Nov. 24, 1931. H. A. MYERS 1,833,615

WINDOW REGULATOR FOR AUTOMOBILES

Filed April 25, 1929

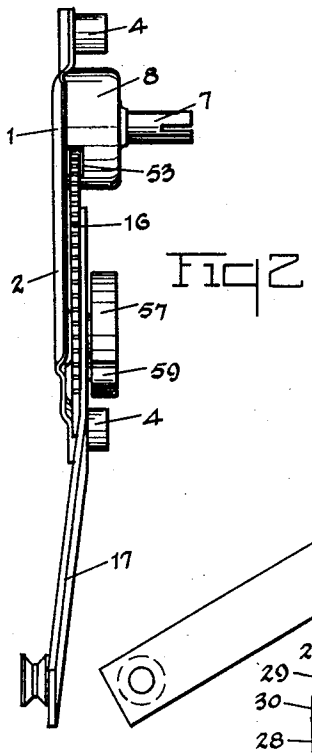


Fig 2

Fig 1

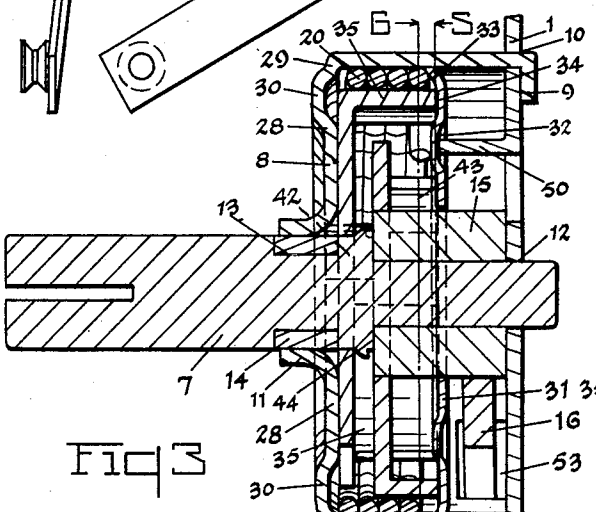


Fig 3

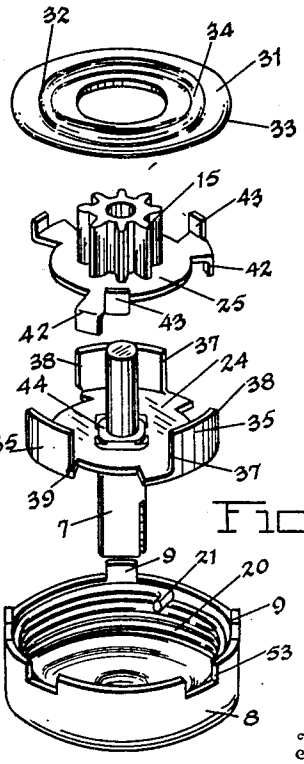


Fig 4

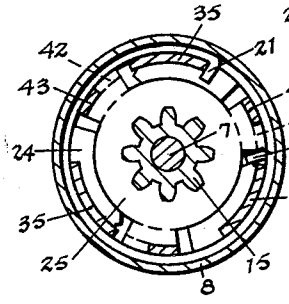


Fig 5

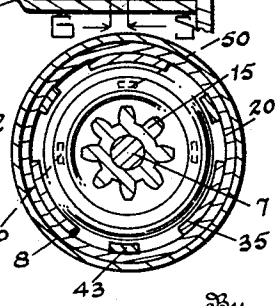


Fig 6

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1,833,615

UNITED STATES PATENT OFFICE

HUBERT A. MYERS, OF TOLEDO, OHIO, ASSIGNOR TO THE MYERS REGULATOR COMPANY, OF TOLEDO, OHIO, A CORPORATION OF OHIO

WINDOW REGULATOR FOR AUTOMOBILES

Application filed April 25, 1929. Serial No. 357,973.

My invention has for its object to provide a window regulator that is particularly adapted for raising and lowering windows of conveyances, such as automobiles, and which is so formed that it may be readily constructed at a low cost of production and yet will be exceedingly efficient in its operation. The invention consists in forming a regulator largely of sheet metal parts that may be die stamped and assembled by cheap labor.

The invention particularly provides a means for actuating a lifting arm that engages the lower edge of the window, and operates to lift and lower the window, and a clutch or locking member that automatically operates to secure the arm in any position in which it may be located to support the window and prevent its descent either by a force applied to the window or by reason of its own weight due to, particularly, the shaking or vibration caused by movement of the vehicle over the road and wherein the locking and clutch member will cooperate through its interconnection with the arm to not only support and maintain the window in the position to which it is raised or lowered, but will enable, by a very free and uniform movement or application of a substantially constant pressure, the operation of the window.

The invention consists more particularly in the simplification of the parts whereby they may be readily assembled and secured in their relative positions and whereby their co-action will be insured. The invention may be contained in window regulators that vary in their details of construction, and, to illustrate a practical application of the invention, I have selected a window regulator as illustrative of the various embodiments of my invention, and shall describe it hereinafter. The window regulator selected is shown in the accompanying drawings.

Fig. 1 is a side view of the window regulator. Fig. 2 is an edge view of the window regulator. Fig. 3 is an enlarged view of a section taken on the plane of the line 3—3 indicated in Fig. 1. Fig. 4 is a composite view indicating the assembly of parts of the construction. Fig. 5 is a view of a section of the controlling parts of the window regulator taken on the transverse plane and looking in a direction of the arrow marked 5—5 indicated in Fig. 3. Fig. 6 is a view of a section of the controlling parts of the regulator taken on a transverse plane and looking in a direction of the arrows marked 6—6 in Fig. 3.

The window regulator shown in the drawings has a supporting plate or base 1 formed of sheet metal and suitably reinforced by grooves 2 that are struck up from the metal of which the supporting plate 1 is formed. This prevents any flexibility of the plate and resists the torque produced by the weight of the window on the long angular moving lifting arm of the regulator. If desired, suitable spacing sleeves 4 may be located at the corners of the plate in order to properly space the supporting plate relative to the frame of the automobile and to give room for the oscillatory movement of the lifting arm of the regulator. Suitable rivets or bolts or screws may be inserted through the spacing sleeves to secure the support in position.

The window regulator is operated by a crank, in the manner well known, which is secured to a shaft 7 that is pivotally supported in the shell 8 and the supporting plate 1. The shell 8 is provided with a plurality of ears 9 and the plate 1 is provided with a corresponding number of openings 10 through which the ears 9 are inserted and turned over the outside of the plate 1 in order to secure the shell 8 in position. The central part of the shell 8 is provided with a flange 11 that surrounds the opening in the shell through which the crank shaft 7 extends and forms a bearing for the support of the crank shaft. The plate 1 is provided with an opening 12 through which one end of the crank shaft extends and forms a second bearing for the crank shaft. The crank shaft 7 may be provided with a channel 13 in which a split bushing or brass collar 14 may be located, to form a bearing bushing for the crank shaft 7. A pinion 15 is supported on the crank shaft and a clutch or locking member is located within the shell 8 for locking

the pinion 15 from movement except when the clutch or lock is first released in the operation of the crank shaft 7, whereupon means is provided for connecting the pinion to the crank shaft to rotate the pinion 15 therewith. In the form of construction shown, a coiled spring 20, normally having a diameter slightly larger than the inner diameter of the shell 8, is placed within the shell so as to frictionally engage the inner surface of the shell. The ends 21 and 22 of the spring are turned inwardly and form engaging parts for the releasement of the spring from its frictional clutch engagement with the inner surface of the shell 8 when the spring ends are drawn to wind the spring in a direction that would reduce its diameter which operates to release it from its clutch engagement with the shell 8. The inturned ends 21 and 22 also afford engaging parts for locking the spring by an increased frictional engagement upon rotation of the pinion 15. Rotative force is applied to the pinion, other than one transmitted through the crank shaft, as when the lifting arm of the regulator is subjected to pressure either by a force applied to the window to lower the window, or by reason of the weight of the window. Thus, the spring 20 is subject to the control of the crank shaft 7 and the pinion 15, the one to release the spring 16 and the other to be locked thereby.

The shaft 7 and the pinion 15 are each provided with spiders 24 and 25 having fingers, preferably three in number, for engaging the inturned ends 21 and 22 of the spring 20. The fingers of the spider 24 on the sleeve 7 are so disposed as to be located on the outer sides of the said inturned ends 21 and 22 while one or more of the fingers of the spider 25 are located between the inturned ends 21 and 22 of the spring 20, whereby upon rotation of the crank shaft 7 the fingers of the spider 24 will engage one or the other of the inturned ends 21 or 22 to reduce the diameter of the spiral springs 20, and a rotative force applied to the pinion 15 by the sector 16 will cause one or the other of the inturned ends 21 and 22 to be engaged and rotation of the pinion will be prevented. Furthermore, continued rotation of the crank shaft 7 will rotate the spiral spring 20 and cause one or the other of the inturned ends 21 or 22 to engage one of the fingers of the spider 25 and thus rotate the pinion 15 with the crank shaft 7 which operates the lifting arm 17 to raise or lower the window.

The bottom of the shell 8 is provided with raised portions 28 and 29 forming an annular depressed portion or channel 30. It has a disc or plate 31 that is also provided, on its inner side, with recessed portions 32 and 33, forming an annular depressed portion or annular channel 34 therebetween. These parts correspond in location to the raised and depressed portions 28, 29, and 30 of the bottom of the shell 8. The raised portions 29 of the shell and the raised portion 33 of the disc or plate 31 are located in proximity to the ends of the spiral spring 20 and maintain it in position in the lower end, or at the bottom, of the shell 8, while the depressed portions 30 and 34 afford a clearance, one below the inwardly turned end 22 of the spring and the other above the inwardly turned end 21 of the spring. This insures a positive engagement as between the fingers of the spiders 24 and 25 and the inturned ends 21 and 22 of the spring and prevents the ends of the spring from slipping over the ends of the fingers.

The spider 24 which is keyed to the crank shaft 7 is provided with three broad finger members 35 having edges 37 and 38 that are spaced apart sufficiently to locate the edges of two of the fingers in close proximity to the outer sides of the inturned ends 21 and 22 and, preferably, to cover substantially the balance of the cylindrical area of the inner surface of the spiral spring. The lower ends of the fingers 35 extend below the inturned end 22 of the spring, while the upper ends of the fingers extend into the depressed portion 34 of the plate 31 to locate the upper end well above the inturned end 21 of the spring and thus insure the engagement of one or the other ends 21 or 22 of the spring when the crank shaft 7 is rotated. If desired, the lower ends of the fingers 35 may be provided with substantially semi-circular notches 39 for receiving the inturned end 22 of the spring to further insure a positive engagement of the inturned end 22 by the finger 35 located in juxtaposed relation thereto.

The spider 25 is provided with the fingers 42 and 43 that extend above and below the body of the spider 25. The spider 25 is keyed to the pinion 15 and the crank shaft 7 is provided with a shoulder 44 which locates the body of the spider at a point midway between the ends of the spring 20. The fingers 42 and 43 are arranged in pairs. The fingers of each pair are located contiguous to each other and the ends of the fingers of each pair are located so as to extend one into the depressed portion 30 of the shell 8 and the other into the depressed portion 34 of the disc or plate 31, to insure a positive engagement with one or the other of the inturned ends 21 and 22. The total width of the fingers 42 and 43 of each pair, in the form of construction shown, is less than the distance between the opposing edges 37 and 38 of two of the fingers of the spider 24 so that any one of the pair of fingers 42 and 43 may be located between the inturned ends 21 and 22 of the spring and the opposing edges 37 and 38 of two of the fingers of the spider 24. The inturned ends 21 and 22, however, may be so disposed relative to each other that they may be

located at points to be engaged by edges 37 and 38 more remote as measured in degrees to the axis of the shaft than that shown in the figure, that is, the inturned end 21 may be engaged by any of the edges 37 and the inturned end 22 may be engaged by any one of the edges 38 and likewise the inturned end 21 may be engaged by any one of the fingers 43. The same is true with reference to any one of the fingers 42 and the inturned end of the spring 22.

The disc or plate 31 is secured in position to allow sufficient clearance for the fingers of the spiders 24 and 25 to hold the spring 20 in position by the raised portion 33 that extends along the periphery of the disc, by means of the fingers 50 that are struck up from the plate 1. The fingers 50 are disposed in spaced relation so as to engage the disc on the side thereof opposite to that of the raised portion 32. The ends of the fingers 50 extend into the channel formed by the raised portion 32.

The shell 8 is provided with a pair of openings or slots 53 formed in its edge and having a length or width sufficient to receive the sector strip 16 that meshes with the pinion 15 for the purpose of oscillating the arm 17 to raise and lower the windows by the rotation of the crank shaft 7 operating through the spider 24, the inturned ends 21 and 22 of the spring 20, the spider 25 and the pinion 15, which is attached to the spider 25.

The lower end of the plate 1 is provided with a stud 55 that is secured to the plate 1. The stud 55 has a channel 56 that extends substantially diametrically through the end of the stud and a convolute spring 57 is provided with turned end portions 58 and 59, the inner end 58 is located in the channel 56. The inturned end 58 of the spring 57 may protrude into either end of the channel 56, depending on whether the arm 17 extends to the right or to the left side of the plate 1, that is, the construction may be made right or left handed. A finger 60 is struck up from the arm 17 and in position to be engaged by the return end 59, the spring 57 is subjected to the desired tension or distortion by movement of the returned end 59 and hooking the returned end 59 on to the finger 60. The spring 57 thus operates to counterbalance the weight, or material part of the weight, of the window which reduces the pressure on the crank shaft 7 that may be required to raise the window and operates to increase the pressure that would be required to lower the window if the counter-balancing spring were not used, whereby substantially the same force is required to raise and to lower the window and makes the "feel" of the crank shaft the same whether the window is raised or lowered.

I claim:

1. In a window regulator, a driving shaft, a pinion rotatably supported on the driving shaft, a housing, a clutch for frictionally engaging the surface of the housing and having inwardly extending parts, the shaft and the pinion having fingers extending parallel to the axis of the shaft and the pinion for engaging the clutch, one to release the clutch from the housing and the other to lock the pinion, the housing having walls, the walls having annular channels located on opposite sides of the clutch, to afford a clearance for the ends of the fingers and insure engagement with the clutch.

2. In a window regulator, a driving shaft, a pinion supported on the driving shaft, a housing, a circular spring clutch for frictionally engaging the inner surface of the housing and having inturned ends, the housing having walls, the walls of the housing having circular channels, the shaft and the pinion having finger members extending parallel to the axis of the shaft and the pinion and located between the channel parts of the walls of the housing for engaging the inturned ends of the spring clutch.

3. In a window regulator, a supporting plate, a shell connected to the supporting plate, the bottom of the shell having an annular channel, a circular spring clutch having inwardly extending parts and located in the shell, a plate located within the shell, the bottom of the shell and the edge of the plate adapted to engage the sides of the circular spring clutch, a shaft extending into the shell, a pinion supported on the shaft, the shaft and the pinion having fingers extending across the inturned ends of the spring clutch and extending into the channels, one for locking the pinion and the other for unlocking the clutch and rotating the pinion.

4. In a window regulator, a shell having tongues, a plate having slots for receiving the tongues and for securing the shell to the plate when the tongues are bent over the edges of the slots, the shell and the plate forming a housing, a spring member for frictionally engaging the housing and having parts protruding inwardly, a shaft rotatably supported in the housing, a pinion located in the shaft, the shell having an annular recess, a disc located in the shell and having an annular recess, the shell and the pinion having fingers extending parallel to the axis of the shaft and extending into the said recess, one for locking the pinion and the other for unlocking and rotating the pinion.

5. In a window regulator, a plate, a shell connected to the plate and forming a housing, a shaft rotatably supported in the housing, a disc, a circular spring for frictionally engaging the housing and located between one end of the housing and the disc, a wall of the housing having fingers for securing the disc relative to the spring, a pinion, the shaft and the pinion having members for

engaging the spring, one for locking the pinion and the other for unlocking and rotating the pinion when the shaft is rotated.

6. In a window regulator, a supporting plate, a shell secured to the supporting plate and forming a housing, a shaft rotatably supported on bearings in the shell and the supporting plate, a pinion located on the shaft and between the bearings, the bottom of the shell having an annular channel, a circular spring clutch located in the shell and having inwardly protruding parts, a disc surrounding the pinion and having an annular channel, the edge of the bottom of the shell and the edge of the disc adapted to engage the sides of the circular spring clutch, the shaft and the pinion having fingers extending parallel to the axis of the shaft and into the channels for engaging the protruding parts of the spring clutch, the fingers of the pinion locking the pinion from rotation and the fingers of the shaft for unlocking the pinion.

In witness whereof I have hereunto signed my name to this specification.

HUBERT A. MYERS.