

Dec. 18, 1945.

A. RAPPL

2,391,073

WINDOW OPERATOR

Filed Jan. 2, 1943

2 Sheets-Sheet 1

FIG. 1.

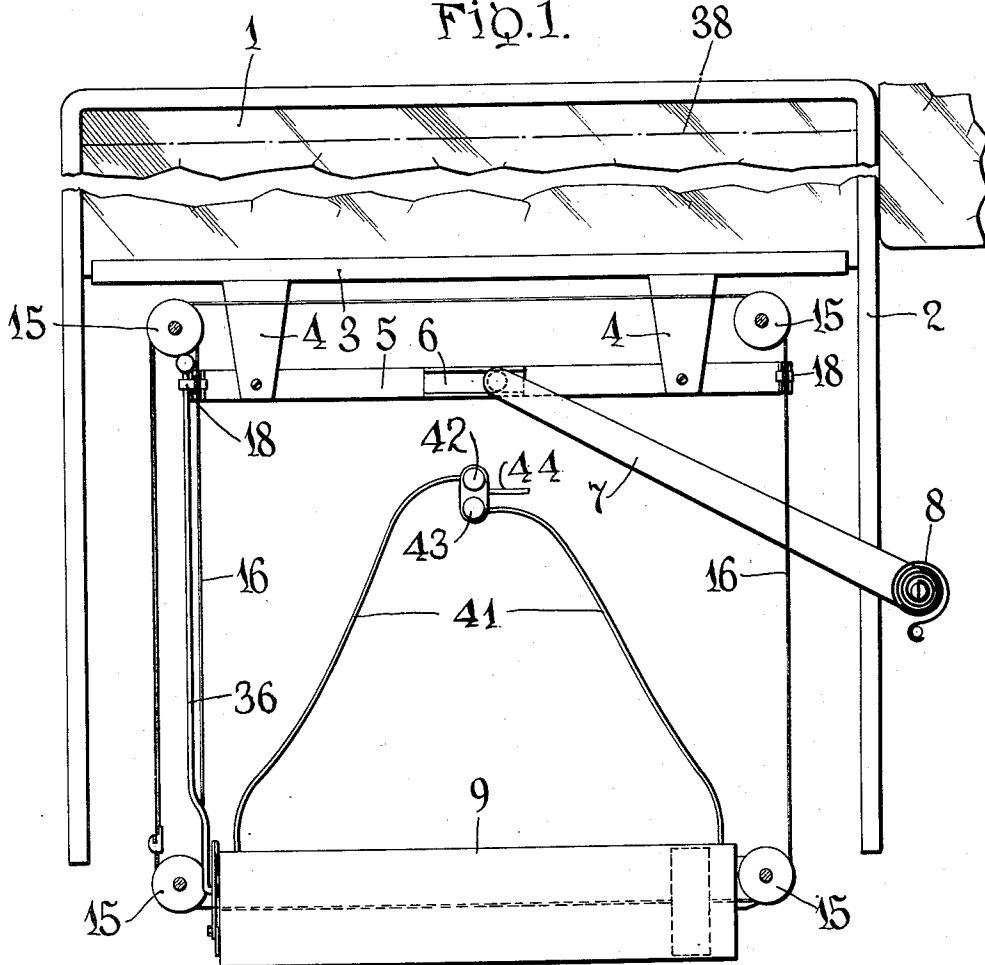


FIG. 5.

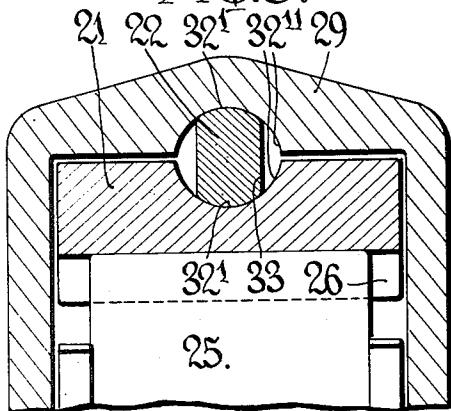
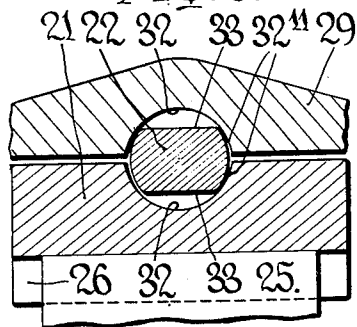


FIG. 6.



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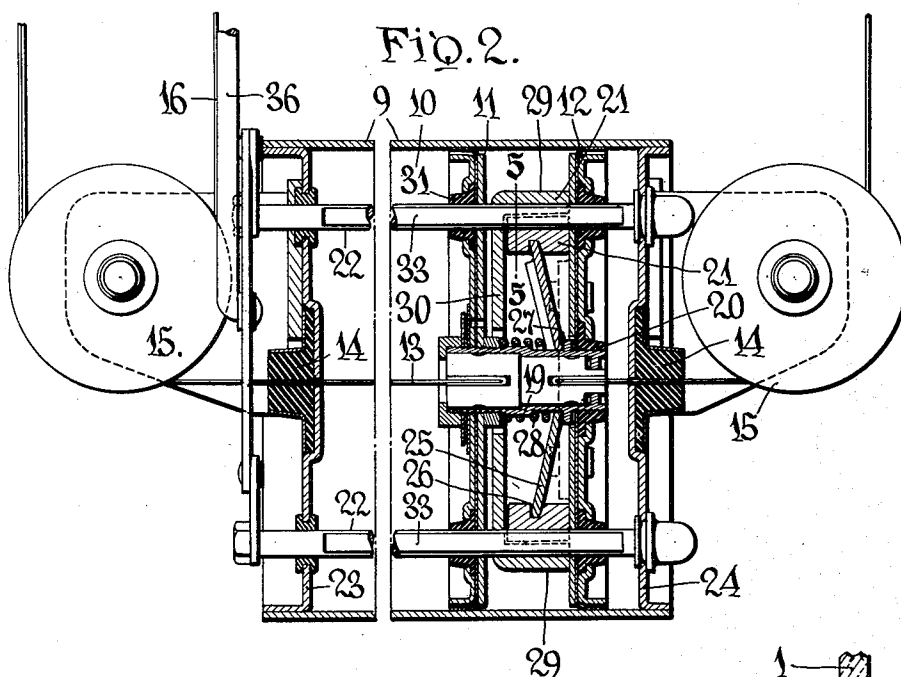
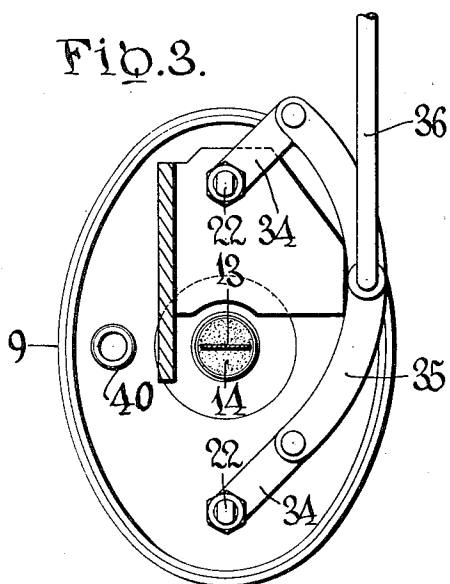
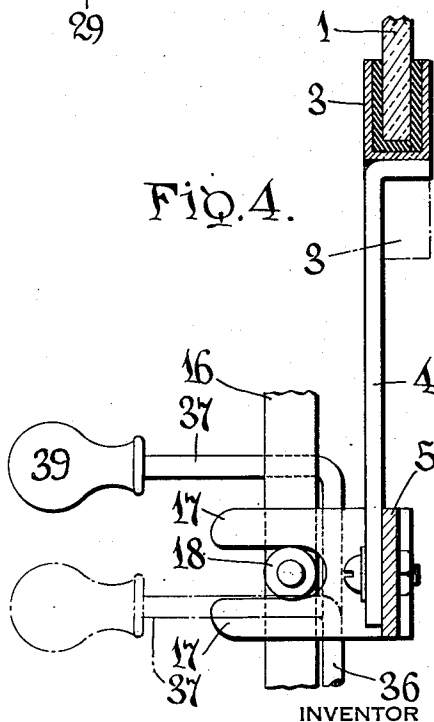
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2,391,073

WINDOW OPERATOR

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Application January 2, 1943, Serial No. 471,152

19 Claims. (Cl. 268—125)

This case relates to a closure operator and primarily to a window system for motor vehicles, the same being an improvement on the disclosure made in my earlier application filed November 5, 1940, Serial No. 364,421, wherein is shown and claimed a fluid motor operatively connected to a window and incorporating window locking means operable from the window to prevent unauthorized opening of the window, with means being provided to permit the window to be opened in an emergency. Specifically, the window was freed from the motor.

In the present invention the window is likewise rendered ineffective on the lock during an emergency but the result is accomplished in a manner which permits the motor-window connection to maintain.

The invention therefore has for its primary object to provide a window system which is efficient and practical and one in which the power unit connection to the window always remains operative.

A further object of the present invention is to provide a window system in which the window actuated lock may be rendered inoperative when an emergency arises that necessitates a quick manual opening of the window.

In the drawings,

Fig. 1 is a schematic view illustrating a practical application of the present invention;

Fig. 2 is a longitudinal sectional view through the fluid motor of the power unit, with portions broken away;

Fig. 3 is an end elevation of the motor with the adjacent pulley removed;

Fig. 4 is a fragmentary view showing the disconnect or freeing control in its relationship to a window for effecting a partial opening of the latter;

Fig. 5 is an enlarged sectional view about on line 5—5 of Fig. 2 showing the lock operative; and

Fig. 6 is a similar view showing the lock inoperative for freeing the window.

Referring more particularly to the drawings, the numeral 1 designates a closure, such as the window of a motor vehicle, slidable vertically in guides 2 and provided on its lower edge with a frame member 3 having depending bracket arms 4 joined to an actuating bar 5. This bar is illustrated herein as having a horizontal guideway 6 slidably receiving the outer end of an arm 7 which is acted upon by a spring 8 to counterbalance substantially the weight of the closure.

The power unit of the window system embodies a fluid motor comprising a cylinder or casing 9

having a chamber 10 depicted as oval cross section and in which is disposed a movable wall in the form of a composite piston member. The piston member comprises relatively movable piston sections 11 and 12, each packed for fluid operation in a direction opposite to the other, with the piston section 11 being fixed to a flexible piston rod 13 which latter is shown as being a tape or band that passes out of the motor chamber through the packing glands 14 and takes over guide pulleys 15 in a manner to provide a pair of vertical active flights 16. The closure is operatively connected to these active flights through the actuator bar 5, the latter having terminal bifurcations 17 angularly deflected to straddle lugs 18 on the flights (Fig. 4). The lugs may slide in and out relative to the bifurcations to compensate for irregular movement of the closure.

The piston section 12 is connected by a hub sleeve 19 to the fixed piston section 11 for limited play movement but fluid sealed by the packing flange 20 against leakage, which play or relative movement between the sections is utilized for operating the window lock, as will now be described. This lock is shown herein as including a pair of shoes 21 expansible or otherwise cooperable with shoe engaging parts carried by the motor casing 9. In order to relieve the chamber walls of the expansive braking force there is provided one or more lock rods 22 which are mounted in the end walls or heads 23 and 24 of the casing. The gripping operation of the shoes 21 is accomplished by the expansive action of the toggle arms 25, which support the shoes from the hub sleeve 19. The outer ends of the toggle arms engage in seats 26 in the inner or back faces of the shoes while the inner ends bear against a shoulder 27 on the sleeve, being held thereagainst by the sleeve encircling spring 28. Fixed abutments 29 on the piston section 12 are arranged at the outer side of the lock rods 22 in opposition to the lock shoes 21, these abutments being connected by a bridge piece 30 serving to give support thereto. The rods are sealed by packing members 31 where they pierce the piston sections. As shown in Fig. 5, the abutments 29 and the shoes 21 are formed with complementary seats 32 for receiving the lock rods 22. Any attempt to manually open the window from the outside of the vehicle will impart a pull on the flexible piston rod 13 to the left, as shown in Fig. 2, thereby serving to actuate the toggle support for expanding the shoes against the lock rods with a window locking effort. All of the foregoing

motor details have been more clearly described and claimed in my application filed May 4, 1942, Serial No. 441,613.

In case of an emergency necessitating the window to be manually opened, such as when the motor is dead and the supply of fluid pressure is nil, means are provided to render the lock ineffective on the window as well as inoperative on the lock rods. This is accomplished herein by providing the otherwise preferably round lock rods 22 with one or more flat chordal faces 33 to provide lock releasing clearance with the seats 32 when the rods are rotated to present the faces in opposition to the seats, such as is shown in Fig. 6, wherein it will be observed that the seats 32 which are semi-cylindrical are of a slightly greater diameter than that of the circular lock rod with the result that the seats 32 effectively engage the rods only in the bottom portions of the seats, as indicated at 32' in Fig. 5. When the rods are substantially rotated 90°, the side edge portions 32'' of the seats will be spaced from the rods and consequently release the shoes as well as the window to permit the latter being manually moved without interference.

For rotating the rods to their window releasing position, they are equipped with crank arms 34 joined by a tie bar 35. A releasing or disconnect control rod 36 is pivotally connected to the tie bar so that upon moving the control rod up or down the lock rods will be turned accordingly. The terminal portion of the control rod is provided with a horizontal part 37 which is designed upon disconnect operation to engage and lower the actuator bar 5 and thereby partially open the window, as shown at 38 in Fig. 1, a distance sufficient to permit the fingers being engaged over the upper edge of the glass and pulled downwardly to a more fully opened position. The operative connection between the actuator bar and the part 37 is accomplished by extending the lug 18 on the adjacent flight 16 into the path of said part, the arrangement being such that the lock rods are rotated to an inoperative position to present the clearance faces 33 for releasing the lock shoes prior to the part 37 engaging the actuator bar for lowering the window to the dotted position 38.

From the foregoing it will be observed that the window may be readily opened in case of an emergency simply by depressing the control rod 36 by its knob 39, first, to render the lock inoperative and, second, to crack the window open a sufficient distance to enable the motorist grasping the top edge of the window, whereby he may pull the window further open during which opening movement the piston 11, 12 will idly follow. The fluid pressure for operating the motor may be superatmospheric or subatmospheric. Where subatmospheric pressure is used the intake manifold of the vehicle engine may provide the source. The opposite ends or heads of the motor chamber are provided with nipples 40 which are in turn connected by conduits 41 leading through control valves 42 and 43 to the pressure supply line 44. The pressure may be supplied normally to both sides of the piston and when it is desired to operate the motor one of the valves is depressed to close off the suction to such side of the piston and vent the same to the atmosphere for providing the pressure differential.

The terms closure and window are used interchangeably herein and as being synonymous and while the foregoing description has been given in detail it is obvious that the inventive prin-

ciples herein involved may be incorporated in other physical embodiments without departing from the spirit of the invention or its scope, as defined in the appended claims.

What is claimed is:

1. A window system comprising a window, a fluid motor operatively connected to the window in a permanent manner and including a chamber and a piston member disposed therein for relative back and forth movement, window locking means operable by and from the window to secure the piston member against movement relative to the motor chamber, means for rendering the locking means inoperative while permitting the movable element of the motor to idly follow along with the manual opening of the window, and means operable by the last means subsequent to the unlocking operation thereof for moving the window to an accessible position.
2. A closure operator comprising a closure actuating member, a fluid motor operatively connected thereto and including a chamber and a piston therein, the piston having relatively movable and individually fluid operable sections, a lock rod fixed in the chamber against lengthwise movement, a shoe engageable with the rod, said rod having a locking face engageable by the shoe and also a clearance face rotatable to a position opposing the shoe in clearance therewith, said shoe carried by one piston section for movement therewith, means operatively connecting the shoe to the closure actuating member to be moved thereby to its rod engaging position, and means for rotating the rod to present the clearance face to the shoe and thereby render the latter inoperative.
3. A closure operator comprising a closure actuating member, a fluid motor having a chamber and a piston therein, a control for the motor, the piston being operatively connected to said member for being moved thereby and having a relatively movable section adapted to be fluid operated, a lock member movably carried by the piston and operable upon relative movement between the movable section and the remaining portion of the piston as imparted by said member to co-operate with a part of the chamber in locking the piston against movement, and means independent of the motor control for rendering the lock ineffective by such member imparted movement whereby the piston may be manually moved along with the closure actuating member.
4. A closure operator comprising a closure actuating member, a fluid motor having a piston operating in a chamber and operatively connected to the actuating member, expansible and contractible closure locking means carried by the piston to move therewith, a rod-like lock member carried by the chamber and cooperably engageable by the locking means to lock the piston and through the latter the closure actuating member against movement, and manually controlled means operable to displace the lock member from the path of said expansible and contractible locking means.
5. A fluid motor having a piston operating in a chamber, expansible and contractible closure locking means fixedly related to the piston to move therewith, a rod-like lock member carried by the chamber and adapted to be gripped by the locking means to lock the piston against movement, said lock member being movably mounted for disposing it in a non-cooperable position and

thereby rendering the locking means inoperative, and means for so disposing the lock member.

6. A closure operator comprising a closure actuating member, a fluid motor having a piston operating in a chamber and operatively connected to the actuating member, closure locking means fixedly related to the piston to move therewith, a lock member carried by the chamber and cooperably engageable by the locking means to lock the piston and through the latter the closure actuating member against movement, means for rendering the piston locking means inoperative, and means operable by said second means for moving the closure actuating member to a closure opened position.

7. A closure operator comprising a closure actuating member, a fluid motor having a piston operating in a chamber and operatively connected to the actuating member, closure locking means related to the piston to move therewith, a lock member carried by the chamber and cooperably engageable by the locking means to lock the piston and through the latter the closure actuating member against movement, said lock member having an active face portion cooperable with the locking means to lock the closure actuating member arrested and a non-cooperable face portion, the lock member being rotatably adjustable to present either face portion to the locking means, and means for so adjusting the lock member.

8. A closure operator comprising a closure actuating member, a fluid motor having a piston operating in a chamber and operatively connected to the actuating member, closure locking means related to the piston to move therewith, a lock member carried by the chamber and cooperably engageable by the locking means to lock the piston and through the latter the closure actuating member against movement, said lock member having an active face portion cooperable with the locking means to lock the closure actuating member arrested and a non-cooperable face portion, the lock member being rotatably adjustable to present either face portion to the locking means, and means for so adjusting the lock member to render the locking means inoperative and move the closure actuating member to a closure opened position.

9. A closure operator comprising a closure actuating member, a fluid motor having a piston operating in a chamber and operatively connected to the actuating member, a lock rod arranged within the chamber and adjustably supported thereby, said rod having an active face and a clearance face, a locking shoe adapted to engage the active face but falling short from operative engagement with the clearance face, and means for adjusting the rod to present either face to the shoe.

10. A closure operator comprising a closure actuating member, a fluid motor having a piston operating in a chamber and operatively connected to the actuating member, lock means carried by the piston, a pair of lock rods journaled in the chamber and having active face portions engageable by the lock means to arrest the piston and consequently the closure actuating member against movement upon any attempt to manually move the closure actuating member to a closure opened position, said rods having lock releasing face portions presentable to the lock means to render the latter inoperative, and means to rotate the lock rods to displace their active face portions relative to the piston carried lock means and to

present the releasing face portions to the latter whereby said closure actuating member and piston may be moved manually as a unit.

11. A closure operator comprising a closure actuating member, a fluid motor having a piston operating in a chamber and operatively connected to the actuating member, a pair of lock rods carried by the chamber against movement with the piston and extending through the latter in a fluid tight manner, lock means carried by the piston and operable to grip active face portions on the rods upon manual movement of the closure actuating member to arrest further movement of the latter, said rods being rotatable to displace such active face portions from the grip of said lock means to render the latter inoperative and thereby permit manual movement of the closure actuating member and piston as a unit, and means for rotating the rods to so displace the active face portions.

12. A closure operator comprising a closure actuating member, a fluid motor having a piston operating in a chamber and operatively connected to the actuating member, a pair of lock rods carried by the chamber against movement with the piston and extending through the latter in a fluid tight manner, lock means carried by the piston and operable to grip active face portions on the rods upon manual movement of the closure actuating member to arrest further movement of the latter, said rods being rotatable to displace such active face portions from the grip of said lock means to render the latter inoperative and thereby permit manual movement of the closure actuating member and piston as a unit, means for rotating the rods to so displace the active face portions, and means operable by said rod rotating means to move the closure actuating member from a fully closed position.

13. A closure operator comprising a closure actuating member, a fluid motor having a piston operating in a chamber and operatively connected to the actuating member, a pair of lock rods carried by the chamber against movement with the piston and extending through the latter in a fluid tight manner, each rod being round in cross section except for a flat chordal face, shoes carried by the piston and operable from said closure actuating member by manual movement of the latter to grip the rods on their round surfaces, said rods being rotatable to present the chordal faces to the shoes with sufficient clearance therebetween to render the shoes inoperative upon such manual movement of the closure actuating member, and means operable to rotate the rods to so present the chordal faces.

14. A closure operator comprising a closure actuating member, a fluid motor having a piston operating in a chamber and operatively connected to the actuating member, a pair of lock rods carried by the chamber against movement with the piston and extending through the latter in a fluid tight manner, each rod being round in cross section except for a flat chordal face, shoes carried by the piston and operable from said closure actuating member by manual movement of the latter to grip the rods on their round surfaces, said rods being rotatable to present the chordal faces to the shoes with sufficient clearance therebetween to render the shoes inoperative upon such manual movement of the closure actuating member, the shoes having arcuate seats struck from a radius greater than that of the rods whereby the seats will grip the rods in line contact length-

wise thereof, and means for so rotating the rods as to present the chordal faces.

15. A closure operator comprising a closure actuating member, a fluid motor having a piston operating in a chamber and operatively connected to the actuating member, a pair of lock rods carried by the chamber against movement with the piston and extending through the latter in a fluid tight manner, each rod being round in cross section except for a flat chordal face, shoes carried by the piston and operable from said closure actuating member by manual movement of the latter to grip the rods on their round surfaces, said rods being rotatable to present the chordal faces to the shoes with sufficient clearance therebetween to render the shoes inoperative upon such manual movement of the closure actuating member, crank arms on the rods, a link joining the crank arms, and a push-pull rod connected to the arms for rotating the rods to so present the chordal faces.

16. A closure operator comprising a closure actuating member, a fluid motor having a piston operating in a chamber and operatively connected to the actuating member, a pair of lock rods carried by the chamber against movement with the piston and extending through the latter in a fluid tight manner, each rod being round in cross section except for a flat chordal face, shoes carried by the piston and operable from said closure actuating member by manual movement of the latter to grip the rods on their round surfaces, said rods being rotatable to present the chordal faces to the shoes with sufficient clearance therebetween to render the shoes inoperative upon such manual movement of the closure actuating member, crank arms on the rods, a link joining the crank arms, and a push-pull rod connected to the arms for rotating the rods to so present the chordal faces, said rod having a shoulder interlocking with the closure actuating member for play movement sufficient in extent to render the lock inoperative, the shoulder thereafter acting to depress the closure actuating member from a fully closed position.

17. A window system comprising a window, a fluid motor operatively connected to the window and including a chamber and a piston, the piston being connected to the window for back and forth

movement as a unit, window locking means comprising cooperable members, one member being displaceably mounted on a stationary part alongside the path of movement of the unit, the companion member being carried by the unit for movement thereon and normally having sliding contact with the stationary member, the unit having means acting in response to a window imparted movement thereof for moving the unit carried member into locking engagement with the stationary member and acting in response to motor imparted movement to render the locking means inoperative, and manually controlled means operable to displace the stationary member from locking contact with the unit carried member.

18. A window system comprising a window, a fluid motor having a chamber and a piston member therein, a control for the motor, the piston member being operatively connected to the window for movement as a unit therewith, a window locking means including a part movably carried by the piston member and a co-operating second part on the chamber against which the piston carried part is movable by and during a window imparted movement of the unit to secure the window against being manually opened, and a single means independent of the motor control and mechanically connected to one of said parts to move the same for initially disabling the locking means and thereafter to manually move the window.

19. A closure operator comprising a closure actuating member, a fluid motor having a chamber and a piston therein, a control for the motor, the piston being operatively connected to said member for being moved thereby and having a relatively movable section adapted to be fluid operated, a lock carried by the piston and operable upon relative movement between the movable section and the remaining portion of the piston as imparted by said member to lock the piston against movement, means independent of the motor control and manually operable for rendering the lock inoperative to permit manual movement of the piston along with the member, and means operable by said first means subsequent to the disabling of the lock for effecting such manual movement of the member.

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