

April 9, 1929.

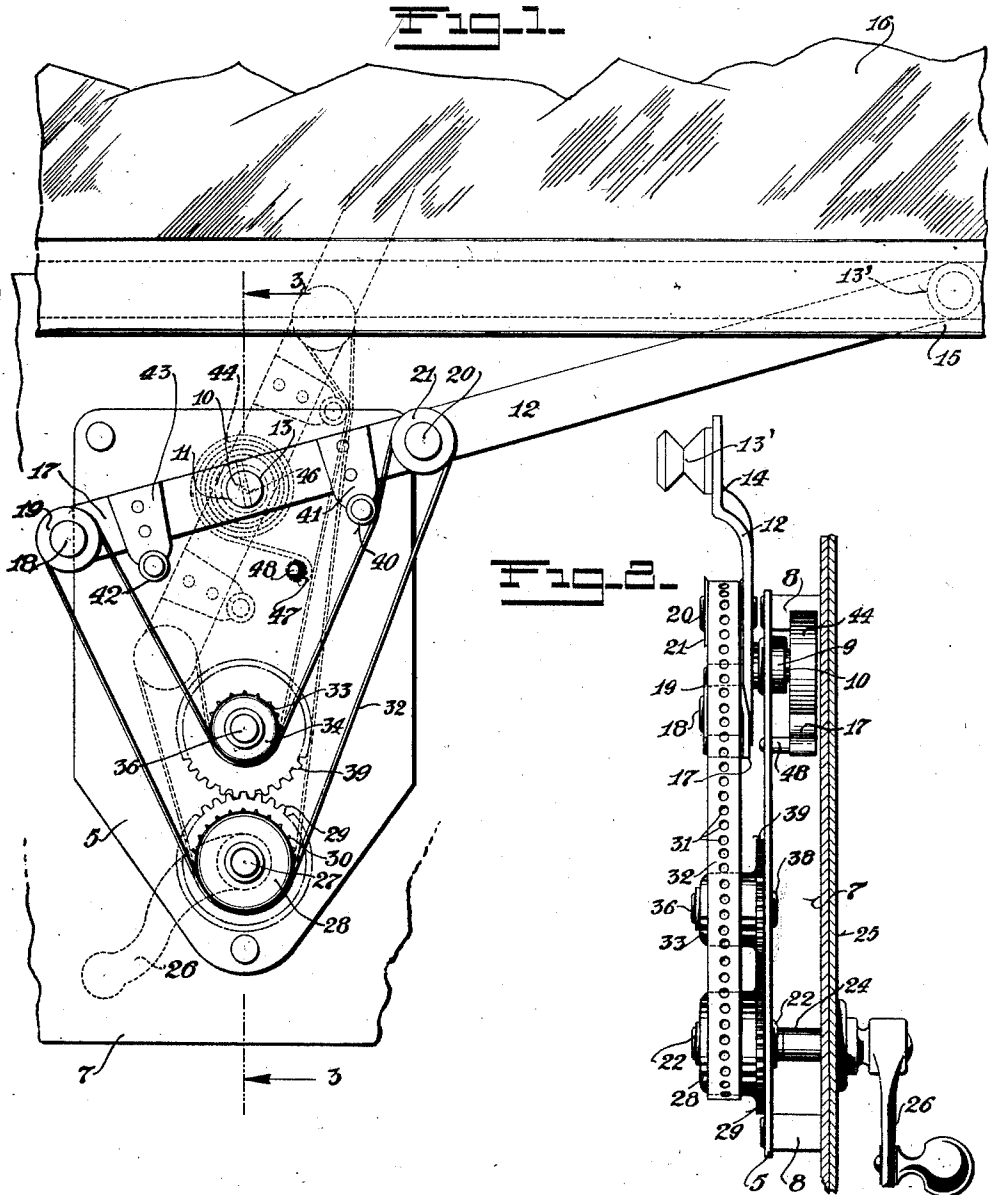
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1,708,877

WINDOW REGULATOR

Filed March 5, 1928

2 Sheets-Sheet 1



Indenter:

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Fig. 3.

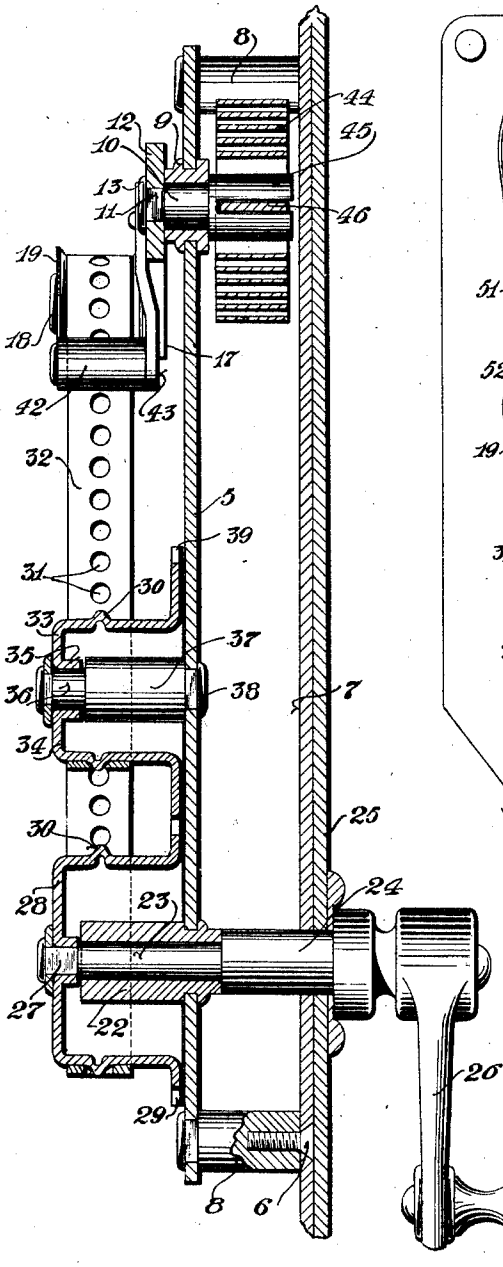
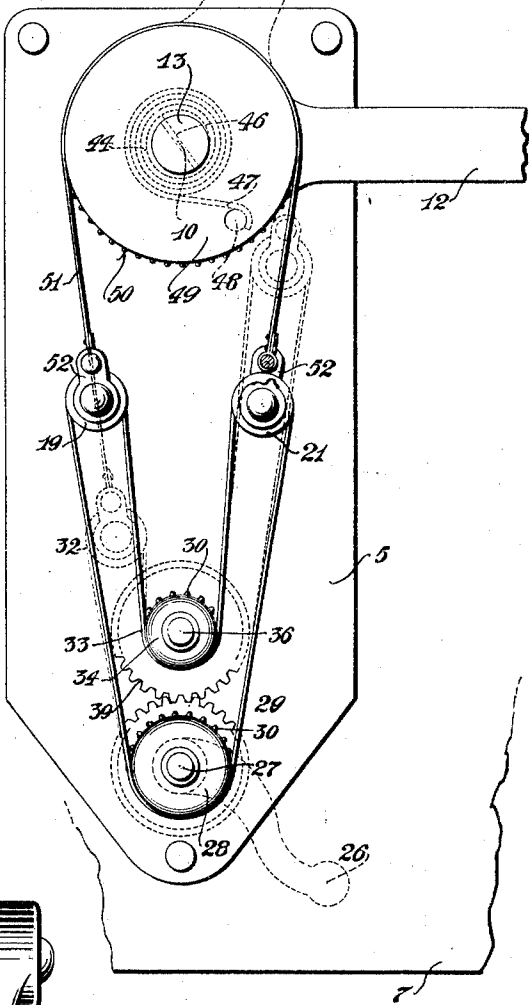


Fig. 4.



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UNITED STATES PATENT OFFICE.

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WINDOW REGULATOR.

Application filed March 5, 1923. Serial No. 259,150.

This invention relates to certain new and useful improvements in window regulators of the character particularly designed for use in connection with automotive vehicle windows and adapted to be controlled by a handle member or crank in the customary manner.

In window regulators, it is essential that means be provided to prevent opening of the window due to jarring incidental to passage over rough ground or by the application of downward opening pressure on the window. Heretofore, this result has been generally accomplished by the provision of a window brake mechanism located between the operating handle or crank and the regulator mechanism proper, which by reason of its structure materially increases the cost of manufacture both from the standpoint of labor and material.

Therefore, this invention has as an object the provision of an improved window regulator mechanism which will be positive in operation and which will have positive means for preventing opening of the window except by manipulation of the handle or crank member which means is incorporated within the regulator mechanism itself, eliminating the necessity of providing an additional clutch or brake device.

Another object of this invention resides in the provision of an improved regulator structure including an endless perforated strap member controlled by a pair of inter-gear drum members whereby the gear connection between the drum members oppose each other upon the application of opening pressure to the window to prevent movement of the window but which is smoothly and readily operated upon the application of driving force to any one of the drum members through a handle or crank member connected therewith.

A further object of this invention resides in the provision of an improved and simplified window regulator structure in which the number of operating parts is reduced to a minimum and their construction simplified to permit its production at a greatly reduced cost without sacrificing smoothness of operation or durability.

With the above and other objects in view which will appear as the description proceeds, my invention resides in the novel construction, combination and arrangement

of parts substantially as hereinafter described and more particularly defined by the appended claims, it being understood that such changes in the precise embodiment of the hereindisclosed invention may be made as come within the scope of the claims.

In the accompanying drawings, I have illustrated two complete examples of the physical embodiments of my invention constructed according to the best modes I have so far devised for the practical application of the principles thereof, and in which:

Figure 1 is a front plan view of a regulator mechanism embodying my invention;

Figure 2 is a side plan view thereof;

Figure 3 is a transverse, sectional view with parts in side elevation, taken through the regulator on the plane of the line 3—3 of Figure 1; and

Figure 4 is a view similar to Figure 1 of a slightly modified form of my invention.

Referring now more particularly to the accompanying drawings, in which like numerals designate like parts throughout the several views, 5 designates a mounting bracket or plate of suitable shape adapted to be secured by screws or other means 6 to the usual vehicle door lock board 7, studs 8 properly spacing the bracket member from the board. Fixed to the bracket 5 at its upper end is a bearing structure 9 in which a stub shaft 10 is journaled having its outer end reduced and squared, as at 11, to mount a window lifting lever or arm 12 secured on its squared end by swedging the shaft thereover, as at 13.

The arm 12 has a stud or other member 13' on its outer free end 14 which engages in the conventional channel strip 15 extending across the lower edge of the window to be controlled. The other end 17 of the lever extends beyond the other side of the shaft 10 and is provided with a stud 18 on which a drum or roller member 19 is journaled, a stud 20 similar to the stud 18 being carried by the lever 12 on the side of the shaft 10 opposite the stud 18 and spaced therefrom a distance equal to that between the stud 18 and the shaft 10, there being a drum or roller member 21 journaled on the stud 20 similar to the member 19, for the purpose now about to be described.

A bearing member 22 is fixed to the bracket plate 5 near its lower portion in vertical alignment with the bearing 9 and

provides a journal for the end 23 of an operating shaft or arbor 24 which passes through the lock board 7 and the inner wall or covering 25 of the door structure to receive an operating handle or crank 26. The end 27 of the shaft 24 projected beyond the bearing 22 has a substantially inverted cup shaped drum member 28 drivingly fixed thereon, the inner peripheral edge of the drum member 28 being laterally flanged and toothed to provide a gear 29, and the wall of the drum proper being formed with equispaced lateral projections or tits 30 providing drive teeth or projections engageable with the apertures 31 of an endless belt or strap 32 trained about the drum 29, drums 19 and 21 and a drum 33 of a construction like the drum 28 but of less diameter, as later described.

The drum member 33 is of less diameter than the drum member 28 and has its closed wall 34 apertured and provided with a bearing 35 which journals on the bearing portion 36 of a shaft 37 fixed to the bracket plate 5, as at 38, the peripheral edged portion of the drum being laterally flanged and toothed to provide a gear 39 meshing with the gear 29. The belt 32, which is preferably constructed of a strip of thin sheet steel having its ends joined by welding, brazing, or riveting, is trained about the drums 19, 21, 28 and 33, in the manner best illustrated in Figure 1, and the drums 28 and 33 operating on the belt at different speeds due to a difference in diameters of either the drum peripheries or the gears. It will be readily apparent that, assuming the crank 26 is rotated in a counter-clockwise direction with respect to Figure 1, the drum 28 rotates in a like direction and drum 33 in an opposite direction. As the drum 28 or its gear is of greater diameter than the drum 33 or its gear, it winds the belt 32 at a greater rate than drum 33 unwinds, creating a downward pull on the drum 19 elevating the end 14 of the lever 12 and with it the window 16.

The slight slack occurring in the innermost stretch of the belt 32 between the drum 21 and the drum 33, as the lever 12 approaches either its uppermost position, is automatically taken up by a roller member 40 carried by an arm 41 fixed to the lever 12 inwardly of the stud 20, the roller member being arranged to bear against the belt 32 in the manner best shown in Figure 1. A second member 42 similar to the member 40 is carried by the lever 12 inwardly of the stud 19 on an arm 43 whereby the belt slack occurring when the window is lowered is compensated for. The weight of the window is counterbalanced by a convolute spring 44 coiled about the inner end 45 of the shaft 10 and having one end 46 connected with the shaft end 45 and its other

end 47 connected with a stud 48 carried by the bracket 5.

Opening of the window 16 by jarring or by the application of a downward pressure thereon is prevented by reason of the drums 28 and 33 being at all times connected through the gears 29 and 39 as a downward pressure on the window tends to raise the end of the lever 12 carrying the drum 19 to exert a pull in the same direction on the drums 28 and 33 which are locked against rotation in the same direction by the gears 29 and 39, as will be readily apparent.

In Figure 4, a slightly modified construction of my invention is illustrated in which the lever 12 has a drum 49 formed on its inner end and journaled on the shaft 10 and having lateral circumferential projections 50 which engage in apertures, not shown, in a strap 51 trained thereabout with its ends secured to clevis members 52 in which the drums 19 and 21 are journaled. The operation of this form of my invention being identical with that form illustrated in Figures 1 and 2, further description thereof is deemed unnecessary.

From the foregoing description, taken in connection with the accompanying drawings, it will be readily apparent to those skilled in the art to which an invention of the character described appertains, that I have provided an improved and simplified window regulator construction in which the necessity of providing suitable brake and clutch mechanism is eliminated and at the same time positive means prevents the opening of the window by the application of downward pressure thereon.

I claim:

1. In a mechanism for opening and closing a slidably mounted window and including a window operating arm having one end operatively connected with the window and its other pivotally mounted, means for swinging the arm on its pivot and including drum members of different diameters, means mounting the drum members with their axes parallel, guide members connected with the operating arm at opposite sides of its pivot, an endless belt member trained about the drum members and the guide members, and means for simultaneously rotating the drum members in opposite directions to wind the endless belt member thereabout and produce a movement of the window operating arm in the direction of rotation of the drum member of greater diameter.

2. In a mechanism for opening and closing a slidably mounted window and including a window operating arm having one end operatively connected with the window and its other pivotally mounted, means for swinging the arm on its pivot and including drum members of different diameters, means mounting the drum members with their axes

parallel, means connecting the drum members for simultaneous rotation in opposite directions, guide members connected with the operating arm at opposite sides of its pivot, an endless belt member trained about the drum members and the guide members, means drivingly connecting the belt member with the drum members, and operating means for rotating the drum member to produce movement of the window operating arm on its pivot.

3. In a mechanism for opening and closing a slidably mounted window including a window operating arm having one end operatively connected with the window and its other pivotally mounted, means for swinging the arm on its pivot including drum members, means mounting the drum members with their axes parallel, guide members connected with the operating arm at opposite sides of its pivot, an endless belt member trained about the drum members and the guide members and means for simultaneously rotating the drum members in opposite directions at different peripheral speeds to wind the endless belt member thereabout and produce movement of the window operating arm in the direction of rotation of the drum member moving at the greater peripheral speed.

4. In a mechanism for opening and closing a slidably mounted window including a window operating arm having one end operatively connected with the window and its other pivotally mounted, means for swinging the arm on its pivot including drum members, means mounting the drum members with their axes parallel, guide members connected with the operating arm at opposite sides of its pivot, an endless belt member trained about the drum members and the guide members, means for simultaneously rotating the drum members in opposite directions at different peripheral speeds to wind the endless belt member thereabout and produce movement of the window operating arm in the direction of rotation of the drum member moving at the greater peripheral speed and means for maintaining said belt taut.

5. In a mechanism for opening and closing a slidably mounted window including a window operating arm having one end operatively connected with the window and its other end pivotally mounted, said other end of the arm being extended beyond its pivot, pivotally mounted drum members, means whereby the drum members are simultaneously rotated in opposite directions at different peripheral speeds, guide members carried by the window operating arm at opposite sides of its pivot, an endless belt trained about the drum members and the guide members, and an operating member connected with one of the drum members for

rotating the same, whereby the operating arm is moved on its pivot in the direction of rotation of the drum member moving at the greater peripheral speed.

6. In a mechanism for opening and closing a slidably mounted window including a window operating arm having one end operatively connected with the window and its other end pivotally mounted, said other end of the arm being extended beyond its pivot, pivotally mounted drum members, means whereby the drum members are simultaneously rotated in opposite directions at different peripheral speeds, guide members carried by the window operating arm at opposite sides of its pivot, an endless belt trained about the drum members and the guide members, an operating member connected with one of said drum members for rotating the same, whereby the operating arm is moved on its pivot in the direction of rotation of the drum member moving at the greater peripheral speed, and means for taking up slack occurring in the belt member as the window operating arm leaves a horizontal position.

7. In a mechanism for opening and closing a slidably mounted window including a window operating arm having one end operatively connected with the window and its other end pivotally mounted, said other end of the arm being extended beyond its pivot, pivotally mounted drum members, means whereby the drum members are simultaneously rotated in opposite directions at different peripheral speeds, guide members carried by the window operating arm at opposite sides of its pivot, an endless belt trained about the drum members and the guide members, an operating member connected with one of said drum members for rotating the same, whereby the operating arm is moved on its pivot in the direction of rotation of the drum member moving at the greater peripheral speed, and depending members carried by the arm inwardly of each guide member and adapted to engage the inner stretches of the belt member as slack occurs therein to maintain the belt member taut.

8. In a window regulator of the character described, a mounting bracket, a shaft arbor journaled in one end of the bracket, a window operating arm fixed to one end of the arbor, a counterbalance spring connected with the other end of the arbor, a pair of drum members rotatably mounted on the bracket member below the shaft arbor, the axes of the arbor and drum members being in a substantially perpendicular line, said drum members being of different diameters, intermeshing gears carried by the drum members whereby they rotate in opposite directions, an endless belt trained about the lowermost portions of the drum members,

guide members about which the stretches of the belt intermediate the drum members are trained, means connecting the said guide members with the operating arm at opposite sides of its pivot, and means for simultaneously rotating the drum members in opposite directions at different peripheral speeds to wind in the belt thereabout and produce movement of the operating arm in the direction of rotation of the drum member having the greater peripheral speed. 10

In testimony whereon I hereunto affix my signature.

JOHN W. FITZGERALD.