Feb. 17, 1942. B. S. FLORADAY 2,273,632

WINDOW REGULATOR MECHANISM

Filed Feb. 8, 1940

FIG. 1.

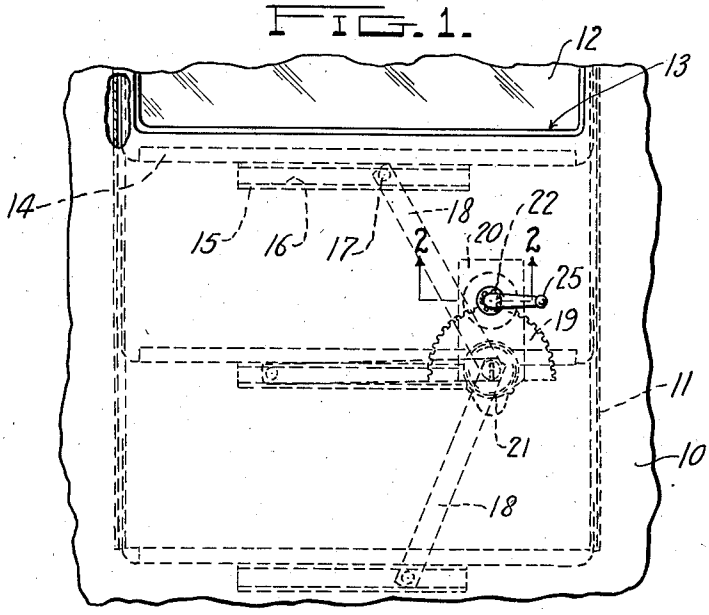


FIG. 2.

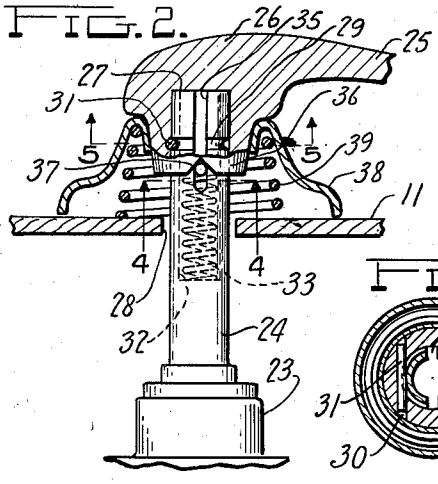


FIG. 8.

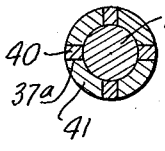


FIG. 6.

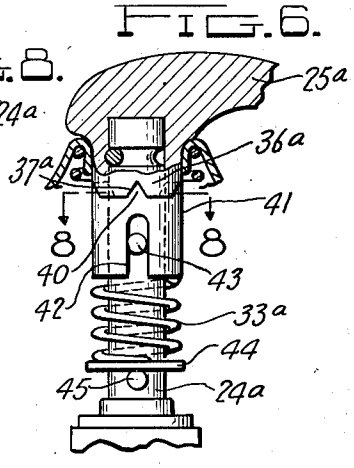


FIG. 5.

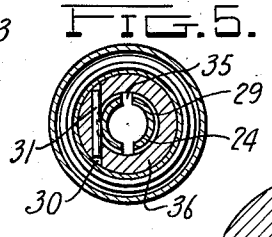
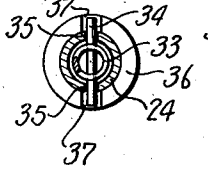


FIG. 4.



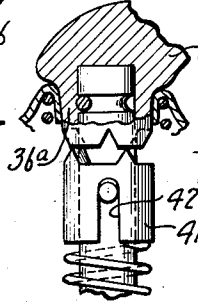
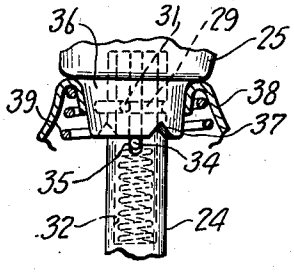


FIG. 7.

FIG. 3.



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WINDOW REGULATOR MECHANISM

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Application February 8, 1940, Serial No. 317,911

2 Claims. (Cl. 74—549)

This invention relates to window regulator mechanism for use particularly in connection with vehicle windows for moving the same to and from closed position, but more particularly to operators for window regulators enabling operation of the mechanism from the inside of the vehicle.

Not infrequently, an overload is imposed on the regulator mechanism such, for example, as where an obstacle is interposed between the window and its frame without the operator discontinuing the turning of the handle. Such an overload oftentimes damages the regulator mechanism as, for example, the gears are stripped or the regulator arms are bent or broken, and as a result, considerable trouble and expense is necessary to place the mechanism again in operating condition.

An object of this invention is to overcome the above difficulties and to afford a safety factor so that in case of an overload on the regulator mechanism, continued turning movement of the operating handle will not damage or injure the working parts.

Another object is to produce a new and improved drive for a regulator mechanism which normally operates in the usual manner but in the event that the regulator mechanism encounters a resistance in excess of a predetermined maximum, continued turning movement of the handle is permitted without performing useful work.

A still further object is to produce a new and improved drive connection between the crank handle of a regulator mechanism and the regulator mechanism which affords relative movement between the handle and mechanism in the event that the regulator mechanism encounters an obstacle setting up a resistance in excess of a predetermined maximum and which is thereafter capable of operating in the normal manner upon the removal of the obstruction or otherwise remedying the adverse condition.

A still further object is to produce an operating connection between a rotatable handle and a window regulator mechanism by which the handle is held against axial movements but which is so designed as to enable the handle to rotate independently of the mechanism upon encountering a resistance in excess of a predetermined maximum.

Other objects and advantages of the invention will hereinafter appear and the invention is shown in the accompanying drawing merely by way of illustration and not of limitation, and in which

Figure 1 is a fragmentary elevation of the inside of an automobile door showing by dotted lines the position of the window panel and regulator mechanism in different positions of adjustment;

Figure 2 is an enlarged sectional elevation substantially on the line 2—2 of Figure 1;

Figure 3 is an enlarged fragmentary elevation of a portion of the handle and operating shaft showing the relative position of the parts when a force in excess of a predetermined maximum is encountered;

Figure 4 is a transverse sectional view on the line 4—4 of Figure 2;

Figure 5 is a transverse sectional view on the line 5—5 of Figure 2;

Figure 6 is a fragmentary elevation, partly in section, of an alternate form of driving connection between the handle and operating shaft or spindle;

Figure 7 is a fragmentary sectional view showing the relative position of the parts when the drive shown in Figure 6 encounters a force in excess of a predetermined maximum; and

Figure 8 is a transverse sectional view on the line 8—8 of Figure 6.

Referring to the drawing, 10 designates the inside panel or covering of a door in rear of which, and, as represented by dotted lines, is a window well 11 into which the window glass panel 12 is lowered when moved to open position, suitable vertically disposed channel guides being arranged on opposite sides of the well to guide the up and down edges of the window glass during its movement to and from closed position. In the upper portion of the door is a window opening 13 having the usual garnish molding as will be readily understood by those skilled in this art.

Fixed to the lower horizontal edge portion of the window panel 12 is a channel 14 of any well-known type to the underside of which is fixed a retainer 15 having a horizontal guide 16 to receive the stud 17 carried by an arm 18 of a window regulator mechanism. In this instance, the arm 18 is fast to a gear sector 19 which is pivotally mounted on a back plate 20. The back plate 20 is suitably secured to the body structure. A spiral counterbalancing spring 21 which is generally indicated assists in the raising of the window as will be readily understood by those skilled in this art. Meshing with the teeth of the sector 19 is a pinion 22 which forms a part

of the usual clutch or brake assembly contained within the housing 23. Operatively connected to the clutch assembly for actuating the pinion 22 is a shaft or spindle 24. The construction and operation of the clutch assembly is well-known to those skilled in this art and detailed description or illustration is not considered necessary. Suffice it to say that it operates to lock or retain the window in its adjusted position when the operating handle is released.

Fitted to the outer end of the shaft 24, as will hereinafter appear, is a crank handle 25. The above described arrangement is such that turning of the handle 25 in one direction imparts upward swinging movement to the arm 18, thereby raising the window glass 12 to its closed position and swinging movement of the regulator arm 18 downwardly by turning movement of the handle 25 in the opposite direction imparts opening or downward movement to the window glass 12.

The handle 25 is formed with an enlarged end portion 26 which is formed with a cavity 27 of substantial depth and into this cavity fits the outer end portion of the shaft 24 which, as indicated on Figure 2, projects through an opening 28 in the panel 11. Spaced inwardly from the outer end of the shaft 24 is an annular groove 29 and extending transversely through the end portion 26 of the handle is a bore 30 which is adapted to receive a pin 31. The pin 31 is driven into the bore 30 and is so arranged that a portion of it is disposed in the annular groove 29 thereby holding the handle 25 from axial movements with respect to the shaft 24 but enabling the handle to turn on the shaft 24 independently thereof.

Formed in the shaft 24 is a socket 32 which is open at the outer end of the shaft. Disposed within the socket 32 is a helical spring 33. The spring bears against a pin 34. The opposite ends of the pin 34 are disposed in longitudinally elongate slots 35 arranged in diametrically opposed relation in the end portion of the shaft 24. The opposite ends of the pin 34 extend outwardly beyond the shaft 24 and terminate approximately flush with the edge portions of the hub 36 of the crank handle 25. Formed on the lower edge portion of the hub 36 are diametrically opposed V-shaped grooves 37 into which the projecting ends of the pin 34 are urged by the coil spring 33, the latter being under a predetermined compression so that the ends of the pin 34 are snugly forced into the inner end of the V-shaped notches 37. An escutcheon 38 of the usual type is yieldingly held in position by a coil spring 39.

From the above description it will be understood that by turning the handle 25 in one direction or the other, the window glass 12 is raised or lowered, the driving connection being established by the pin 34 cooperating with the notch portions 37. It will be understood that the force imparted by the coil spring 33 is such as to retain the pin 34 in engagement with the hub of the handle 25 and the character and strength of the spring 33 will be chosen in accordance with the demands of service and structure of the regulator mechanism with which the assembly is employed. In the event that the window encounters an obstruction such, for example, as an obstacle interposed in the path of movement of the window or the window being held at the same time the crank handle is turned so that a resistance is imparted to the regulator mechanism in excess of a predetermined maximum, the handle 25 is enabled to turn independently of the shaft 24. In such event the pin 34 will be forced or cammed downwardly by the side edge portions of the notches 37 so that the end portion of the hub 36 will ride along the ends of the pin 34. In this manner, it will be manifest that the handle 25 retains its normal position axially with respect to the shaft 24 and no damage or injury to the parts of the regulator mechanism is incurred. As soon as the obstacle or resistance to the normal movement of the window or to the operation of the regulator mechanism is removed, the pin will then be enabled to cooperate with the side edge portions of the V-shaped notches 37 so that useful work will again be resumed upon turning of the handle 25.

The form of the invention illustrated on Figures 6 to 8 is similar in operation to that above described. In this instance, four equi-distantly V-shaped notches 37*a* are formed on the free end of the hub 36*a* of the crank handle 25*a*. Cooperating with the V-shaped notches 37*a* are four teeth 40 which are shaped to fit into the notches 37*a* and are carried by the upper end of a sleeve 41 which is mounted for longitudinal sliding movements on the operating shaft 24*a*. The sleeve 41 is formed with diametrically opposed longitudinally elongate slots 42 which receive studs 43 integral with and projecting outwardly from the shaft 24*a*. The sleeve 41 is urged toward the hub 36*a* by a coil spring 33*a*, the upper end of which bears against the lower end of the sleeve 41 and the lower end of which bears against a washer 44 which seats against lugs 45 on the shaft 24*a*. It will be understood that the remaining mechanism is similar to that above described.

It will be readily understood that in the normal operation of the handle 25*a*, driving force is imparted to the shaft 24*a* through the sides of the notches 37*a* cooperating with the teeth 40, then through the sleeve 41 and lugs 43. In the event that a force or resistance in excess of a predetermined maximum is encountered, the sleeve 41 is cammed inwardly against the force of the spring 33*a*, thus enabling the handle to turn independently of the shaft 24*a*. Such independent or relative movement of the crank handle 25*a* continues until the obstacle or resistance has been removed so that the normal driving connection between the parts can be again established.

From the above description, it is manifest that any overload imposed upon the regulator mechanism will not impart any injury to the mechanism from a continued turning of the operating handle. It will further be apparent that the handle is at all times maintained in its normal position inasmuch as axial movement of the handle relative to the other working parts is prevented. In this manner, a safety factor is afforded in an extremely simple and inexpensive manner.

It is to be understood that numerous changes in details of construction, arrangement and operation may be effected without departing from the spirit of the invention especially as defined in the appended claims. Although I have described a particular form of regulator mechanism, it is to be understood that such description is merely given by way of illustration because the invention is not confined thereto. It will be understood that the drive connection can be employed with other forms of regulator

mechanisms without departing from the spirit of the invention as set out in the accompanying claims.

What I claim is:

1. A crank operated overload drive for a window regulator mechanism, including a rotatable shaft having an annular groove adjacent the outer end thereof, a handle having an integral hub formed with a socket into which said end of the shaft and the groove projects, a pin rigidly secured to the shaft inwardly of the free end of the hub and disposed tangentially thereof and received in the groove to hold the handle against movement longitudinally of the handle while permitting rotation of the handle relative to the shaft, said hub having its free end formed with one or more substantially V-shaped notches disposed at the outer end of the socket, an elongated sleeve slidable on the shaft and having its outer end, formed with a number of substantially V-shaped teeth corresponding to the number of notches and projecting within the latter, said sleeve being formed with opposed longitudinal slots which extend through the inner end thereof, projections rigid on the shaft and received in said slots, a coil spring encircling the shaft and having its outer end abutting the outer end of the sleeve, and means carried by the shaft and engaging the inner end of the spring to retain the latter on the shaft.

2. A crank operated overload drive in accordance with claim 1, wherein there is an escutcheon having an outer end portion of substantially U-shape in cross section which engages the free end of the hub, and a coil spring within the escutcheon to hold the outer end portion of the latter in firm engagement with the hub and handle.

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