Oct. 17, 1961 B. R. WANLASS 3,004,448

WINDOW REGULATOR OPERATING APPARATUS

Filed Aug. 18, 1958 3 Sheets-Sheet 1

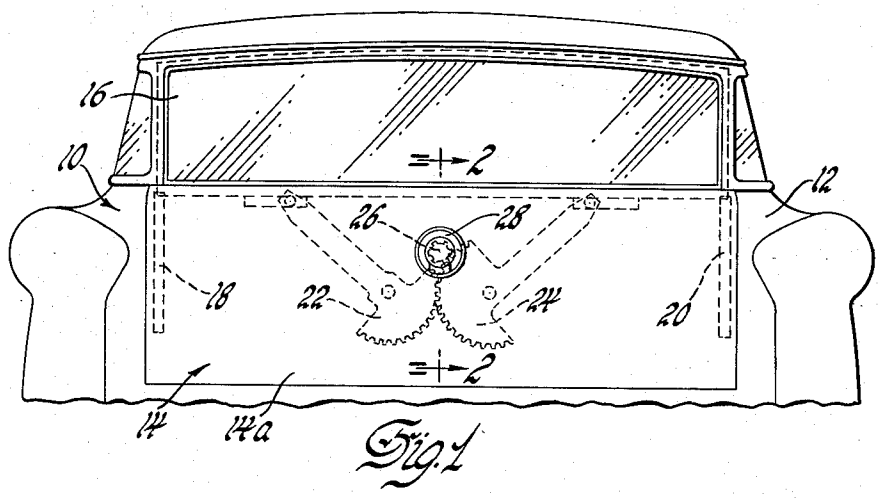


Fig. 1

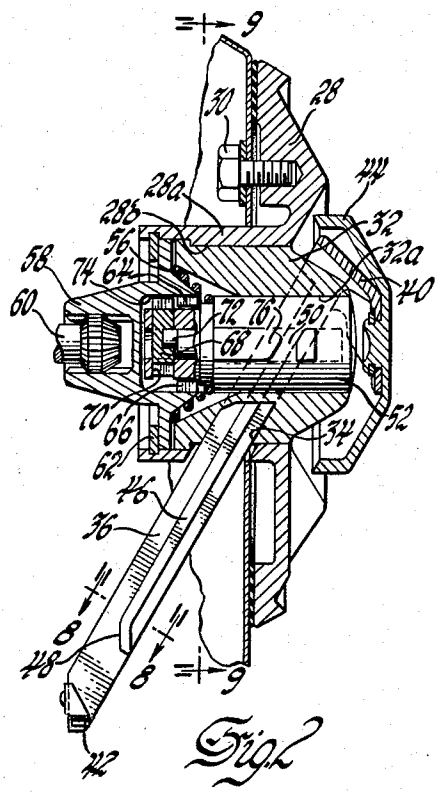


Fig. 2

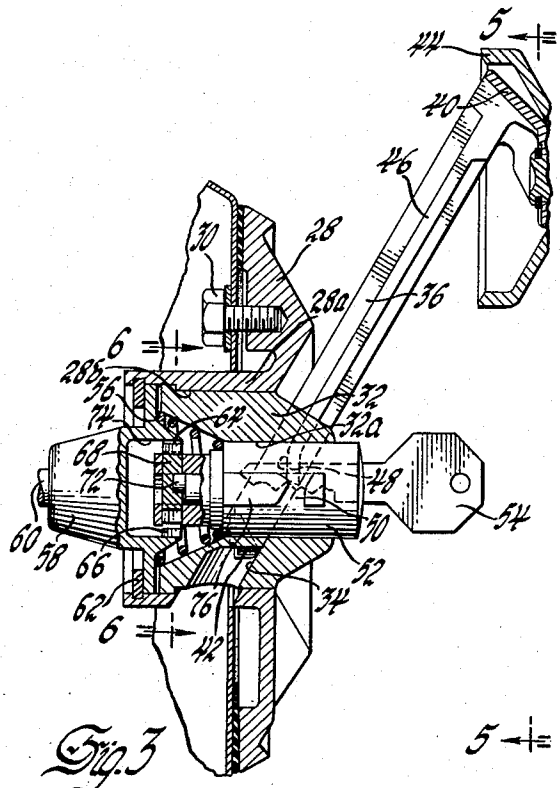


Fig. 3

INVENTOR
Bert Ray Wanlass
BY William E. Finnegan
ATTORNEY

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WINDOW REGULATOR OPERATING APPARATUS

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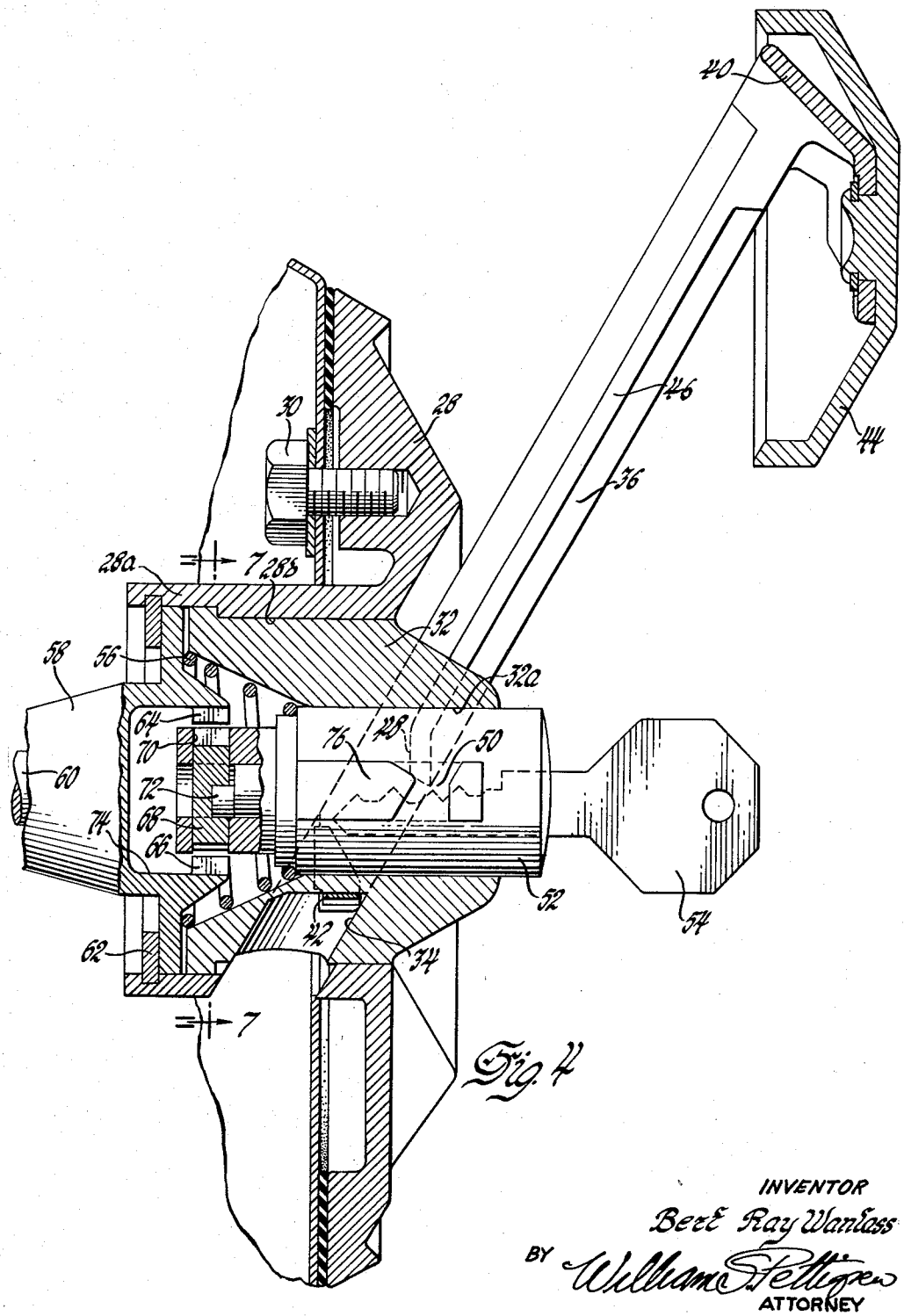


Fig. 4

INVENTOR
Bert Ray Wanlass
BY William Stellingwerf
ATTORNEY

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WINDOW REGULATOR OPERATING APPARATUS

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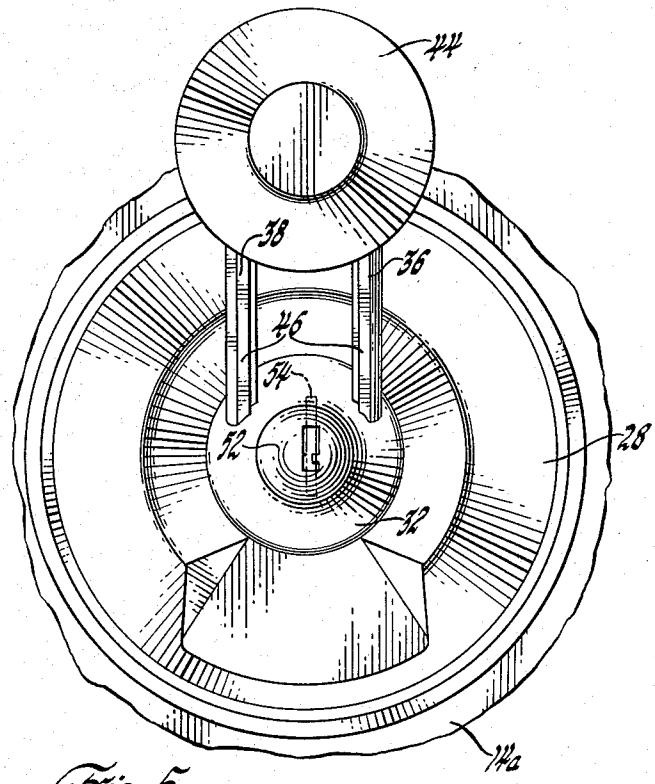


Fig. 5

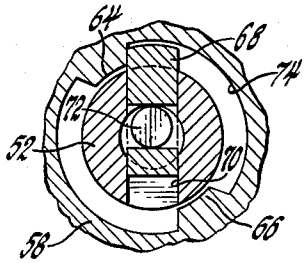


Fig. 6

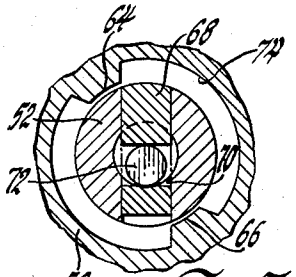


Fig. 7

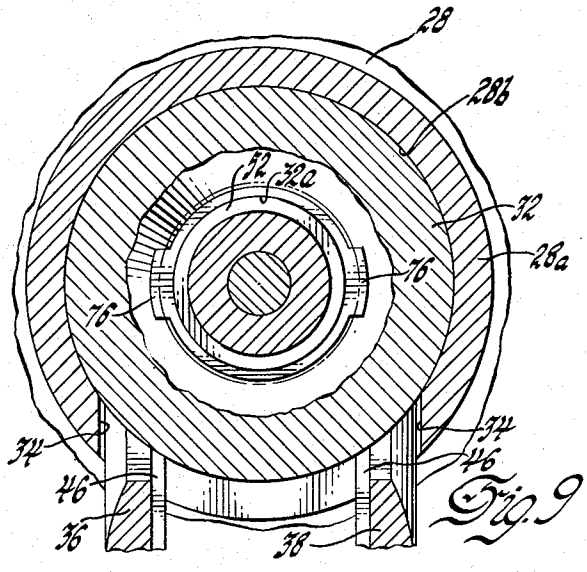


Fig. 9

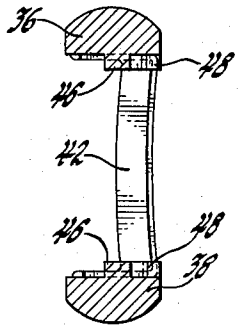


Fig. 8

INVENTOR
Beet Ray Wanlass
BY William J. Pettigrew
ATTORNEY

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3,004,448
WINDOW REGULATOR OPERATING APPARATUS

Bert Ray Wanlass, Warren, Mich., assignor to General Motors Corporation, Detroit, Mich., a corporation of Delaware

Filed Aug. 18, 1958, Ser. No. 755,583
14 Claims. (Cl. 74—548)

This invention relates to operating apparatus for a closure and more particularly to operating apparatus especially adapted for use with a window regulator in a vehicle.

In the copending application of Julius Hezler, Jr., entitled "Window Regulator Operating Apparatus" filed September 18, 1958 as Serial No. 761,843 and assigned to the assignee of this application, a novel window regulator operator is disclosed including a slidable crank arm which may be moved between retracted and extended positions and which, when in extended position, may be rotated to raise or lower a window. This invention provides an improvement in the general type of apparatus shown in the above-mentioned copending application. Particularly, this invention provides a novel coupling means whereby the rotatable hub which carries the retractable crank arm handle is coupled to or uncoupled from the window regulator drive spindle as a function of movement of the crank arm. In the improved apparatus, when the crank arm is in its retracted position, the rotatable hub is uncoupled from the window regulator drive spindle since a coupling member on the hub is held in uncoupled or inoperative position by cam means on the crank arm engaged by a follower on the coupling member. When the crank arm is moved to its extended position, the follower enters a triggering notch on the crank arm and the coupling member moves under the force of a spring to coupled position. Novel locking means are also provided for disabling the coupling means so that when in locked position the crank arm and hub merely free wheel, the hub being uncoupled from the window regulator drive spindle. Furthermore, when the crank arm is retracted, the locking key cylinder is housed in a recess in a gripping knob carried by the crank arm to shield the key cylinder against water, dirt and the like.

Other features and advantages of the invention will be apparent from the following specification and drawings in which:

FIG. 1 is a fragmentary rear elevational view of a station wagon having a tail gate with a movable window, the regulator operating apparatus for which incorporates the invention;

FIG. 2 is an enlarged vertical longitudinal section through the regulator operating apparatus taken along the line 2—2 of FIG. 1;

FIG. 3 is a view similar to FIG. 2 but showing the crank arm in its extended position;

FIG. 4 is a further enlarged view of the apparatus of FIG. 3 but showing the parts in locked position wherein the coupling means have been disabled;

FIG. 5 is a vertical section taken along the line 5—5 of FIG. 3;

FIG. 6 is a detail section taken along the line 6—6 of FIG. 3;

FIG. 7 is a sectional view similar to FIG. 6 but showing the parts in locked position and being taken along the line 7—7 of FIG. 4;

FIG. 8 is a section of the crank arm taken along the line 8—8 of FIG. 2; and

FIG. 9 is an enlarged detail section taken along the line 9—9 of FIG. 2.

Referring now more particularly to the drawings, a

station wagon 10 is shown in FIG. 1, including a body 12 having a tail gate 14 hingedly mounted on its rear side. The tail gate carries a drop window 16. For a more detailed disclosure of a station wagon tail gate having a vertically movable window, reference is had to Patent No. 2,793,907 which issued on May 28, 1957, to W. Hess et al. and which is entitled "Vertically Swingable Station Wagon Tail-Gate With Retractable Window." It is sufficient here to say that the tail gate 14 is hinged on the body 12 at its lower edge in conventional manner and that the window is movable from the closed position illustrated in FIG. 1 to an open position wherein it is housed substantially entirely within the tail gate. In moving between closed and open positions, the window moves along guides 18 and 20 which are mounted within the tail gate and the window is driven by a manually operable window regulator comprising interconnected gear sectors 22 and 24, each of which is pivotally mounted in the tail gate and each of which is connected to the window. The gear sectors are driven by a pinion 26 which is mounted in conventional manner on a window regulator drive spindle.

While the invention is shown in connection with a tail gate window, it will be understood that the invention is suitable for use as a control device on vehicle closures generally and with other types of window regulators, including windows mounted in other closure members and windows mounted on fixed parts of a vehicle body.

A housing 28 is mounted on the outer surface of the outer panel 14*a* of the tail gate by a plurality of bolts, one of which is shown at 30. The housing has a generally tubular hollow open ended bearing sleeve 28*a* which projects into the interior of the tail gate 14 through an opening in the outer panel 14*a*, and which is formed with an opening 28*b* in its lower wall for the reception of a slidably mounted crank arm later to be described. A hub 32 is rotatably mounted within the housing bearing sleeve 28*a* and is formed at each opposite side with similar bearing portions comprising trackways 34 on which is slidably mounted an operating handle comprising a crank arm formed of spaced parallel opposite side members 36 and 38 joined at their outer end by an integrally formed brace 40 and joined at the inner end by a brace 42 which is welded to the side members 36 and 38. A gripping knob 44 is rotatably mounted on the crank arm at the outer end thereof, being mounted on the outer brace 40. Each side member 36, 38 of the crank arm is formed on its inner surface with an elongated cam surface 46 which terminates adjacent the inner end of the arm in a sloping ramp 48 which leads into a triggering notch 50.

A conventional key cylinder is mounted in a bore 32*a* in the hub 32 for axial movement between inoperative and operative positions and for rotary movement between locked and unlocked positions, the key cylinder being straddled by the arms 36, 38 of the crank arm as shown best in FIGS. 5 and 9. The tumblers and other internal mechanisms of the key cylinder are conventional and are well known in the art and are not described here. The cylinder may be turned between locked and unlocked positions upon the insertion of a proper key 54. The key cylinder, in addition to being rotatable in the hub, is also axially movable between an inoperative position shown in FIG. 2 and an operative position shown in FIG. 3. A truncated conical compression spring 56 constantly urges the key cylinder 52 towards its operative position, the spring 56 seating between the key cylinder and a shoulder on a window regulator drive spindle 58 which, at its inner end, is splined to a drive shaft 60. The inner end of the drive shaft mounts the drive pinion 26 which is shown in FIG. 1. The spindle 58 is rotatable in the bearing sleeve 28*a* of the housing 28 and is held

against axial movement in the housing by a stop ring 62 which seats in an annular groove in the inner wall of the bearing sleeve 28*a*.

A first coupler carried by the window regulator drive spindle 58 comprises a pair of inwardly radially extending teeth 64, 66 oppositely disposed in a well in the outer end of the drive spindle. The inner end of the key cylinder projects into this well and the key cylinder carries a second coupler comprising a pawl 68 which is radially movable in a transversely extending opening 70 adjacent the inner end of the key cylinder. This pawl is formed with an opening on its outer side which loosely receives a locking pin 72 projecting eccentrically from the inner end of the key cylinder into a counter-bore 74 in the spindle 58. By means of the eccentric locking pin, the pawl 68 may be moved from an extended operative position shown in FIGS. 2, 3, and 6 to a locked or retracted position shown in FIGS. 4 and 7. When in its operative position, the pawl may be coupled to an uncoupled from the one of the first coupler teeth 64, 66 on the window regulator drive spindle, the coupling depending on the axial position of the key cylinder. However, when the pawl is in its locked or retracted position shown in FIGS. 4 and 7, it is not adapted for coupling with the first coupler teeth 64, 66 and the crank arm and hub merely free wheel without picking up the drive spindle when the crank arm is rotated. In this position the window is locked.

Followers 76 project from each side of the key cylinder and normally ride on the cam surfaces 46 of the side arms 36, 38 of the crank arm. When the followers engage these cam surfaces as shown in FIG. 2, the key cylinder is pushed in to its inoperative position against the force of the compression spring 56 and the key cylinder is shielded by the gripping knob 44. With the parts in this position, the pawl 68, even when it is in its extended unlocked position, lies in a position inwardly of the first coupler teeth 64, 66 so that the hub 32 is uncoupled from the spindle 58 and upon rotation of the hub the parts merely free wheel. Rotation to any appreciable extent is, of course, prevented when the crank arm is in its retracted position shown in FIG. 2 by the opposite walls of the opening 28*b* in the stationary housing. When the crank arm is pulled out from its retracted position of FIG. 2 to its extended operative position of FIG. 3, the followers 76 ride down the ramp 48 at the end of each cam surface into the triggering notch 50, thus permitting the compression spring 56 to move the key cylinder axially outward from the position of FIG. 2 to the position of FIG. 3. This movement uncovers the key cylinder and locates the second coupler or pawl 68 in coupling position with relation to one of the first couplers 64, 66 on the spindle 58 so that upon rotation of the crank the window may be raised or lowered. When the crank is pushed again to the position of FIG. 2, the followers 76 ride up the ramp onto the cam surface to move and hold the coupling members in inoperative position with the second coupler 68 out of coupling position with respect to the first coupler members 64, 66. The window may be locked regardless of the fact that the crank arm is in its extended position by turning the key 54, causing the eccentric locking pin 72 to slide the pawl 68 into the retracted position shown in FIGS. 4 and 7. With the parts in this position, the hub is uncoupled from the spindle 58 and upon rotation of the crank arm the hub and crank arm merely free wheel.

It should be noted that when the crank arm is in its retracted position as shown in FIG. 2, the outer end of the key cylinder is covered by the gripping knob 44 which overlies the key cylinder. Since the outer end of the key cylinder lies in a recess in the inner surface of the gripping knob 44, the entrance of rain, dirt and the like is prevented.

While I have shown and described one embodiment of my invention, it is capable of many modifications.

Changes, therefore, in the construction and arrangement may be made without departing from the spirit and scope of the invention as set forth in the appended claims.

What is claimed is:

1. Window regulator operating apparatus of the character described, including: a rotatably mounted hub member, a crank arm slidably mounted on said hub member for slidable movement into and out of the hub between retracted and extended positions; a window regulator drive spindle, and coupling means engaged by said crank arm and operable thereby for coupling said hub to said drive spindle when the crank arm is in extended position and for uncoupling said hub from said drive spindle when the crank arm is in retracted position.

2. Window regulator operating apparatus of the character described, including: a rotatably mounted hub member, a crank arm slidably mounted on said hub member for slidable movement into and out of the hub between retracted and extended positions, a window regulator drive spindle, coupling means engaged by said crank arm and operable thereby for coupling said hub to said drive spindle when the crank arm is in retracted position, and locking means for disabling said coupling means.

3. Window regulator operating apparatus of the character described, including: a rotatably mounted hub member having a bearing portion, a crank arm slidably mounted in said bearing portion for movement into and out of the hub between retracted and extended positions, a window regulator drive spindle, and coupling means engaged by said crank arm and operable thereby for coupling said hub to said drive spindle when the crank arm is in extended position and for uncoupling said hub from said drive spindle when the crank arm is in retracted position.

4. Window regulator operating apparatus of the character described, including: a rotatably mounted hub member having a bearing portion, a crank arm slidably mounted in said bearing portion for movement obliquely outwardly from said hub between retracted and extended positions, a window regulator drive spindle, coupling means engaged by said crank arm and operable thereby for coupling said hub to said drive spindle when the crank arm is in extended position and for uncoupling said hub from said drive spindle when the crank arm is in retracted position, and key operated locking means for disabling said coupling means.

5. Apparatus of the character claimed in claim 4 wherein said key-operated locking means has an access opening and said crank arm is so located that it overlies and conceals said access opening when in retracted position.

6. Apparatus of the character claimed in claim 4, wherein said coupling means includes a first coupler on the drive spindle and a second coupler on the hub, said second coupler being held in inoperative position out of coupling relation with said first coupler by the crank arm when the crank arm is in retracted position.

7. Window regulator operating apparatus of the character described, including: a rotatably mounted hub member, a crank arm slidably mounted on said hub member for slidable movement into and out of the hub between retracted and extended positions, a window regulator drive spindle, and coupling means engaged by said crank arm and operable thereby for coupling said hub to said drive spindle when the crank arm is in extended position and for uncoupling said hub from said drive spindle when the crank arm is in retracted position comprising a coupling member mounted in said hub for movement between inoperative and operative positions, a first coupler on said drive spindle, a second coupler on said coupling member, and a follower on said coupling member engaging said crank arm when the crank arm is in retracted position to hold said coupling member in inoperative position with said second

coupler out of coupling position with relation to said first coupler.

8. Apparatus of the character claimed in claim 7 wherein said crank arm has a cam surface terminating in a triggering notch, said follower riding on the cam surface when the crank arm is in retracted position and said follower moving into said triggering notch when the crank arm reaches extended position.

9. Window regulator operating apparatus of the character described, including: a rotatably mounted hub member having a bearing portion, a crank arm slidably mounted in said bearing portion for movement into and out of said hub member between retracted and extended positions, said crank arm having a cam surface thereon terminating in a triggering notch, a window regulator drive spindle having a first coupler thereon, a coupling member mounted in said hub for movement between inoperative and operative positions, a second coupler on said coupling member, and a follower on said coupling member engaging the cam surface on said crank arm when the crank arm is in retracted position to hold said coupling member in inoperative position with said second coupler out of coupling position with said first coupler, movement of said follower into said triggering notch when said crank arm reaches extended position moving said coupling member to operative position wherein said second coupler is in coupling position with said first coupler to couple the hub to the spindle.

10. Window regulator operating apparatus of the character described, including: a stationary housing member, a hub member rotatably mounted in said housing, said hub having a bearing portion, a crank arm slidably mounted in said bearing portion for movement into and out of said hub member between retracted and extended positions, said crank arm having a cam surface thereon terminating in a triggering notch, a window regulator drive spindle having a first coupler thereon, a coupling member mounted in said hub for movement between operative and inoperative positions, spring means urging said coupling member toward operative position, a second coupler on said coupling member, and a follower on said coupling member engaging the cam surface on said crank arm when the crank arm is in retracted position to hold said coupling member in inoperative position against the force of said spring with said second coupler out of coupling position with said first coupler, movement of said follower into said triggering notch when said crank arm reaches its extended position permitting said spring to move the coupling member to operative position wherein said second coupler is in coupling position with said first coupler to couple the hub to the spindle.

11. Window regulator operating apparatus of the character described, including: a stationary housing member, a hub member rotatably mounted in said housing member and having a bearing portion, a crank arm slidably mounted in said bearing portion for movement into and out of said hub member between retracted and extended positions, said crank arm having a cam surface thereon terminating in a triggering notch, a gripping knob on the other end of said crank arm, a window regulator drive spindle having a first coupler thereon, a coupling member mounted in said hub for movement between inoperative and operative positions, a spring urging said coupling member toward operative position, a second coupler on said coupling member, a follower on said coupling member engaging the cam surface on said crank arm when the crank arm is in retracted position to hold said coupling member in inoperative position with said second coupler out of coupling position with said first coupler, movement of said follower into said triggering notch when said crank arm reaches extended position moving said coupling member under the force of said spring to operative position wherein said second coupler is in coupling position with said first coupler to couple the hub to the spindle, and locking means for moving one of said couplers to an out-of-the-way position with reference to the other coupler.

12. Apparatus of the character claimed in claim 11 wherein said gripping knob overlies said coupling member when the crank arm is in retracted position.

13. Operating apparatus for a closure which is mounted on a body, comprising: coupling means including a key cylinder, means for mounting said coupling means on the body with the end of the key cylinder accessible from outside thereof, an operating handle, and means for mounting said operating handle on the body for movement between a retracted position in which it is substantially flush with the outer surface of said body and overlies and conceals the end of the key cylinder, and an extended operating position in which said handle projects outwardly from the body.

14. Apparatus of the character claimed in claim 13, wherein said operating handle has a gripping knob with a recess in which a portion of said key cylinder lies when the operating handle is in retracted position.

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