April 14, 1925.

1,533,155

A. ZITTERBART

WINDOW OPERATING MECHANISM

Filed Feb. 6, 1922

3 Sheets-Sheet

Fig. 1

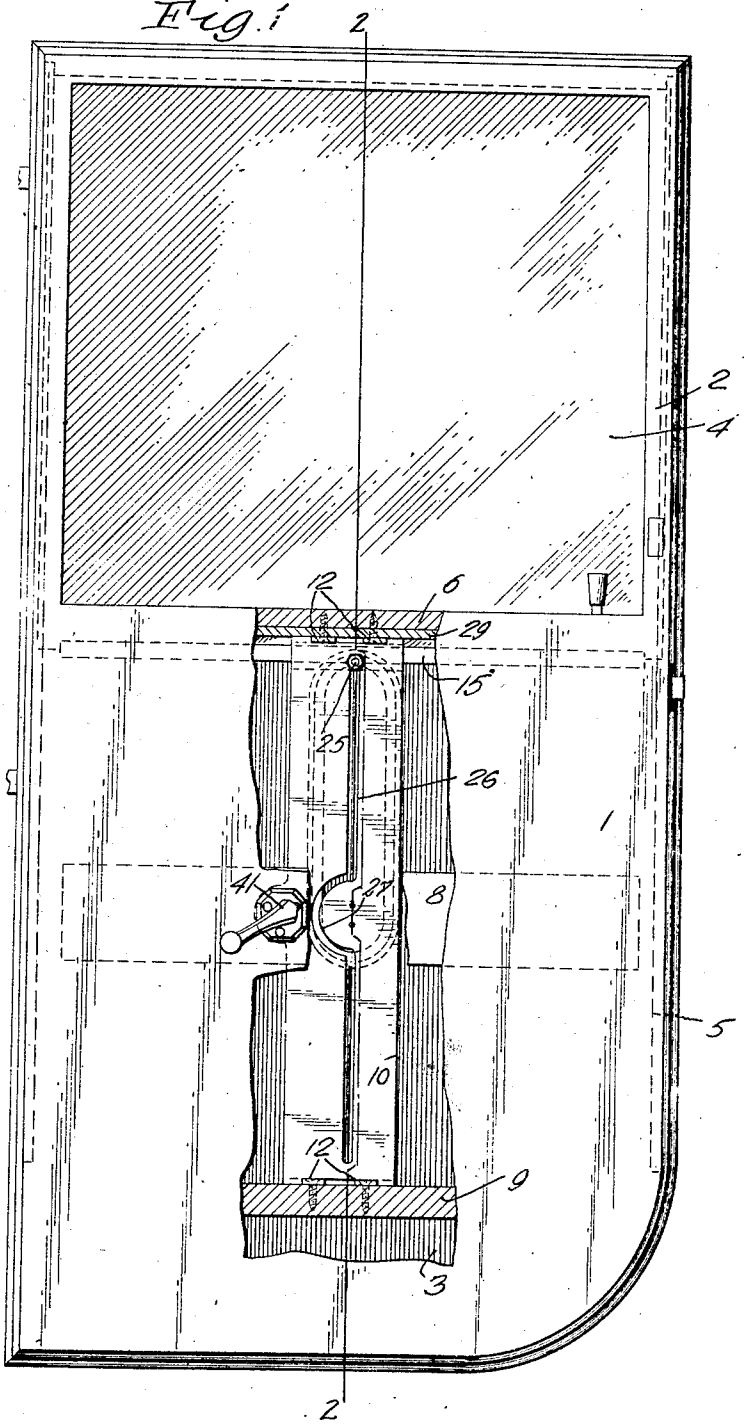
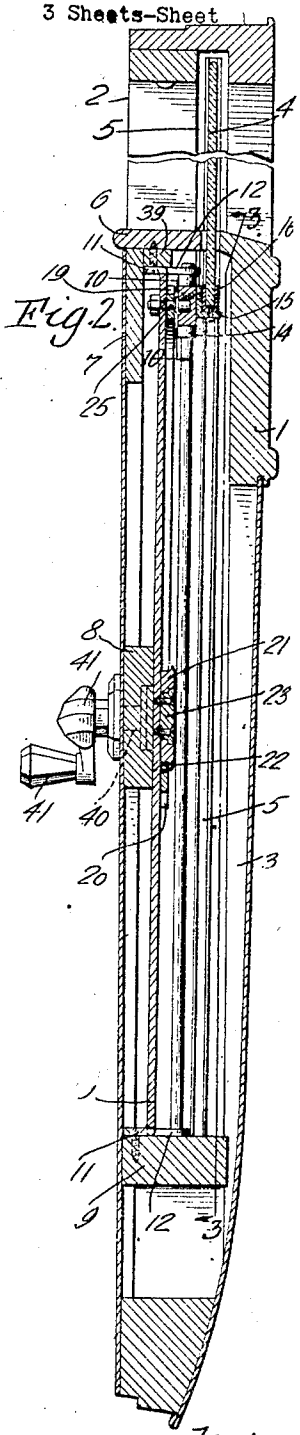


Fig. 2.



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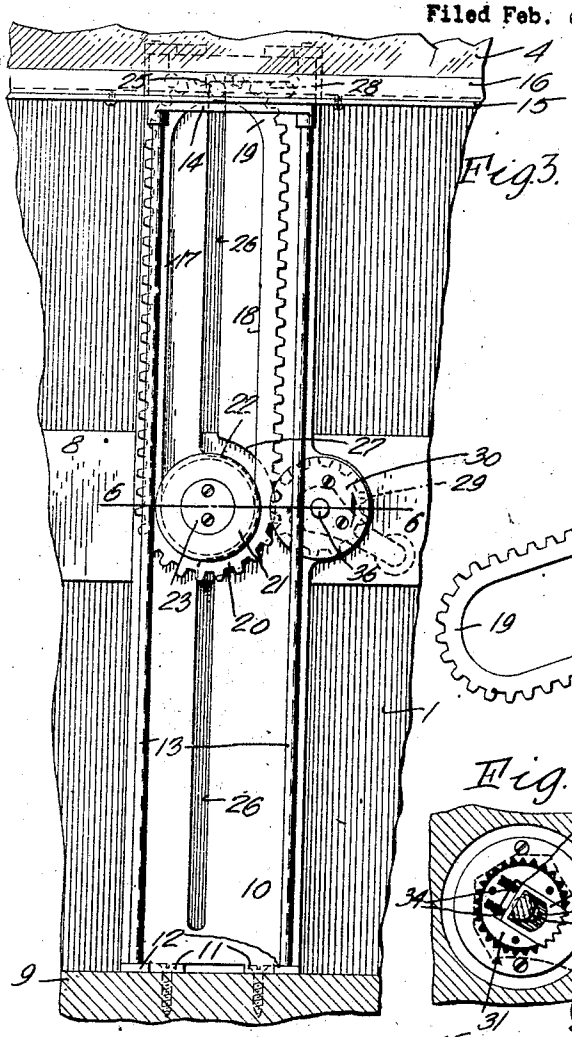


Fig. 3.

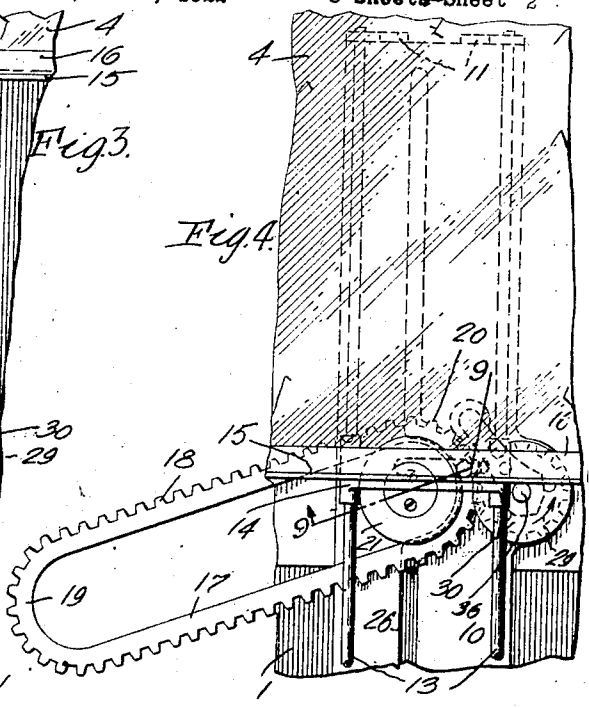


Fig. 4.

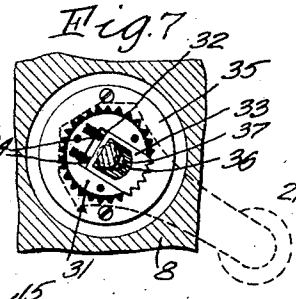


Fig. 7.

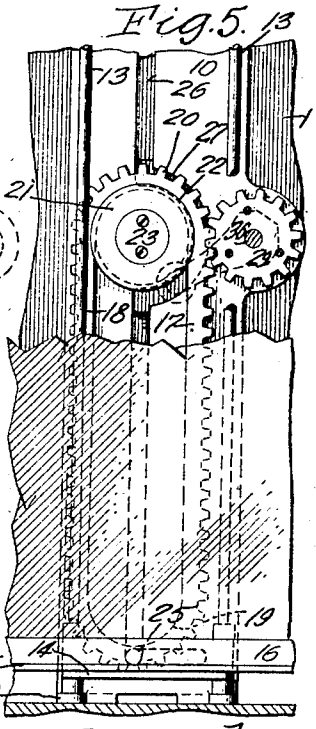


Fig. 5.

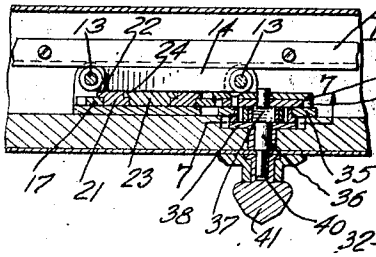


Fig. 6.

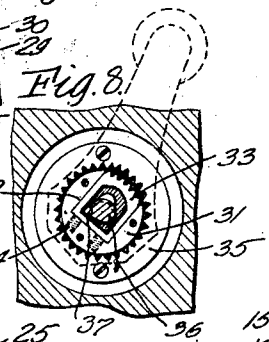


Fig. 8.

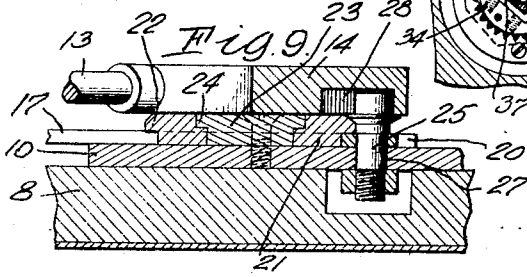


Fig. 9.

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April 14, 1925.

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Fig. 10.

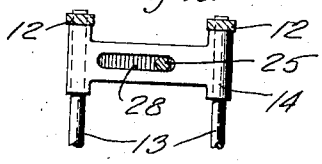


Fig. 11.

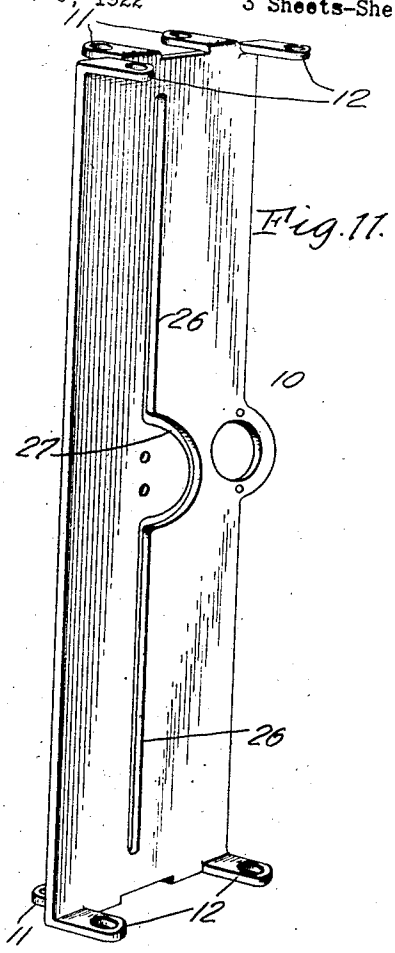


Fig. 12.

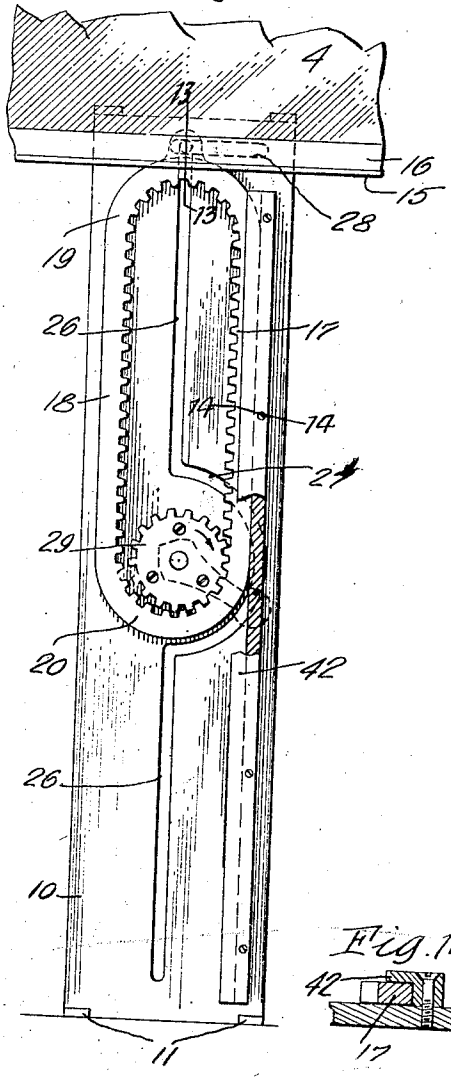


Fig. 13.

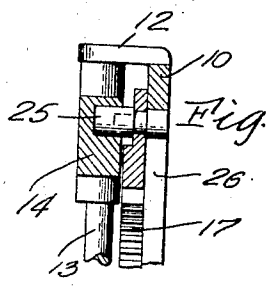


Fig. 14.

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Patented Apr. 14, 1925. 1,533,155

UNITED STATES PATENT OFFICE.

ANTHONY ZITTERBART, OF BUFFALO, NEW YORK, ASSIGNOR TO MATTHIAS STRODEL, OF BUFFALO, NEW YORK.

WINDOW-OPERATING MECHANISM.

Application filed February 6, 1922. Serial No. 534,434.

To all whom it may concern:

Be it known that I, ANTHONY ZITTERBART, a citizen of the United States, residing at Buffalo, in the county of Erie and State of New York, have invented a new and useful Improvement in Window-Operating Mechanism, of which the following is a specification.

My invention relates to window operating mechanisms and is more particularly designed for use in connection with vehicle windows for raising and lowering the glass panels of such windows.

One of the objects of the invention is to provide a window operating mechanism for the doors of vehicles such, for instance, as automobiles, which shall dispense with the sprocket chain that up to the present has been extensively used in the window raising and lowering mechanism of automobiles. In such structures there is generally provided a lower idler sprocket wheel and an upper operating sprocket wheel rotated by a handle mounted on the interior face of the door. A sprocket chain rides over these wheels and is provided with a device or mechanism arranged to engage the lower edge of the window for raising and lowering the same. One of the difficulties contended with in this structure is that of the sprocket chain jumping off one or the other sprocket wheel. The chain has to have a certain amount of slack to readily run over the sprockets and frequently, particularly after the chain has been in use for a length of time and the parts become slightly worn or loosened, the chain will jump off the sprocket, especially if any unusual strain is exerted thereon necessitating partially dismantling the door to get at the apparatus for repair.

Another objection to the sprocket chain structure is the cost of manufacture and the difficulty in placing the structure in position. The two sprocket wheels have to be carefully aligned relatively to one another and relatively to the glass panel to insure easy running of the device and to prevent the sprocket from jumping one of the wheels. The sprocket chain itself is a costly device and is easily gotten out of order.

Another object of my invention is to provide a structure particularly designed for raising or lowering the glass panels of automobile doors and the like, which dispenses entirely with a sprocket wheel and which at the same time will operate in the limited space provided in an automobile door for devices of this character and provide more complete raising and lowering of the glass panel.

Another object of my invention is to provide in a device of this character a mechanism which shall comprise in itself a complete unit completely assembled and ready for insertion in the door.

Another object of my invention is to provide in an apparatus of this character a structure wherein the necessity of aligning the various parts after or during assembly in the door is dispensed with and to provide a device wherein the parts may all be assembled and properly aligned before being placed in position in the door.

Other objects and advantages of my invention will more fully appear in the accompanying specification and claims.

For the purpose of disclosing the invention certain embodiments thereof have been illustrated in the accompanying drawings, in which:

Fig. 1 is a side elevation of an automobile door, the portion of the interior lining being broken away to show the window operating mechanism in position.

Fig. 2 is a sectional view taken on the line 2—2 of Fig. 1,

Fig. 3 is a sectional view taken on the line 3—3 of Fig. 2 and showing the window operating mechanism more in detail,

Fig. 4 is a detail view showing the position of the rack in a portion of its movement.

Fig. 5 is a detail view showing the operating mechanism in its lowered position,

Fig. 6 is a sectional view taken on the line 6—6 of Fig. 3,

Fig. 7 is a detail sectional view taken on the line 7—7 of Fig. 6 showing the locking mechanism in locking position,

Fig. 8 is a similar view showing the locking mechanism unlocked,

Fig. 9 is a detail section on the line 9—9 of Fig. 4,

Fig. 10 is a detail section of the window elevator,

Fig. 11 is a perspective view of the guide plate,

Fig. 12 is a side elevation of a modified form of my invention,

Fig. 13 is a sectional view taken on the line 13—13 of Fig. 12, and

Fig. 14 is a sectional view taken on the line 14—14 of Fig. 12.

In the embodiment illustrated I have shown a conventional door 1 for use on an automobile of the closed type. This door as is usual is provided with a window frame 2 at its upper part and a window well 3 at its lower part, the window glass 4 being the usual plate glass structure adapted to be raised into the frame and lowered into the well, and operating in the usual side channel guides 5. The top of the well is covered by the usual rail 6 slotted to permit the glass to be raised and lowered therethrough and bracing panels 7, 8 and 9 are secured within the well to provide means for attaching the lining of the door and for securing the raising and lowering mechanism in position.

The parts of the raising and lowering mechanism are all mounted on a supporting and guide plate 10 which preferably comprises a flat rectangular plate provided at each end with a pair of integrally formed horizontally disposed securing ears 11 which extend at right angles to the plate and provide means for attaching, by means of screws, the plate in position. The plate is also provided at each end with a pair of integrally formed angularly disposed ears 12 in which are supported vertical guides 13 which preferably take the form of guide rods secured between these ears 12. A raising and lowering carriage or window attached member 14 moves vertically on these guide rods and on its front face is provided with an angle 15 forming a seat for the lower edge of the window glass 4. This glass is preferably secured at its lower edge in a channel member 15 by the usual means provided for such a structure, such for instance as imbedding the lower edge of the glass in shellac in the channel and the channel secured to the angle 15 by means of screws, if desired, or gravity may be depended upon for causing the glass to drop as the window attached member 14 is lowered. The window attached member 14 is raised and lowered by a continuous looped shaped rack having a pair of oppositely disposed parallel side members 17 and 18 which at their ends merge into semi-circular ends 19 and 20. The outer edges of this member in the preferred construction are provided with rack teeth while the inner edges are straight. This rack member is secured on the face of the plate 10 by means of a circular rotatable disk 21 which fits within the rack member and has its outer edges engaged by the rack member. The outer face of this disk wheel is provided with an annular flange 22 which overlaps the face of the rack member to prevent displacement of the rack member from the plate and the disk is provided with a central opening to receive the hub 23, which hub is secured to the plate 10 by screws extending therethrough and into the plate and is provided with a flange 24 countersunk in the disk for securing the disk in position and at the same time permitting a rotation of the rack. One end of the rack is provided with a pin 25 arranged to project through a slot 26 formed in the plate 10. This slot, as illustrated, is straight from end to end with the exception of its middle portion 27 which is semi-circular and concentric with the guide disk 21. This pin 25 on the rack engages in a transversely extending slot or recess 28 on the elevator so that the window attached member will be raised and lowered with the rack and at the same time the pin may move transversely in the slot.

The rack is engaged and operated by a gear 29 rotatably mounted on the face plate, which gear on its face is provided with a disk cover 30 of substantially the same diameter as the diameter of the gear whereby it will overlap the face of the rack to insure with the flange on the center guide disk 21 the guiding of the rack and prevent the rack from slipping off the gear. This gear is provided with an enlarged hub 31 extending through and bearing in the base plate 10 and on its inner face this hub has formed therein and extending to the periphery thereof a rectangular recess 32. Mounted within the recesses a reciprocating locking dog 33, the outer edge of which is provided with teeth arranged, when the dog is forced outwardly under the influence of the coil springs 34 interposed between the base of the dog and the bottom of the recess, to engage in the rack teeth formed on the inner periphery of an annular ring 35 secured to the face of the base and thereby lock the gear against rotation. This locks and holds the rack, due to the meshing of the gear therewith, in any position to which it may be moved so that the window 4 may be moved to any desired position and locked in said position. The gear is rotated by means of a shaft 36 which is provided with a substantially triangularly shaped cam 37. The base of this cam is arranged to engage with the bottom of the locking dog 33. provide not only a mechanism for rotating the gear but for automatically releasing the locking dog when the shaft is rotated. This operation is shown in Figs. 7 and 8 of the drawings. When the shaft 36 is rotated in either direction the base of the cam will rock in engagement with the dog and move the dog inwardly until the bottom of the dog comes into engagement with the bottom of the recess 32 on the hub, after which further movement of the cam will be prevented and the gear 30 and shaft will move together. A cover plate 38 fits over the hub and is secured thereon by suitable machine screws.

In assembly, the parts above described are

all assembled on the base plate 10 before introduction into the window well of the door so that the device comprises a complete unitary structure. It will be seen that the parts are of such construction and arrangement that practically all of them may be stamped from sheet metal which permits the device to be cheaply and easily manufactured. About the only parts which are not necessarily made with stamping are the two guide rods 13 and possibly the window attached member 14, although the guide bars could be made flat instead of round to enable them to be formed from stampings.

The assembled unit is placed in the well of the door, suitable screws being passed through the bottom ears 11 for securing the lower end of the mechanism to the bottom brace 9. At its top the ears 11 on the plate 10 are secured to a cross-piece 39 beneath the rail 6, or the mechanism may be secured in position in any other desired manner. The squared end 40 of the shaft 36 is projected through the central brace 8 and after the lining and padding is secured on the inner face of the door the operating handle 41 which makes a slip connection with the squared end of the shaft is secured in position on the door. The lower end of the glass having been secured on the channel 15, all the parts are in condition for operation.

In operation, referring particularly to Figs. 3, 4 and 5, with the rack in its raised position, the gear 29 will be rotated by the handle 41 in the direction of the arrow. The upper end of the rack being held against rotation by the engagement of the pin 25 in the slot 26, the rack bar will be lowered until its upper end coincides with the guiding disk 21. Due to the fact that the slot 26 at this point is semi-circular, the guide-pin 25 will now no longer hold the rack bar against rotation and the bar will be rotated on the guide disk 21 in the manner illustrated in Fig. 4, the elongate slot 28 in the window attached member 14 permitting the pin 25 to move transversely while still maintaining operating engagement with the window attached member. A continued rotation of the gear 29 will eventually raise the lower end 20 of the rack to the top, presenting the side 18 to the gear, and by continuing the rotation of the gear 29 in the same direction the rack will continue in its downward movement with the pin 25 operating in the bottom straight portion of the slot 26. The window attached member 14 is thus lowered from its extreme upper position to its extreme lower position and the glass completely lowered in the well. In rotating the handle 41 for the purpose of operating the shaft of the driving gear, as heretofore explained the teeth of the locking dog 33 will be moved out of engagement with the teeth of the rack 35 so that the handle will be free to rotate. Since, however, as soon as pressure is released on the handle 41 the springs 34 will throw the dog 30 outwardly and the teeth thereof into engagement with the rack on the ring 35 the gear will be locked against rotation and the parts held in whatever position to which they may have been moved. This is particularly advantageous as it permits the glass to be locked in any position to which it may be moved without attention on the part of the operator. The mere releasing of the handle locks the glass in the position to which it is moved.

For elevating the glass, the handle is operated in a reverse direction to that heretofore described and the same movement will take place on the part of the rack except in a reverse direction. It is thus seen that by reversing the rack and causing the rack teeth on one side of the rack first to engage the gear and then the rack teeth on the opposite side of the rack member to engage the gear, I am enabled to get a movement of the window attached member substantially twice the length of that of the rack whereby the device may be operated in comparatively limited space.

In Figs. 12, 13 and 14 I have illustrated a modified form of elevating mechanism wherein the rack teeth are formed on the inner edge of the member with the operating gear 29 arranged within the member. In this instance a guide gib 42 is provided on the base instead of the disk guide 21 provided in the apparatus illustrated in Figs. 1 to 11. In other respects, however, the operation and construction of the apparatus is substantially the same.

I claim as my invention:

1. In a window operating device, the combination with a window attached member, of means for imparting movement thereto including a gear wheel, a pair of parallel racks connected to said window attached member operated by said gear wheel and arranged to successively engage said gear wheel, so as to be moved endwise and be reversed by said gear wheel and means for locking said racks in any position to which they may be moved.

2. In a window operating device, the combination with a window attached member, of means for imparting movement thereto including a gear wheel, a pair of parallel racks connected to said window attached member operated by said gear wheel and arranged to successively engage said gear wheel, so as to be moved endwise and be reversed by said gear wheel, and means for locking said gear wheel against rotation in any position in which it may be turned when operating said racks.

3. In a window operating device, the combination with a window attached member, of means of imparting movement

thereto including a gear wheel, a pair of parallel racks connected to said window attached member operated by said gear wheel so as to be moved endwise and be reversed by said gear wheel, and means for locking said gear wheel against rotation automatically disengaged by the application of power to said gear wheel for rotating the same.

4. The combination with a member to be moved, of means for imparting movement thereto including a gear wheel, a pair of parallel racks connected to said member operated by said gear wheel and arranged to successively engage said gear wheel, so as to be moved endwise and be reversed by said gear wheel a shaft for rotating said gear wheel, a handle mounted on said shaft, means for locking said gear wheel against rotation, and means operated by said handle in turning the gear wheel for rendering said locking means inoperative.

5. In a window operating device, the combination with a window attached member, of a base member, guide means for said window attached member secured to said base member, and means for imparting movement to said window attached member including a gear wheel and a pair of parallel and reversible racks mounted on said base member, said racks being operated by said gear wheel and arranged to successively engage said gear wheel and be moved thereby to continue the movement of said racks and window attached member in the same direction.

ANTHONY ZITTERBART.