

June 5, 1934.

S. W. NICHOLSON

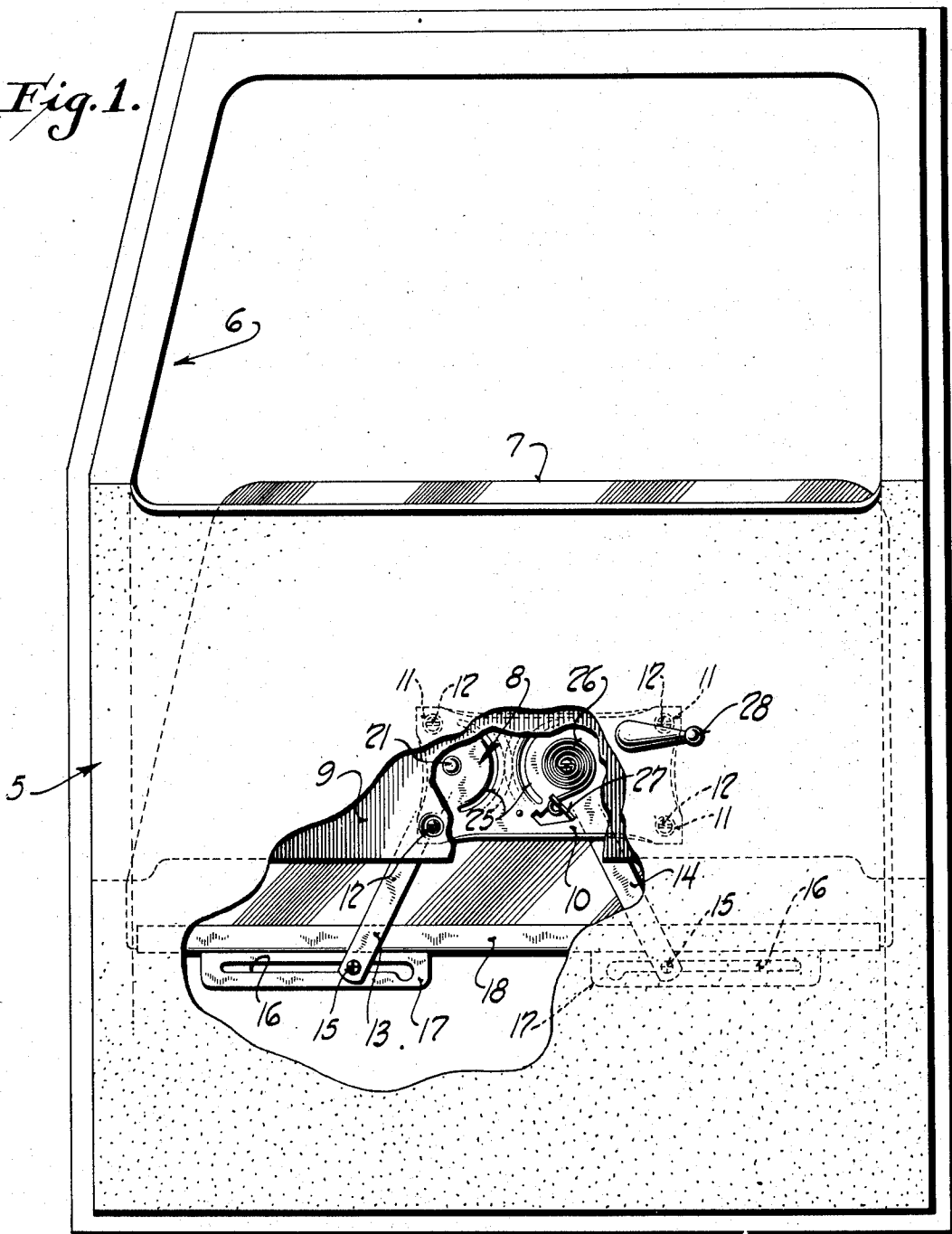
1,961,507

WINDOW REGULATOR

Filed May 31, 1932

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Fig. 1.



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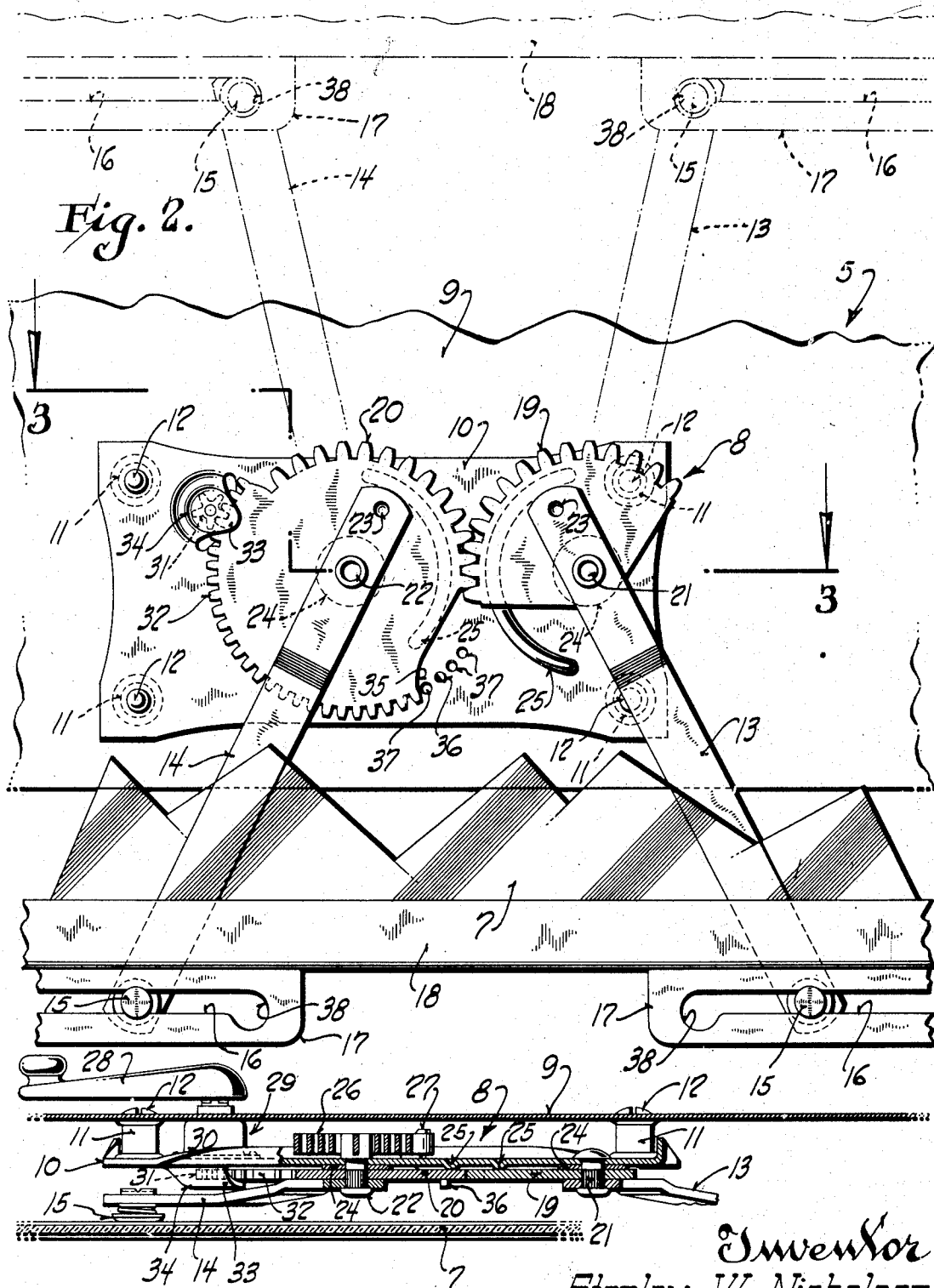


Fig. 3.

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Fig. 4.

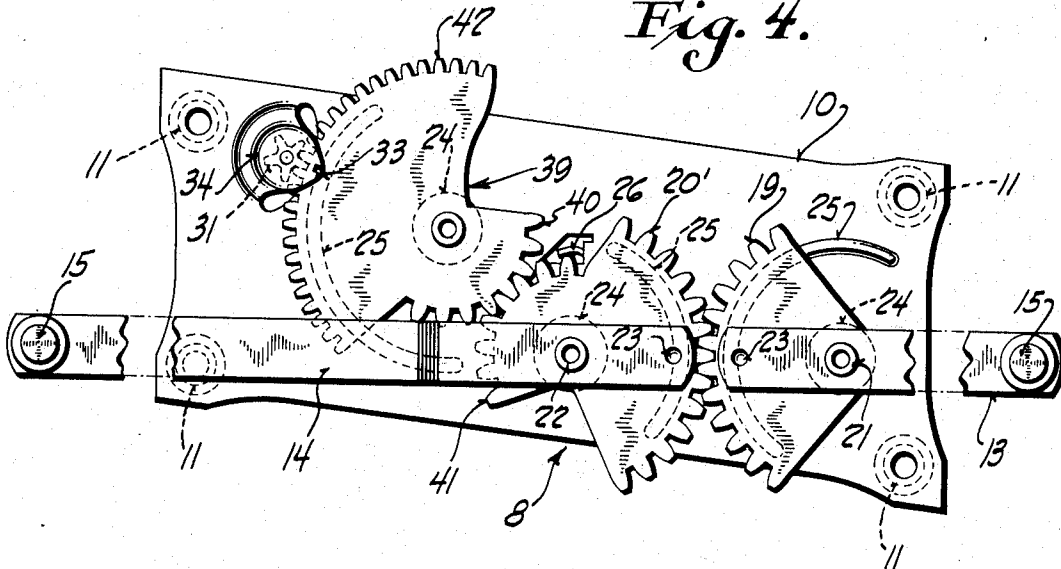
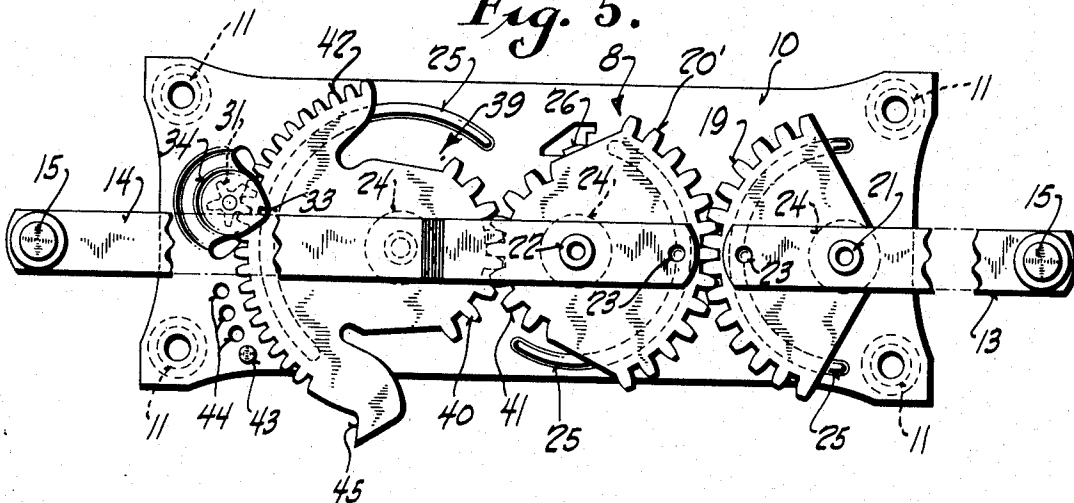


Fig. 5.



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UNITED STATES PATENT OFFICE

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WINDOW REGULATOR

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Application May 31, 1932, Serial No. 614,433

1 Claim. (Cl. 268—126)

The invention relates to window regulators of the type commonly used in automotive vehicles.

As is the custom in modern automotive vehicle design, the windows are often of irregular shape so that the conventional method of guiding the window pane during raising and lowering by means of guide ways at the opposite sides of the window cannot be employed. The regulator is thus called upon to assist and serve practically as the entire guide for the window pane in its raising and lowering movement.

Provision against tilting of the glass pane must thus be provided. For this purpose, regulators have been equipped with double arms engageable with the window at spaced points, but all past constructions of this character have been complicated and expensive.

This invention thus has as a general object to provide a double arm regulator of simple and rugged construction and one in which the required number of parts is reduced to a minimum.

Another object of this invention is to provide an improved window regulator of the double arm type whereby the window pane is supported at all times from its bottom edge portion and at a plurality of spaced points, and in which complicated link and gear mechanisms are eliminated and an extremely simple and efficient construction provided, all mounted from a single panel or base plate.

Another object of this invention resides in the provision of an improved regulator of the character described in which the operating levers or arms are mounted from sidewise spaced fixed pivots and have meshing gear members rotatable about their pivots, with a gear of different pitch and pitch diameter fixed with respect to one gear member and rotatable about its axis, and with which an operating mechanism meshes.

A still further object of this invention resides in the provision of an improved regulator of the character described in which a plurality of lever arms are pivotally mounted from a base with their pivots in sidewise spaced relation and, with their outer ends connected with a window pane, are actuated from a manually operable drive mechanism through gears including compound segments having a plurality of sets of gear teeth integrally connected.

With the above and other objects in view which will appear as the description proceeds, the invention resides in the novel construction, combination and arrangement of parts substantially as hereinafter described and more particularly defined by the appended claim, it being understood that such changes in the precise embodiment of the hereindisclosed invention may be made as come within the scope of the claim.

In the accompanying drawings, several complete examples of the physical embodiment of

this invention are illustrated constructed according to the best modes so far devised for the practical application of the principles thereof, and in which:

Figure 1 is a side view of a conventional vehicle door provided with a regulator constructed in accordance with this invention;

Figure 2 is an enlarged detail view of the regulator looking at that side of the structure opposite that shown in Figure 1;

Figure 3 is a cross section through the regulator taken on the plane of the line 3—3 of Figure 2; and

Figures 4 and 5 are views similar to Figure 2, illustrating slightly modified forms of this invention.

Referring now more particularly to the accompanying drawings in which like numerals designate like parts throughout the several views, the numeral 5 designates generally a vehicle door having a window opening 6 adapted to be closed by a glass pane 7.

The pane 7 is slidably mounted to move vertically to and from a position completely closing the opening 6 and is adapted to be raised and lowered by means of a novel regulator forming the subject matter of this invention and indicated generally by the numeral 8.

The regulator 8 is mounted, as is customary, from a transverse panel 9 positioned directly beneath the window opening 6, which comprises a panel or base plate 10 of substantially rectangular shape having attaching lugs 11 at its corners to threadedly receive screws or other suitable attaching means 12 which are passed through openings in the transverse panel 9.

Pivotally mounted on the base 10 are two lever arms 13 and 14, the outer ends of which are provided with buttons 15 for engagement in slots 16 formed in depending flanges 17 carried by the channel 18 in which the lower edge of the window pane is secured. The flanges 17 are so positioned on the channel 18 and their elongated slots 16 are of such length that the full sidewise movement of the buttons 15 incidental to the swinging motion of the lever arms during the raising and lowering of the window pane is accommodated.

Secured to the inner ends of the arms 13 and 14 are gear segments 19 and 20, respectively, the teeth of which mesh so that the lever arms move in unison with an imaginary line connecting their buttons 15 at all times horizontal.

The specific manner in which the gear segments are secured to the inner ends of the arms is not material, but in the present instance it has been found desirable to employ the pivot posts 21 and 22 fixed to the arms 13 and 14 respectively, as a common means for pivotally mounting the arms and attaching the segments thereto.

Relative rotation of the arms and segments about the pivot posts is precluded by engaging lugs 23 carried by the innermost ends of the arms and formed preferably by depressing a portion of the arms, in suitable recesses, not shown, formed in the gear segments.

It is observed that the gear segments are disposed between the arms and the panel or base plate 10 and to space the segments from the base so as to avoid excessive frictional contact therebetween, a washer 24 is interposed between the base plate and each segment at the pivotal mounting. Support against wobbling is provided for the arms without increasing the friction between the segments and base plate by striking arcuate tracks 25 from the base plate. These tracks are concentric about the axes of the pivots 21 and 22, and are of a height substantially equal to the thickness of the washers to have a narrow edge-like contact with the adjacent faces of the segments.

The washers and arcuate tracks, being spaced a substantial distance apart, support the segments and arms connected therewith against all movement except rotation about their respective pivots.

The pivot 21 may be merely a headed stud passed through aligned openings in the base plate 10, the washer, the gear segment 19, and the arm 13 to be riveted over the outer face of the arm. The pivot 22, however, has its headed end extended beyond the back of the base plate to provide a shank about which a counter-balance spring 26 is coiled.

The inner end of the spring 26 is received in a slot milled in the shank of the pivot 22 and its outer end is hooked to a stop 27 preferably formed by striking a portion of the base plate rearwardly.

Motion is imparted to the segments 19 and 20 and the arms 13 and 14 connected respectively thereto, from a manually operable crank 28 fixed to the driving element of a clutch mechanism indicated generally by the numeral 29. The clutch mechanism 29 is of conventional construction and is assembled within a brake cup 30 mounted on the back of the base plate with its driven pinion 31 projecting to the front of the base plate to mesh with the teeth of a segment 32. In the present instance, the segment 32 is formed integrally with the segment 20 although it is apparent that these segments may be formed as separate units connected together one upon the other.

It is observed that the segment 32 has a greater pitch radius and smaller pitch than the segment 20, to increase the mechanical advantage of the regulator.

Additional rigidity is afforded the compound segment 20—32 and the arm 14 carried thereby, by the overhanging end 33 of a bearing part 34 formed by pressing a portion of the base plate outwardly, and in which the adjacent end of the driven pinion 31 is journaled. The arm 14 is offset to ride over the bearing part 34.

The motion of the arms in lowering the window pane is limited by the engagement of the end 35 of segment 32 with a pin 36 carried by the base plate. The pin 36 is riveted to the base plate and to accommodate different distances of total vertical travel of the buttons at the ends of the arms, the base plate is provided with a plurality of apertures 37 in any one of which the pin 36 may be secured. When the regulator is actuated to swing

the arms to their extreme uppermost positions as illustrated in dotted lines in Figure 2, the buttons 15 may be aligned with enlargements 38 at the inner ends of the slots 16 in the flanges 17 to thus permit detachment of the window pane from the regulator.

Obviously, the normal travel of the window pane is less than that required to align the lever arm carried buttons with the enlargements 38, and such alignment may be effected only upon the removal of the usual moldings or guides which serve to hold the window pane against lateral displacement. When these moldings or guides are removed, the glass pane may be moved laterally out of the opening to permit the additional upward movement required to align the buttons with the enlargements 38.

In the event additional leverage is desired, a second compound segment 39 may be provided as illustrated in Figures 4 and 5. In each of these modifications, the idler compound segment 39 has a small diameter segment 40 meshing with a small diameter segment 41 connected with and forming an integral part of the segment 20', and a large diameter segment 42 with which the driven pinion of the clutch meshes.

The different arrangements shown in Figures 4 and 5 also enable the manually operable crank handle to be located at a greater distance from the center of the window, which in some instances is desirable.

In Figure 5, the means for limiting the travel of the arms induced through the train of compound segments, consists of a pin 43 engageable in one of a plurality of openings 44 formed in the base plate and arranged in an arc about the axis of the pivotal mounting for the compound segment 39. A hook or abutment 45 formed on an extension of the compound segment 39 engages the pin as will be readily apparent.

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 this invention affords an extremely simple and durable double arm window regulator, capable of manufacture at a low cost, and in which the number of parts is reduced and the overall size materially minimized by the use of a novel compound gear segment.

What I claim as my invention is:

In a window regulator of the character described, a base plate, a plurality of window pane actuating arms pivotally mounted on the base plate, a gear segment connected with one arm and having teeth concentric about the axis of its pivotal mounting, a compound gear segment connected with the other arm, said compound gear segment having gear teeth concentric about the axis of the pivotal mounting of said second arm and meshing with the gear teeth of the segment connected with the first arm so that the motion of the arms is coordinated, said compound gear segment also having gear teeth of different pitch diameter than its aforesaid gear teeth, and means to limit the movement of the arms comprising, a pin secured in one of a plurality of apertures in the base plate and projecting in the path of an abutment on one of the gear segments, the pin being securable in anyone of said plurality of apertures in the base plate so that different degrees of movement of the arms are readily accommodated,

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