

Dec. 11, 1945.

A. RAPPL

2,390,617

WINDOW OPERATOR

Filed May 23, 1944

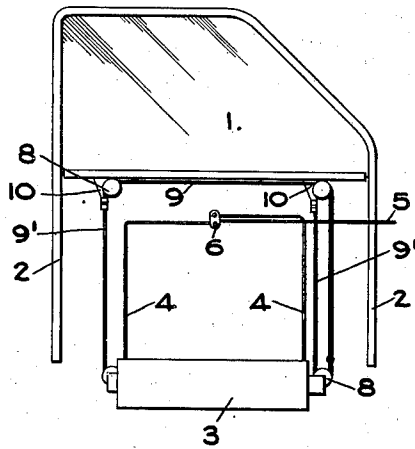


Fig. 1.

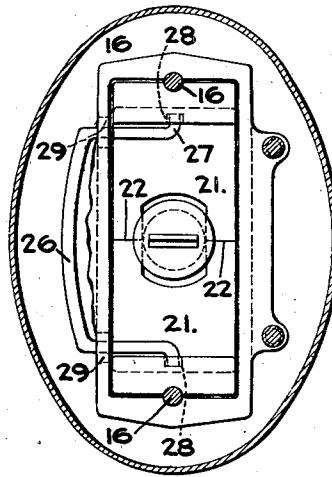


Fig. 3.

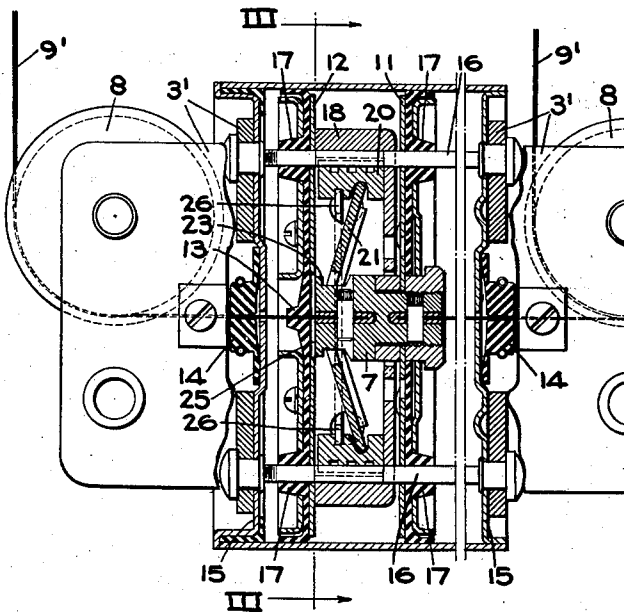


Fig. 2.

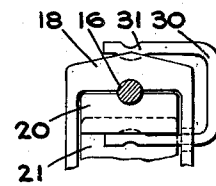


Fig. 4.

INVENTOR
ANTON RAPPL

BY

Beau, Brooks, Buckley & Beau.
ATTORNEYS

UNITED STATES PATENT OFFICE

2,390,617

WINDOW OPERATOR

Anton Rappi, Eggertsville, N. Y., assignor to Trico Products Corporation, Buffalo, N. Y.

Application May 23, 1944, Serial No. 536,875

11 Claims. (Cl. 268-125)

This invention relates to a window operator especially designed for the opening and closing of motor vehicle windows. These windows are ordinarily counterbalanced by a heavy spring so as to minimize the lifting effort required for raising the window to a closed position.

The modern motor vehicle has of late been equipped with suction or vacuum operated motors to raise and lower the window, means being employed to lock the window by and during any attempt to pry the window open. Where the window is freely movable and is being power operated in a downward or window opening direction, there is a tendency for the window to chatter, which chattering is caused by the window falling ahead of the motor and momentarily by its own weight applying the window lock rendered inoperative as soon as the motor catches up.

The primary object of the present invention is to provide an efficient window operator which will function in a smooth and practical manner. Further, the invention has for its object to provide a window system which is of durable and economical construction and one in which the formerly required counterbalancing means may be eliminated for all practical purposes.

In the drawing

Fig. 1 is a diagrammatic view showing the window system of the present invention;

Fig. 2 is a fragmentary longitudinal sectional view through the motor unit;

Fig. 3 is a transverse section about on line III-III of Fig. 2; and

Fig. 4 is a fragmentary showing of a slightly modified form of the window retarding means employed in the present invention.

Referring more particularly to the drawing, the numeral 1 designates a window of a motor vehicle which is vertically slidable in guideways 2 for opening movement down into an underlying well. Within the well is arranged a fluid motor 3 having conduits 4 connecting the opposite ends thereof to a suction or low pressure supply line 5 through a control valve 6. A flexible power transmitting member 9 is supported by four pulleys 8 to provide two vertically disposed active flights or portions 9' on which the window is supported by the spaced bracket arms 10. The lower pulleys 8 are shown supported by brackets 3' on the opposite ends of the motor. The ends of the flexible member are carried through the opposite end walls of the motor chamber and joined within the latter by a connector 7 which in turn is secured to a piston 11 to move therewith. A second piston 12 is arranged for limited move-

ment relative to piston 11 and has sliding fluid sealed contact with the flexible member 9 by means of the gasket part 13. Gaskets 14 seal the end walls 15 of the motor chamber where the member 9 passes therethrough.

For locking the window there is provided a pair of rods 16 suitably fixed in the end walls 15. These rods pass through the pistons 11 and 12 in a fluid tight manner, as afforded by the gasket parts 17, and also through a cupped shape lock housing 18 carried by the piston 12. Within the housing is a pair of lock shoes 20 opposing wall portions of the housing to cooperatively grip the rods therebetween under the urge of a toggle joint 21. The arms of the toggle abut each other at their inner ends 22 beneath a shoulder 23 on the connector 7 so that a window imparted pull on the latter in a window opening direction will expand the shoes against the rods and lock the flexible member against movement. Therefore the window is frictionally locked against opening movement. The foregoing has been more fully set forth in Patent No. 2,369,797.

The piston unit 11, 12, is normally balanced by the subatmospheric pressure, and when the control valve 6 is selectively actuated it interrupts the suction communication to the selected side of the unit and opens such side to the atmosphere. When the higher pressure is applied to piston 12, the latter will initially engage the lock shoes to move them out of contact with the rods and thereafter the housing 18 will contact the piston 11. For this purpose the clearance between piston 12 and the lock shoes is less than that between the housing 18 and the piston 11, the trailing end of the connector 7 moving into recess 25 to accommodate this movement. This establishes a driving connection between the piston 12 and the power transmitting member 9 for a powered lowering of the window. A reverse pressure differential will actuate the piston 11, which is fixed to the connector, for raising the window.

When the piston 12 is lowering the window under a small pressure differential and therefore is operating at a slower than normal speed, the weight of the window will accelerate the window movement and, in effect, fall upon the lock and apply the latter. In other words the window of its own weight, will exert a pull on the connector 7, to the right as viewed in Fig. 2, and expand the toggle joint against the shoes. This locking action is momentary because the pressure differential will again build up and again push on the piston 12 to unlock the shoes. This constant

repetition results in a chattering of the window during its descent.

To avoid this chattering there is provided an auxiliary but constantly acting retarding means in the form of an expansive spring 26 which is interposed between the two lock shoes 20. As shown in Fig. 3 the spring is U-shaped and has outwardly directed terminals 27 engaging in recesses 28 formed in the back of the shoes. The spring may be located without the housing 18 in which event the terminals may enter the shoe chamber through openings 29. The spring is of sufficient strength to place a predetermined drag upon the lock rods 16 and thereby resist free falling action of the window ahead of the pull of the motor. This drag may be imposed at other points or by other means. Fig. 4 depicts an individual spring 30 for each shoe, the same being U-shaped to straddle the lock rod and the adjacent gripping parts and one or both legs having retainer ribs 31 engaging in seats to prevent accidental dislodgment of the spring.

From the foregoing it will be observed that the lock or clutch produces a constant drag upon the window to resist any falling tendency ahead of the action of the operating motor. This drag is produced by a spring means exerting a light pressure upon the locking shoes. The function of the usual counterbalance spring is therefore eliminated, the retarding means of the present invention being uniform throughout the opening and closing strokes of the window operating motor. This constantly actuating lock or clutch prevents the weight of the window from moving in advance of the effective vacuum and thereby prevents the window from falling on the mechanism to set the window lock during the powered opening of the window. This eliminates any chattering action and effects a smooth window movement.

While the foregoing has been described in detail, it is not intended thereby to restrict the invention beyond the scope of the appended claims since the inventive principles may be embodied in other physical structures without departing from the spirit of the invention.

What is claimed is:

1. A window system comprising a vertically slidable window, a motor having a fluid operable member, means connecting the member to the window in a unit for movement back and forth by a force applied to either the window or the member, said connecting means having a play connection with the piston enabling limited relative movement with respect thereto, a lock shoe movably carried by the member, means operable by a window imparted movement of the unit during such relative movement and connected to the shoe to set the latter against a fixed part to lock the unit, and resilient means acting independently of said setting means normally to maintain the shoe lightly in engagement with the fixed part for imposing a drag on the unit against the window over-running the member and setting the shoe when the motor is operating,

2. A window system comprising a vertically slidable window, a motor having a fluid operable member, means connecting the member to the window in a unit for movement back and forth by a force applied to either the window or the member, said connecting means having a play connection with the piston enabling limited relative movement with respect thereto, a lock carried by the member and embodying a shoe movable against a fixed part of the motor with

means for effecting such movement, said connecting means having a part connected to and operable to actuate said effecting means during such limited relative movement, and a spring acting directly on the shoe independently of said effecting means for normally holding the shoe against the fixed part to impose a drag on the unit against the window moving faster than the motor imparted speed and actuating the lock during motor operation.

3. In combination, a vertically slidable window, a motor having a fluid operable member, connector means joining the member to the window for driving one from the other following a limited extent of relative movement and serving to support the window in an elevated position from which said member may lower it by fluid pressure operation, a friction lock element supported by the member for movement against a fixed part of the motor, means operable by a window imparted movement of the connector means during such relative movement for actuating said element to lock the window against lowering, and drag imposing means acting independently of the lock actuating means to urge the lock element normally against window lowering movement at a faster rate than that imparted by the member during motor operation.

4. In combination, a vertically slidable window, a motor having a fluid operable member, connector means joining the member to the window for driving one from the other following a limited extent of relative movement and serving to support the window in an elevated position from which said member may lower it by fluid pressure operation, expansible and contractible friction lock means carried by said member for engaging a fixed part of the motor, toggle-like means operable by a window imparted movement of said connector means during such relative movement for actuating the lock means and thereby secure the window against lowering, and drag imposing means acting upon said lock means independently of the toggle-like means for holding the window against accelerating beyond the motor imparted rate of speed during motor operation thereof.

5. In combination, a vertically slidable window, a motor having a fluid operable member, connector means joining the member to the window for driving one from the other following a limited extent of relative movement and serving to support the window in an elevated position from which said member may lower it by fluid pressure operation, expansible and contractible friction lock means carried by said member for engaging a fixed part of the motor, toggle means operable by a window imparted movement of said connector means during such relative movement for actuating the lock means and thereby secure the window, and spring means acting on the lock means independently of the toggle means for applying the lock means to a limited degree and thereby imposing a drag upon the window against the latter accelerating faster than the motor imparted speed when the motor is operating.

6. In combination, a vertically slidable window, a motor having a fluid operable member, connector means joining the member to the window for relative movement and serving to support the window in an elevated position from which said member may lower it by fluid pressure operation, a pair of fixed rods within the motor chamber on which the member slides with a

fluid tight seal, a pair of lock shoes movably carried by said member for engaging the rods, means cooperating with the shoes to cause them to frictionally grip the rods upon a window imparted movement of the connector means, and a spring having its opposite ends connected to the shoes to urge them against the rods for providing a drag in resistance to a gravitational movement of the window while the latter is being lowered by the motor.

7. In combination, a vertically slidable window, a motor having a fluid operable member, connector means joining the member to the window for relative movement and serving to support the window in an elevated position from which said member may lower it by fluid pressure operation, a pair of fixed rods within the motor chamber on which the member slides with a fluid tight seal, a pair of lock shoes movably carried by said member between the rods for engaging the latter, toggle means interposed between the shoes to expand them against the rods upon window imparted movement of the connector means, a housing enclosing the shoes and toggle means and providing abutments at the outer sides of the rods to cooperate with the shoes in gripping the rods, and a spring interposed between the shoes to expand the shoes against the rods.

8. In combination, a vertically slidable window, a motor having a fluid operable member, connector means joining the member to the window for relative movement and serving to support the window in an elevated position from which said member may lower it by fluid pressure operation, a pair of fixed rods within the motor chamber on which the member slides with a fluid tight seal, a pair of lock shoes movably carried by said member between the rods for engaging the latter, toggle means interposed between the shoes to expand them against the rods upon window imparted movement of the connector means, a housing enclosing the shoes and toggle means and providing abutments at the outer sides of the rods to cooperate with the shoes in gripping the rods, and spring means acting on the shoes independently of the toggle means to press the shoes against the rods, said spring means being arranged outside the housing and having parts entering the latter to engage the shoes therein.

9. In combination, a vertically slidable window, a motor having a fluid operable member, connector means joining the member to the window for relative movement and serving to support

the window in an elevated position from which said member may lower it by fluid pressure operation, a rod fixed within the motor chamber on which the member slides with a fluid tight seal, a lock shoe movably carried by said member for engaging the rod, means rendered inoperative by and during motor operation of the window and cooperating with the shoe to cause the latter to frictionally grip the rod upon a window imparted movement of the connector means, and a spring connected to the shoe to urge the latter against the rod for providing a drag in resistance to a gravitational movement of the window while the latter is being lowered by the motor.

10. In combination, a vertically slidable window, a motor having a fluid operable member, connector means joining the member to the window for relative movement and serving to support the window in an elevated position from which said member may lower it by fluid pressure operation, a rod fixed within the motor chamber on which the member slides with a fluid tight seal, a lock shoe movably carried by said member for engaging the rod, means rendered inoperative by and during motor operation of the window and operable to set the shoe against the rod upon window imparted movement of the connector means, a housing enclosing the shoe and the shoe setting means and providing an abutment at the opposite side of the rod to cooperate with the shoe in gripping the rod, and spring means acting on the shoe independently of the setting means to press the shoe against the rod, said spring means being arranged outside the housing and having a part entering the latter to engage the shoe therein.

11. A window system comprising a vertically slidable window, a motor having a chamber and a piston therein, a transmission member operatively connecting the window to the motor for actuation thereby, clutch means operable by a window imparted movement of the member to lock the window, said clutch means embodying expansible and contractible shoe means and means operable by such window imparted movement for subjecting the shoe means to a clutching urge, and resilient means normally acting on said shoe means independently of the shoe expanding means to expand the shoe means with a relatively lighter clutching urge for imposing a predetermined drag on the window when the motor is operating.

ANTON RAPPL.