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CLOSURE REGULATOR MEANS

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2 Sheets-Sheet 1

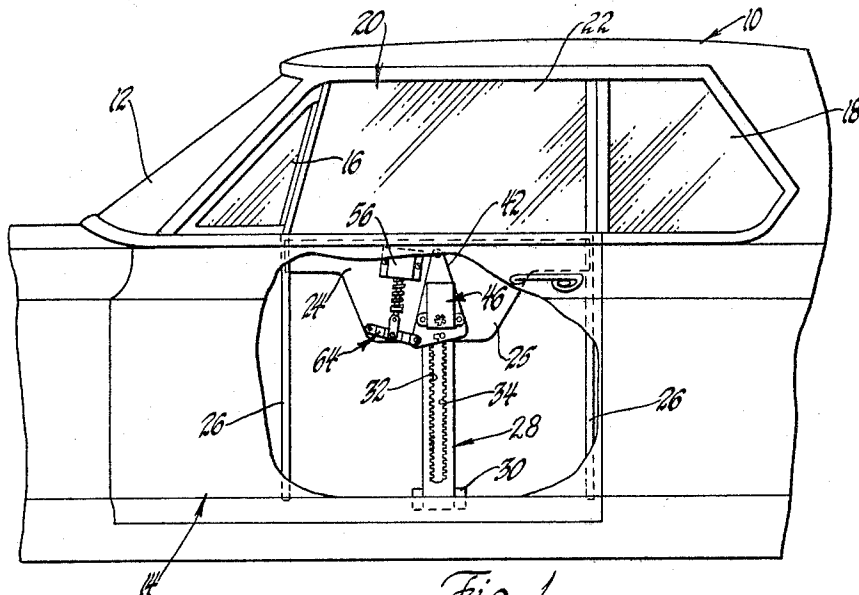


Fig. 1

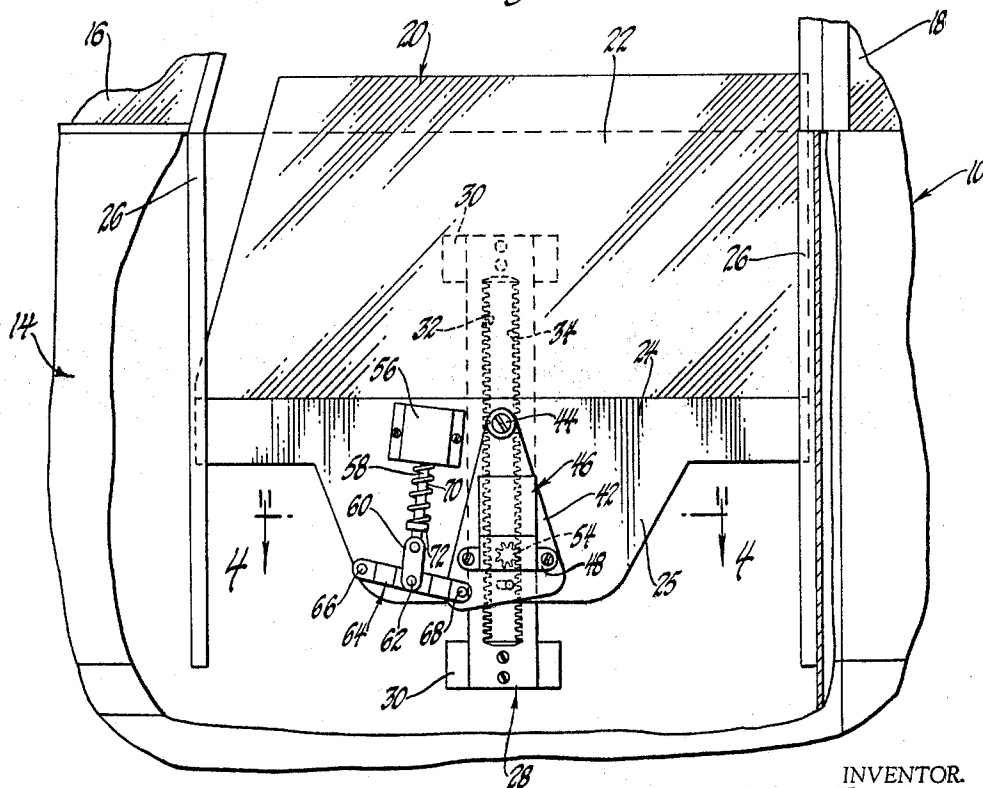


Fig. 2

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CLOSURE REGULATOR MEANS

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This invention relates to regulator means for vehicle body closures and more particularly to power-operated regulator means for vehicle body closures.

One feature of this invention is that it provides new and improved power-operated regulator means for moving vehicle body closures between open and closed positions. Another feature of this invention is that it provides new and improved power-operated regulator means, including a unidirectional electric motor, for moving vehicle body closures in both directions between open and closed positions. A further feature of this invention is that the unidirectional electric motor is shiftably mounted on the closure to have a drive pinion thereof selectively engageable with either of a pair of spaced rack segments mounted on the body, wherein operation of the motor when the pinion engages one of the rack segments moves the closure in one direction, and wherein operation of the motor when the pinion is in engagement with the other rack segment moves the closure in an opposite direction.

These and other features and advantages of the invention will be readily apparent from the following specification and drawings wherein:

FIGURE 1 is a fragmentary partially broken away elevational view of a vehicle body including power-operated regulator means according to this invention, showing the window closures in closed position;

FIGURE 2 is an enlarged partially broken away view of a portion of FIGURE 1, showing a window closure in an open position;

FIGURE 3 is a view similar to FIGURE 2 but showing the regulator means in a different position; and

FIGURE 4 is an enlarged sectional view taken generally along the plane indicated by line 4—4 of FIGURE 2.

Referring now particularly to FIGURE 1 of the drawings, a vehicle body 10 includes a windshield 12, a door 14 hingedly mounted on the body for movement between open and closed positions and mounting a ventilation window 16, and a rear quarter window closure 18. A side window closure 20 in door 14, adapted to move relative to the door inner panel between fully opened and fully closed positions, includes a glass pane 22 mounted at its lower edge in a sash plate 24 which is vertically slidably mounted in a well-known manner in a pair of spaced glass-run channels 26 secured to the door inner panel.

As seen best in FIGURES 2 and 4, a rack member 28 is mounted at either end thereof on the inner panel of door 14 by upper and lower mounting brackets 30. Member 28 has an elongated central aperture therein forming opposite sets of rack teeth providing a left rack segment or portion 32 and a right rack portion 34, both of a length substantially equal to the required travel of closure 20 between fully opened and fully closed positions. As shown in FIGURE 4, a lower central extension 25 of sash plate 24 has mounted thereon by screws 36 respective pairs of guide blocks 38 and 40 slidably embracing the outer side edges of member 28 to provide additional guiding of sash plate 24 during movement thereof between the open and closed positions of closure 20.

Referring now to FIGURE 2, a generally triangular motor carrier plate 42 is pivotally mounted adjacent the upper corner thereof on sash plate 24 by a pin 44, and a unidirectional motor assembly 46 is secured to the carrier plate by a bracket 48. As seen best in FIGURE

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4, motor assembly 46 has an output shaft 50 projecting inwardly toward the inner panel of door 14 through an aperture in carrier plate 42 and an elongated aperture 52 in sash plate 24. A cylindrical toothed pinion member 54 is secured to output shaft 50 and has the teeth thereof disposed within the elongated central aperture of member 28 so as to be engageable with the right and left rack portions 32 and 34 thereof.

Referring to FIGURE 2, a solenoid 56 having an armature plunger 58 is mounted on sash plate 24, and the plunger 58 is connected by a pivotable link 60 to the central pivot 62 of a toggle linkage 64. Linkage 64 is pivotally connected at one end 66 thereof to extension 25 and at the other end 68 thereof to a lower corner of carrier plate 42. A compression spring 70 seating between the housing of solenoid 56 and a shoulder 72 on plunger 58 biases plunger 58 outwardly to position linkage 64 in an unfolded or generally straightened position thereof as shown in FIGURE 2. In this position of the linkage, carrier plate 42, and consequently motor assembly 46, is located with respect to sash plate 24 and member 28 to have pinion 54 located in meshing engagement with the right rack portion 34. If, therefore, motor assembly 46 is energized to rotate pinion 54 clockwise over this rack portion, the unit of carrier plate 42, sash plate 24 and glass 22 are moved upwardly toward the closed position of closure 20.

If it is desired to move closure 20 downwardly to an open position thereof, solenoid 56 is energized to withdraw plunger 58 inwardly against the action of spring 70 to break linkage 64 into a folded position thereof as shown in FIGURE 3. Carrier plate 42 is thereby shifted to a leftward position wherein pinion 54 is located in meshing engagement with the left rack portion 32. Motor assembly 46 may then be energized to rotate pinion 54 clockwise over rack portion 32, thereby to move the sash plate 24 and glass 22 downwardly to the desired open position of the closure. When solenoid 56 is deenergized, spring 70 returns linkage 64, carrier plate 42, and pinion 54 to the position shown in FIGURE 2.

It will be understood that relatively simple control means may be provided for selectively energizing motor assembly 46 and for concurrently controlling solenoid 56 to locate carrier plate 42 in the desired position. For example, a multi-pole double-throw switch 74 may be employed as shown in FIGURE 4, wherein one throw of the switch energizes both the motor assembly 46 and the solenoid 56 so that the pinion 54 is driven over the left rack portion to move the closure downwardly. The other throw of the switch may energize only motor assembly 46 so that spring 70 locates pinion 54 in engagement with rack portion 34, and the pinion then moves the window closure upwardly.

Since relatively low speeds of pinion 54 are desirable, motor assembly 46 may be either of the low output speed vibratory type, or a normally armatured single field winding D.C. motor suitably connected through reduction gearing to output shaft 50. In either case, motor assembly 46 should be irreversible so that window closure 20 may be supported in any selected position thereof by the engagement between the pinion 54 and either rack portion 32 or 34.

Sufficient frictional support means may be provided in glass-run channels 26 and between guide blocks 38 and 40 and member 28 so that the window closure 20 is not permitted to immediately fall by gravity or otherwise whenever carrier plate 42 is moved between two positions of the pinion 54. Further, if it is found that it is undesirable to have motor assembly 46 running immediately during movement of the carrier plate between these two positions, time delay relay means may be pro-

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vided in the control circuit for the motor assembly so that it operates sequentially with solenoid 56.

Thus new and improved regulator means for vehicle body closure members are provided.

I claim:

1. In a vehicle body including a body member and a closure member movable relative to said body member to a plurality of positions between first and second terminal positions, the combination comprising, power-operated means, means mounting said power-operated means on one of said members for movement relative thereto between first and second positions, first means mounted on the other of said members engageable by said power-operated means in said first position thereof to move said closure member in one direction between said terminal positions thereof, second means mounted on said other member and engageable by said power-operated means in said second position thereof to move said closure member in an opposite direction between said terminal positions thereof, and means operable to selectively move said power-operated means between said first and second positions thereof at any position of said closure member between said terminal positions thereof.

2. In a vehicle body including a body member and a closure member movable relative to said body member to a plurality of positions between first and second terminal positions, the combination comprising, a motor shiftably mounted on one of said members for movement between first and second positions, first means mounted on the other of said members engageable by said motor in said first position thereof to move said closure member toward one terminal position thereof, second means mounted on said other member and engageable by said motor in said second position thereof to move said closure member toward the other terminal position thereof, and means operable to selectively move said motor between said first and second positions thereof at any position of said closure member between said terminal positions thereof.

3. In a vehicle body including a body member and a closure member movable relative to said body member to a plurality of positions between first and second terminal positions, the combination comprising, power-operated means, drive means driven by said power-operated means, means mounting said drive means on one of said members for movement relative thereto between first and second positions, first means mounted on the other of said members engageable by said drive means in said first position thereof to move said closure member toward one terminal position thereof upon operation of said power-operated means, second means mounted on said other member and engageable by said drive means in said second position thereof to move said closure member toward the other terminal position thereof upon operation of said power-operated means, and means operable to selectively move said drive means between said first and second positions thereof at any position of said closure member between said terminal positions thereof.

4. In a vehicle body including a body member and a closure member movable relative to said body member to a plurality of positions between first and second terminal positions, the combination comprising, power-operated means including a drive pinion, means mounting said power-operated means on one of said members for movement between first and second positions, first

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rack means mounted on the other of said members and engageable by said pinion in said first position of said power-operated means to move said closure member toward one terminal position thereof, second rack means mounted on said other member and engageable by said pinion in said second position of said power-operated means to move said closure member toward the other terminal position thereof, and means operable to selectively move said power-operated means between said first and second positions thereof at any position of said closure member between said terminal positions thereof.

5. In a vehicle body including a body member and a closure member movable relative to said body member to a plurality of positions between first and second terminal positions, the combination comprising, a unidirectional electric motor, a drive pinion driven by said motor, means mounting said pinion on one of said members for movement between first and second positions, first rack means mounted on the other of said members and engageable by said pinion in said first position thereof to move said closure member toward one terminal position thereof upon operation of said motor, second rack means mounted on said other member and engageable by said pinion in said second position thereof to move said closure member toward the other terminal position thereof upon operation of said motor, and means operable to selectively move said pinion between said first and second positions thereof at any position of said closure member between said terminal positions thereof.

6. In a vehicle body including a body member and a closure member movably mounted on said body member for movement to a plurality of positions between terminal fully open and fully closed positions, the combination comprising, a unidirectional electric motor including a drive pinion, means mounting said motor on said closure member for movement between first and second positions, a rack member mounted on said body member and including spaced first and second rack portions formed therein and engageable by said pinion in said first and second positions respectively of said motor, operation of said motor means in said first position thereof moving said closure member in one direction between said terminal positions thereof, operation of said motor in said second position thereof moving said closure member in an opposite direction between said terminal positions thereof, and means operable to selectively move said motor between said first and second positions thereof at any position of said closure member between said terminal positions thereof.

7. Regulator means as recited in claim 6, wherein said selective moving means includes power-operated means operable concurrently with said motor means.

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