft and the gear. Therefore, when the motor fails to respond to the initial movement of the handle, a continued rotation of the latter will impart like movement to the gear 25 which in turn will move the lever 4 to which it is intergeared, as by means of a segmental gear 27. The fluid communication between the movable seat and the supply line and the cylinder may be established through flexible rubber hose or in some other flexible manner permitting movement of the valve and its seat as a unit during the manual operation of the window. Whenever the handle is released the spring 23 will restore the valve to its intermediate neutral position so that when the engine is again started and the source of pressure replenished, the fluid motor will remain in its then position until the handle 16 is manipulated. It is therefore obvious that the hand cranking or the movement of the control valve to start the motor may be readily continued for manual manipulation without releasing the hold on the handle. In the particular embodiment shown in Fig. 1 the handle 16 will follow the movement of the gear 25 for continued motor operation, such following movement being readily accomplished with little effort by lightly pressing on the handle in the direction of movement until the desired window adjustment has been obtained.

In the modified showing a fluid responsive arrangement has been provided to normally connect the handle 16' to the control valve 17' which latter is rotatably mounted on the shaft 18' of the handle and is normally retained in its neutral position by a spring 23' supported on an anchor pin 24'. The driving connection between the handle and the control valve is effected by means of a key 28 which is adapted to interlock with clutch recesses or teeth 29 on the hub 30 of the valve 17', the key itself having a non-circular stem 31 slidably engaging in a like shaped recess or bore 32 in the shaft 18'. The driving gear or pinion 25' is rotatably supported on a fixed shaft 33 and has a hub 34 formed with recesses or teeth 35 in opposition to the hub recesses 29 of the valve, the key 28 being interposed between these hubs and selectively engageable with either set of recesses in response to the pressure condition of the system. A piston 36 is slidable in a cylindrical bore 37 provided in the fixed shaft 33, and the piston rod 38 which is slidably supported axially of the shaft has one end projecting from the hub 34 against the key 28. The bore or chamber 37 is connected at its inner end by a conduit 39 to the pressure supply line 13'. Therefore, whenever the pressure is available the piston 36 will be acted upon to hold the key 28 in operative engagement with the valve 17' so that upon initial movement of the handle the valve will be moved upon its seat 20' to a port bridging position as determined by the corresponding one of the stops 26'. However, should the pressure fail at any time then a spring 40 which is arranged within the recess 32 behind the stem 31 will push the key member out of engagement with the hub 30 and into engagement with the gear hub 34 so that when the handle is moved the gear 25' will function to manually adjust the window while the valve 17' is held neutral by the spring 23'.

The object of the invention is therefore accomplished since the operation of the single control or handle will always effect a window adjustment either by power or by manual effort alone, and while the foregoing description has been given in detail it is to be understood that the inventive principles herein disclosed may assume other physical embodiments without departing from the spirit or scope of the invention set forth in the appended claims.

What is claimed is:

1. A window regulator for motor vehicles, comprising a window connected actuating means, power means connected thereto for operating the same, a control for the power means, manual means operable mechanically by the control for operating said window actuating means by manual effort, and power responsive means operable to disconnect the manual means mechanically from the control as long the the power is effective.

2. A window regulator for motor vehicles, comprising a window connected actuating means, power means connected thereto for operating the same, a control for the power means, manual means operable mechanically by the control for operating said window actuating means through manual effort, power responsive means operable for holding the manual means inactive as long as the power is effective, and means normally counteracted by the power responsive means and operable to connect the manual means to the window actuating means upon the failure of the supplied power.

3. A window regulator for motor vehicles, comprising a window connected actuating means, power means for actuating the same, manual means for actuating said closure actuating means, a control common to both the power means and the manual means for operating either selectively, and power responsive means operating in the presence of an adequate power supply to connect the power means to said common control and acting to connect the latter to the manual means upon the failure of the supplied power.

4. A window regulator for motor vehicles, comprising a window connected actuating member, a pinion intergeared therewith for manual operation thereof, a control operable to rotate the pinion, power means for operating the actuating member, means normally operating to connect the control to the pinion and adapted to connect the control to the power means independently of the pinion, and means responsive to the power supplied said power means for rendering the connecting means operative to connect the control to the power means.

5. A window regulator for motor vehicles, comprising a window connected actuating member, manual means for manually moving the actuating member, power means for moving the actuating member, a common control for operating either means, and power responsive means for selectively determining the functioning of said common control on one or the other of the first two means.

6. A window regulator for motor vehicles having a source of fluctuating power, a window actuating member, manual means for moving the actuating member, power means for moving the actuating member, a common control for both means, a clutch normally connecting the control

to the manual means, and power responsive means operable on the clutch to disconnect the manual means from the control and to connect the latter to the power means when the power supply is adequate for the operation of the power means.

7. A motor vehicle window system comprising in combination, a window, mechanism for moving the same to and from a closed position, a handle for so actuating the mechanism to provide for the manual opening and closing of the window but being normally free of the mechanism to have idle movement with respect thereto, a fluid pressure motor connected to the mechanism for the power opening and closing of the window, a control operable to connect the motor to a source of fluid pressure and being connected to the handle normally for operation thereby initially, and means for coupling the handle to the mechanism automatically whereby the operation of the handle will normally serve to initiate power operation of the window but upon failure of the power operation will then insure manual operation of the window.

8. A motor vehicle window system comprising in combination, a window, mechanism for moving the same to and from a closed position, a handle for so actuating the mechanism to provide for the manual opening and closing of the window but being normally free of the mechanism to have idle movement with respect thereto, a motor connected to the mechanism for the power opening and closing of the window, a control operable to connect the motor to a source of energy and being connected to the handle normally for operation thereby initially, and means automatically operable to mechanically connect the mechanism for manual operation by the handle when the motor is non-responsive to the initial operation of the handle, whereby to insure the operation of the window when the handle is actuated.

9. A window regulator for motor vehicles, comprising a window connected actuating member, manual means for manually moving the actuating member, power means for moving the actuating member, a common control for both means, and means automatically operable to enable one of the aforesaid means to regulate the window by and upon the actuation of the common control when the other of said first two named means fails to respond thereto, said enabling means mechanically connecting the common control to the manual means when the power means fails.

10. A window regulator for motor vehicles, comprising a window connected actuating member, manual means for moving the actuating member, power means for moving the actuating member, a common control for both means, power responsive means acting normally to connect the control to the power means for energizing the latter for power operation of the actuating member, and means normally counteracted by said power responsive means and operable when permitted by the latter to connect the common control to the manual means.

11. A window regulator for motor vehicles, comprising a window connected actuating member, a pinion intergeared therewith for manual operation thereof, a hand cranking control operable to rotate the pinion, power means for operating the actuating member including a fluid motor, a valve operable by and during the initial movement of the hand cranking operation of the control for energizing the motor, and means automatically connecting the pinion to the control upon the failure of the power means whereby to insure the operation of the window whenever the control is cranked.

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