Nov. 4, 1969 C. H. SCHAMEL 3,475,986

RETRACTABLE WINDOW REGULATOR HANDLE ASSEMBLY

Filed June 3, 1968 2 Sheets-Sheet 1

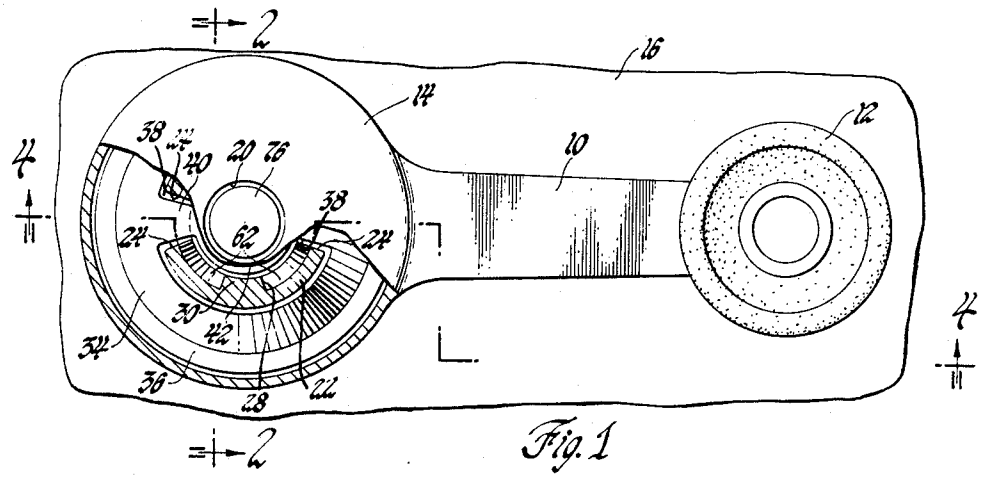


Fig. 1

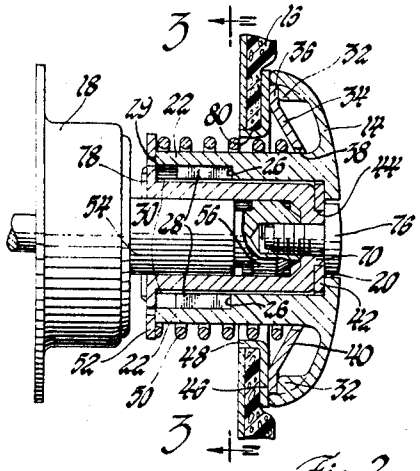


Fig. 2

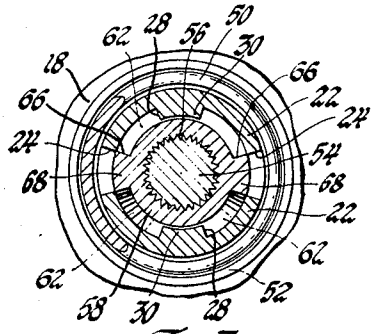


Fig. 3

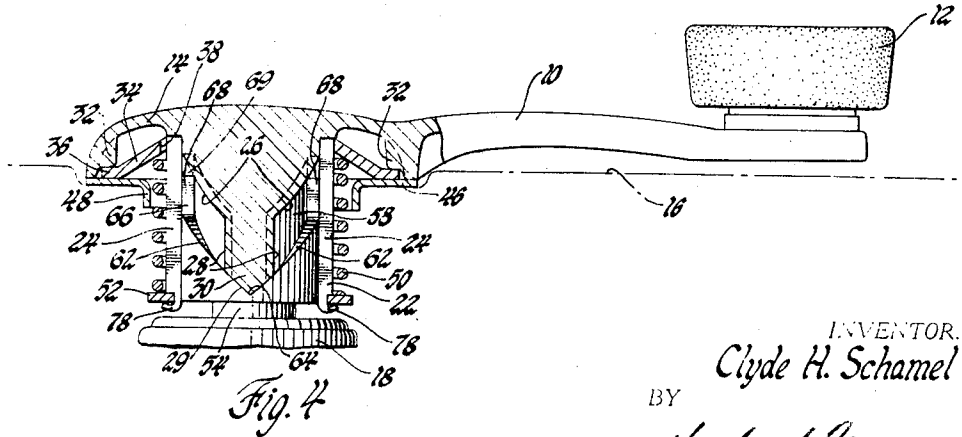


Fig. 4

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RETRACTABLE WINDOW REGULATOR HANDLE ASSEMBLY

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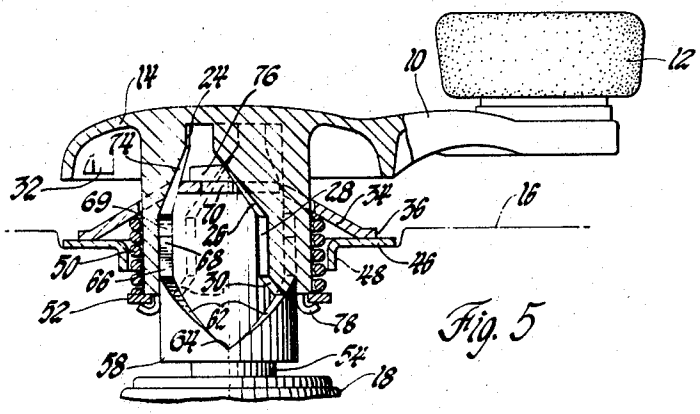


Fig. 5

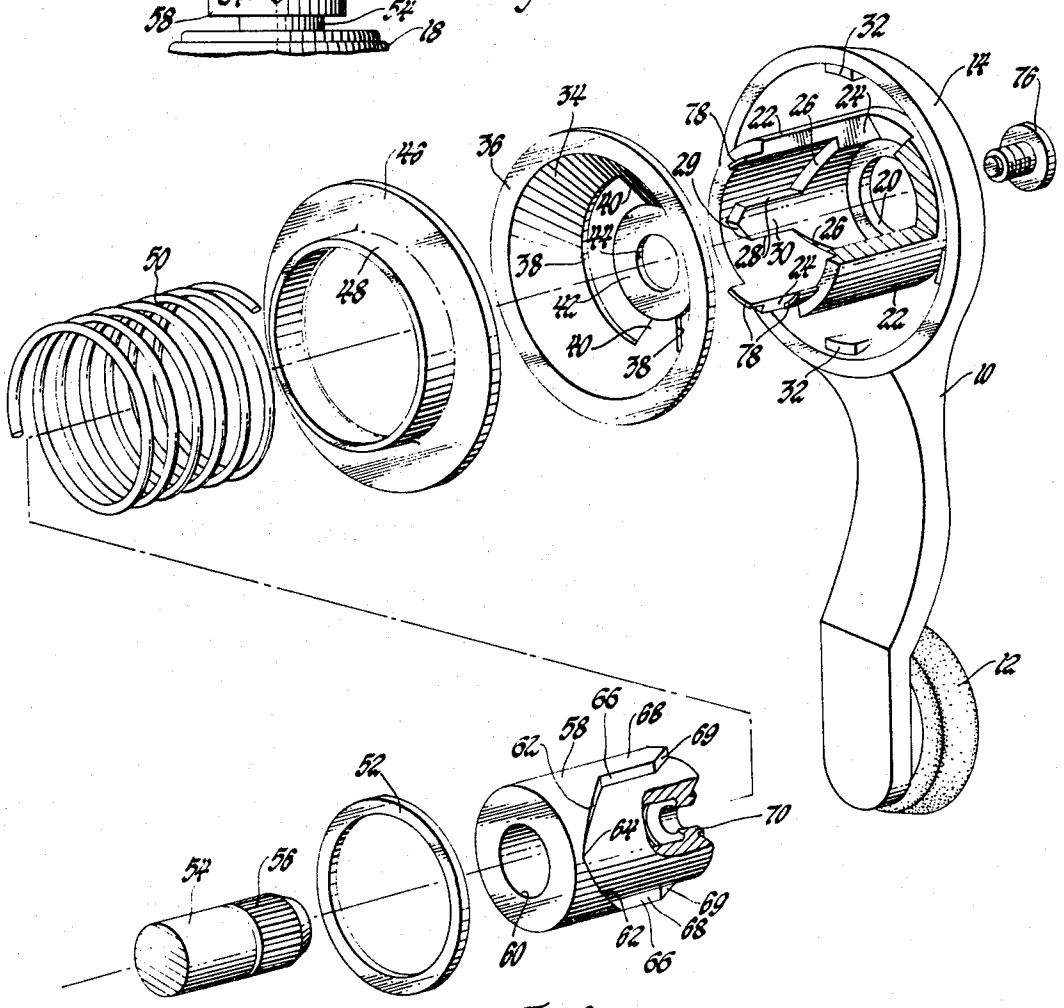


Fig. 6

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RETRACTABLE WINDOW REGULATOR HANDLE ASSEMBLY

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ABSTRACT OF THE DISCLOSURE

A vehicle body window regulator handle is connected to the window regulator clutch by a cam arrangement including coacting cam surfaces for camming the handle outwardly of the body panel from stored to extended positions upon initial rotation in either direction. Further handle rotation engages driving surfaces to drive the clutch. A spring automatically moves the handle back to stored position when the handle is released.

This invention relates generally to vehicle body window regulator handles and more particularly to a driving arrangement interconnecting a window regulator handle and a window regulator mechanism.

Current production window regulator handles are of the low profile type which lie closely adjacent the body interior trim panel. The decrease in manipulative space between the handle and the trim panel can result in difficulty in rotating the handle to operate the window regulator mechanism.

This invention provides a driving arrangement for window regulator handles of the low profile type which normally stores the handle adjacent the body panel but which moves the handle outwardly from the panel upon initial limited rotation of the handle in either direction. The driving arrangement includes cooperating cam surfaces on the handle and on the window regulator mechanism which coact to move the handle outwardly from the panel and the window regulator mechanism to an extended position against the action of a biasing spring upon limited rotation of the handle. Cooperating drive surfaces thereafter establish a driving connection between the window regulator mechanism and the handle to operate the mechanism upon further handle rotation. As soon as rotation of the handle ceases, the biasing spring returns the handle to its stored position adjacent the body panel.

One object of this invention is to provide a driving arrangement between a window regulator handle and a window regulator mechanism for moving the handle outwardly from a position adjacent a vehicle body panel upon limited rotation of the handle in either direction to thereby provide more manipulative space between the handle and the body panel.

Another object is to provide such a driving arrangement which is normally operative to bias the handle to the position adjacent the body panel and includes a cam ramp and follower arrangement on the handle and the window regulator mechanism to move the handle outwardly of the mechanism and the panel upon initial limited rotation.

A further object of this invention is to provide a driving arrangement between a window regulator handle and a window regulator mechanism which includes cooperating cam ramp surfaces on the handle and on the mechanism operative to move the handle axially outwardly of the mechanism upon limited handle rotation and which further includes mating drive surfaces cooperative upon further handle rotation to establish a driving connection between the handle and the mechanism.

These and further features and objects of this invention will become readily apparent upon reference to the following detailed description of the annexed drawings in which:

FIGURE 1 is a partially broken away plan view of a window regulator handle embodying a driving arrangement according to this invention;

FIGURE 2 is a sectional view taken generally on line 2—2 of FIGURE 1;

FIGURE 3 is a sectional view taken generally on the line 3—3 of FIGURE 2;

FIGURE 4 is a partial sectional view taken generally on line 4—4 of FIGURE 1, showing the handle in stored position;

FIGURE 5 is a view similar to FIGURE 4, showing handle extended to use position; and

FIGURE 6 is an exploded perspective view of the handle.

Referring now to FIGURE 1 of the drawings, a window regulator handle **10** mounts a conventional freely rotatable resilient manual knob **12** at one end thereof and includes a hub **14** at the other end. Handle **10** is located on one side of a vehicle body trim panel **16** and drives the clutch of a conventional window regulator mechanism **18** located on the other side of the panel **16**, as shown in FIGURE 2.

The handle **10** and mechanism **18** are interconnected by a driving arrangement according to this invention, shown in FIGURES 2 through 6. The hub **14** includes a central aperture **20** and a pair of like semi-cylindrical collars **22** separated by axially extending slots **24** spaced radially from the aperture. Each collar **22** includes a pair of like inclined or cam ramp surfaces **26** which extend axially and circumferentially from slots **24** and intersect axially extending generally parallel drive surfaces **28**. The drive surfaces **28** merge into intersecting inclined cam ramp surfaces **29** and define therewith a cam follower or finger **30**. The cam followers **30** thus formed are diametrically opposed to each other. Adjacent cam ramp surfaces **26** on each collar **22** can thus be described as diverging from junctures at slots **24**. The inclination of surfaces **26** and **29** is identical. A plurality of circumferentially spaced projections **32** are formed on the inner surface of hub **14**, just inwardly from the periphery thereof.

As best shown in FIGURE 6, a frustoconical spring retainer **34** includes a flat peripheral flange **36** and a pair of arcuate slots **38** separated by a pair of webs **40** which are joined to a flat circular base **42** having a central aperture **44**. The driving arrangement further includes an annular mounting ring **46** having a cylindrical central collar **48**, a helical compression spring **50**, and an annular retaining ring **52**.

The clutch of the window regulator mechanism includes an input shaft **54** splined at **56**. A cam member on shaft **58** includes a partially splined bore **60** for receiving shaft **54**. Diametrically opposed pairs of inclined or cam ramp surfaces **62**, identical to collar cam ramp surfaces **26**, are formed externally on cam member **58**. Both pairs of surfaces **62** diverge circumferentially and axially from an apex or juncture **64** and intersect generally parallel pairs of axially extending drive surfaces **66**. The adjacent drive surfaces of each pair merge into intersecting inclined cam ramp surfaces **69** and define therewith a cam follower or finger **68**. The cam followers **68** thus formed are diametrically opposed to each other. The inclination of surfaces **62** and **69** are identical to the inclination of surfaces **26** and **29**. The apertured axially outer end of cam member **58** includes a pilot flange **70**.

Referring now to FIGURES 2, 3, and 6, the components of the driving arrangement are assembled as follows. Retainer **34** is mounted on cam member **58** by fit-

ting pilot flange **70** within aperture **44**. The collars **22** of handle **10** are then inserted within slots **38**, as webs **40** fit within slot **24**, until the projections **32** seat on the flange **36** of the retainer. Handle **10** and cam member **58** are thus circumferentially oriented as shown in FIGURE 4, so that each pair of cam ramp surfaces **29** of a follower **30** seat on a pair of cam ramp surfaces **62** and the cam followers **68** register with slots **24**. Thus the cam followers **30** and **68** are rotatably spaced 90° from each other. The mounting ring **46** is then assembled into engagement with flange **36** of the retainer and the periphery of hub **14**.

Spring **50** is inserted between collars **22** and **48** into engagement with the retainer **34**. Retainer ring **52** is inserted over member **58**, compressing spring **50** until the ring abuts the ends of collars **22**. Tabs **78** provided on the ends of collars **22** are then bent over to secure the ring **52** to the collars.

The cam member **58** is then fitted over the input shaft **54** to seat the end of the shaft on flange **70** and mate the splined portions of the cam member and shaft. The retainer **46** seats on the trim panel **16** around an opening **80** therein which receives the driving arrangement. As is conventional, window regulator mechanism **18** has been mounted in the door before it is trimmed. A bolt **76** secures cam member **58** to shaft **54**. The head of the bolt fits within aperture **20** and also confines the base **42** of the retainer on flange **70**.

The operation of the driving arrangement will now be described with reference to FIGURES 1, 3, 4, and 5. When it is desired to operate the window regulator mechanism **18**, knob **12** is grasped and handle **10** is rotated in either direction. Operation in either direction is the same. Upon handle rotation counter-clockwise, for example, followers **30** and **68** move follower surfaces **29** and **69** along the respective cam ramp surfaces **62** and **26** until drive surfaces **28** and **66** engage, as shown in FIGURE 5. This moves handle **10** axially outwardly of regulator clutch **18** and panel **16** to a more convenient extended use position to permit the operator more manipulative space. This motion also compresses spring **50** between retainers **34** and **52**. Upon further rotation, handle **10** rotatably drives the regulator clutch **18** through fingers **30** and **68**.

Upon release of knob **12**, spring **50** forces retainers **34** and **52** apart and moves followers **30** and **68** back along cam ramp surfaces **62** and **26** to realignment with the junctures of the cam ramp surfaces, the apexes **66** and slots **24**. This rotates and retracts the handle back to the FIGURE 4 stored position adjacent panel **16**.

Thus, this invention provides a cam and follower interconnection between a driven window regulator clutch input shaft and an operating handle which automatically extends the handle outwardly from a stored position adjacent a trim panel to a use position spaced from the panel upon rotation of the handle in either direction, whereupon a driving engagement is established for rotating the driven shaft upon further handle rotation, and which automatically retracts the handle to stored position when the handle is released.

It is readily apparent that other cam configurations having more or fewer or different followers and cam ramp surfaces could be utilized to effect the same result as that shown in the illustrative embodiment. These and other modifications are contemplated within the scope of this invention.

I claim:

1. A driving arrangement for interconnecting the input shaft member of a window regulator mechanism and a manually operable handle member comprising, in combination: means on one of the members providing a pair of cam ramp surfaces diverging from a common juncture, a cam follower on the other member, means biasing the cam follower into engagement with the cam ramp surfaces to normally maintain the cam follower in axial alignment with the common juncture of the cam ramp surfaces, manual rotation of the handle in one direction moving the cam follower along one of the cam ramp surfaces to cam the handle member outwardly relative to the shaft member, and cooperating abutments on the handle member and on the shaft member engageable with each other upon limited rotation of the handle to effect a driving connection between the handle and shaft members, the biasing means moving the handle member in the opposite rotative direction upon release thereof to move the cam follower along the one cam ramp surface into realignment with the juncture of the cam ramp surfaces to thereby move the handle member inwardly of the shaft member.

2. A driving arrangement for interconnecting the input shaft of a window regulator mechanism and a manually operable handle comprising, in combination: means on the input shaft providing a pair of cam ramp surfaces diverging from a common juncture, means on the handle providing a pair of cam ramp surfaces diverging from a common juncture and mating with the first cam ramp surfaces, means biasing the mating pairs of cam ramp surfaces into engagement with each other to normally maintain the common junctures of the surfaces in axial alignment, manual rotation of the handle in one direction moving one of the handle cam ramp surfaces along one of the shaft cam ramp surfaces to cam the handle outwardly relative to the shaft, and cooperating abutments on the handle and on the shaft engageable with each other upon limited rotation of the handle to effect a driving connection between the handle and the shaft, the biasing means moving the handle in the opposite rotative direction upon release thereof to move the one handle cam ramp surface along the one shaft cam ramp surface and realign the common junctures to thereby move the handle inwardly of the shaft.

3. A driving arrangement for interconnecting the input shaft member of a window regulator mechanism and a manually operable handle member comprising, in combination: means on each member providing a pair of cam ramp surfaces diverging from a common juncture, a cam follower on each member, means biasing the cam follower of one member into engagement with the pair of cam ramp surfaces of the other member to normally maintain the cam follower of each member in axial alignment with the common juncture of the cam ramp surfaces of the other member, manual rotation of the handle member in one direction moving each cam follower along a respective cam ramp surface of the other member to cam the handle member outwardly relative to the shaft member, and cooperating abutments on the handle member and on the shaft member engageable with each other upon limited rotation of the handle member to effect a driving connection between the handle and shaft members, the biasing means moving the handle member in the opposite rotative direction upon release thereof to move each cam follower along its respective cam ramp surface into realignment with the junctures of the cam ramp surfaces to thereby move the handle member inwardly of the shaft member.

4. In a vehicle body having a window regulator mechanism input member mounted on one side of a body panel and adapted to be rotatably driven by a manually operable handle member located on the other side of the panel, a driving arrangement interconnecting the handle and input members comprising in combination:

a cylindrical collar mounted on one member,

a cylindrical shaft mounted on the other member and coaxially telescoped within the collar,

two diametrically opposed pairs of cam ramp surfaces formed on the shaft outer surface, each pair diverging from a common juncture,

two diametrically opposed pairs of cam ramp surfaces formed on the collar inner surface, each pair diverging from a common juncture,

two diametrically opposed cam followers formed on

each of the collar and shaft, each cam follower defining a pair of axially extending drive surfaces each intersecting one of the cam ramp surfaces, and

means biasing the shaft axially inwardly of the collar wherein the cam followers of one member are located at the junctures of the cam ramp surfaces of the other member, the collar cam ramp surfaces junctures are spaced 90° from the pairs of shaft cam ramp surfaces, and the drive surfaces of both members are spaced, thus locating the handle member in a stored position adjacent the panel,

whereby limited rotation of the handle member in either direction moves the cam followers of each member along one of the cam ramp surfaces of the other member to move the handle member to an extended position spaced from the panel and engage half of the drive surfaces on the collar and shaft to

effect a rotary driving connection between the members, the biasing means disengaging the drive surfaces and moving the cam followers along the cam ramp surfaces into realignment with the junctures of the cam ramp surfaces to move the handle member in the opposite rotative direction to the stored position upon release of the handle member.

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