May 17, 1927. 1,629,277

E. KOEB

WINDOW REGULATOR

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Fig. 1.

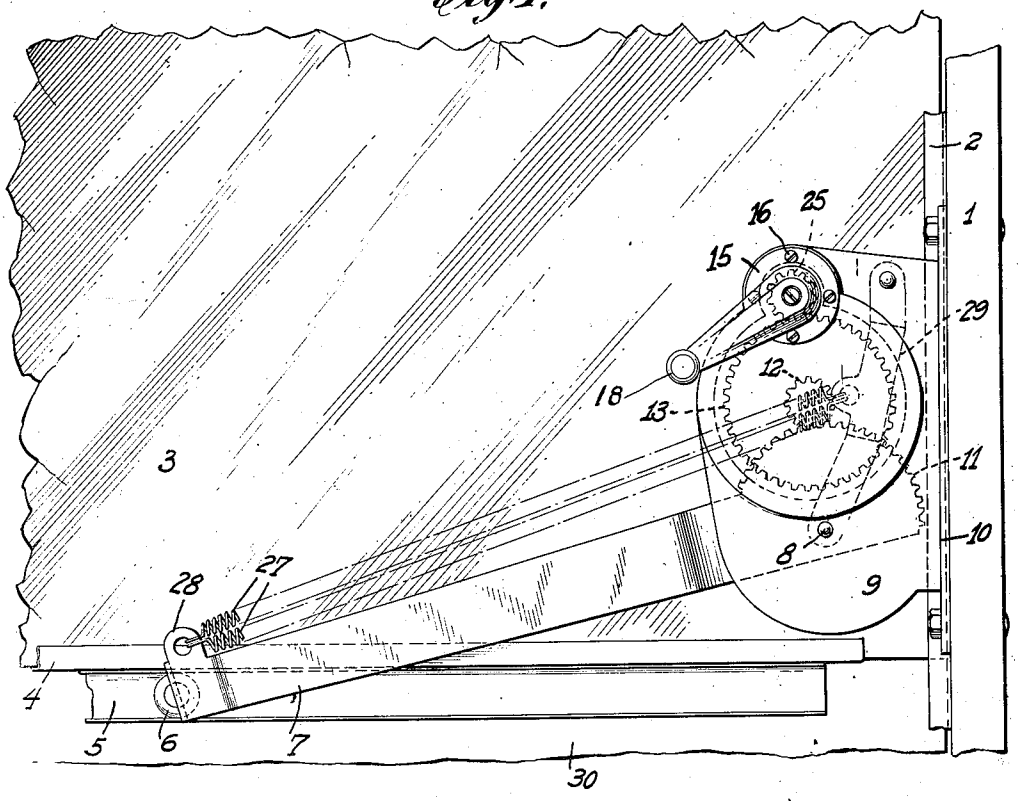



Fig. 2.

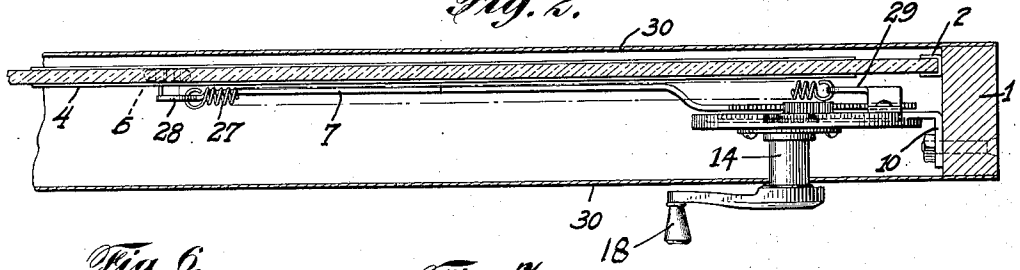



Fig. 6.

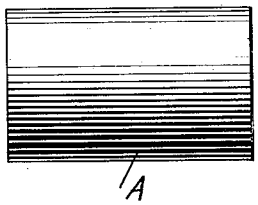



Fig. 7.

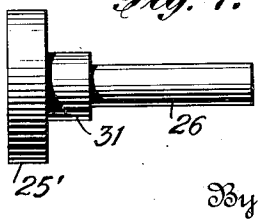
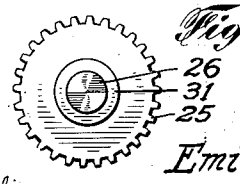



Fig. 8.




Inventor
Emil Koeb
By his Attorneys
Townsend & Decker.

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Fig. 3.

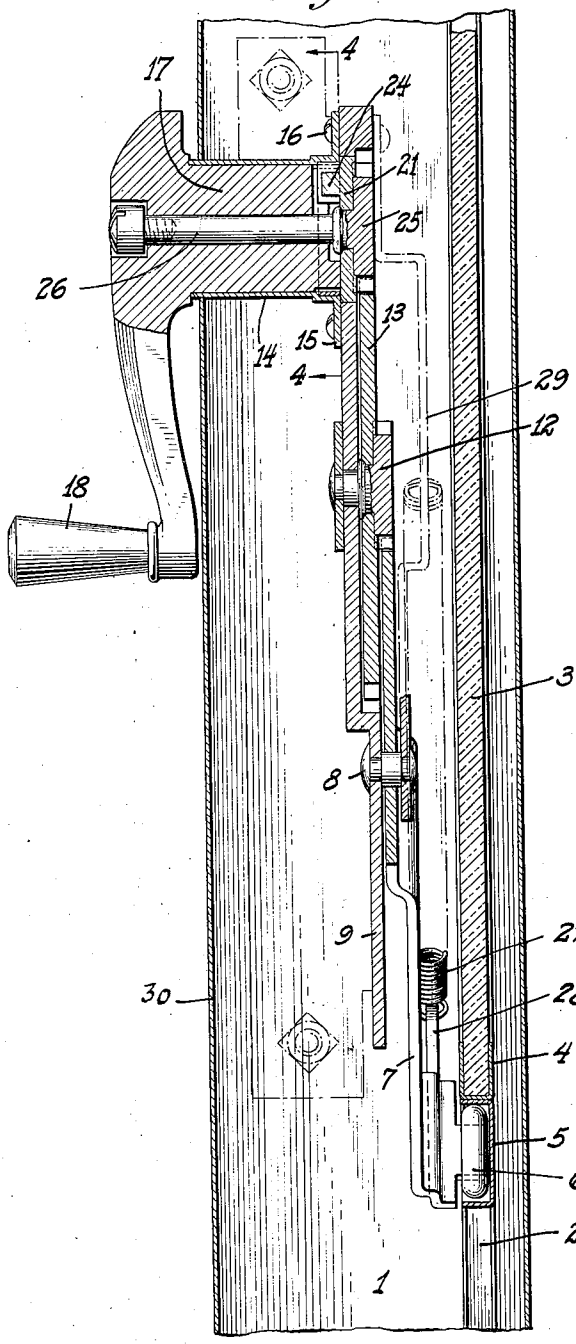



Fig. 4.

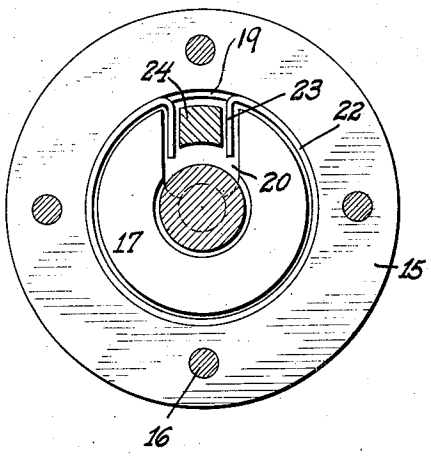
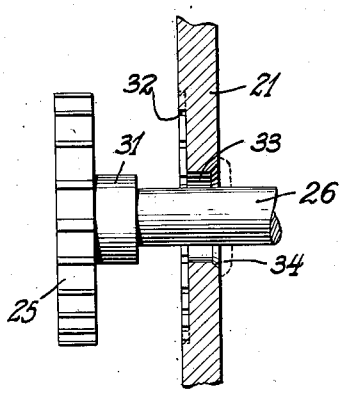



Fig. 5.




Inventor

Emil Koeb

By his Attorneys

Townsend & Wecker.

Patented May 17, 1927. 1,629,277

# UNITED STATES PATENT OFFICE.

EMIL KOEB, OF TUCKAHOE, NEW YORK, ASSIGNOR, BY MESNE ASSIGNMENTS, TO PERFECT WINDOW REGULATOR CORPORATION, OF NEW YORK, N. Y., A CORPORATION OF DELAWARE.

## WINDOW REGULATOR.

Application filed May 17, 1923. Serial No. 639,630.

My invention relates to window regulators adapted to raise and lower windows, in its specific application it being more particularly applicable to the raising and lowering of windows for vehicles such as closed automobiles.

The principal object of the invention is the production of a window regulator which shall preferably be of the crank type, that is, which shall be operated by a rotatable crank or handle and which shall be simple in construction and of few parts.

A further object of the invention is the production of a window regulator having the above characteristics and which shall be so constructed as to lock the window against movement as soon as the crank or handle is released.

Other and further objects of the invention will appear from the accompanying description, the invention consisting in the parts and combinations of parts hereinafter more particularly described and then specified in the claims.

In the accompanying drawings showing a practical embodiment of the invention:

Fig. 1 is a front elevation of a fragmentary portion of the window and frame showing the window regulator applied thereto.

Fig. 2 is a horizontal section (partly in elevation) of the parts shown in Fig. 1.

Fig. 3 is an enlarged vertical section taken through the device.

Fig. 4 is a vertical cross-section on the line 4—4 of Fig. 3.

Fig. 5 is an enlarged side elevation of the upper pinion showing the manner in which it is secured or held fast to its supporting plate.

Figs. 6, 7 and 8 are details showing the steps in the manufacture of a pinion or gear used in the construction of the device with a hub and shaft integral therewith.

Referring in detail to the drawings:

1 indicates the side members of a window frame which may be the window frame of a closed automobile, said members being provided with channels or guideways 2 receiving a window 3 which is slidable vertically therein as is now well known in the art. Said window 3 is provided with a strip 4 secured in any manner to the lower edge thereof and to which is fastened a U-shaped guide or channel 5 receiving a roller 6 which is pivotally mounted on the end of an operating arm 7. Said operating arm 7 adjacent its other end is pivoted as by a pivot 8 to a suitable support 9 which is provided with an inturned flange 10 secured by bolts and nuts or by other means to one of the side members 1. As illustrated, the inner end of said operating arm 7 is also provided with a toothed segment or other toothed member 11 preferably forming an integral part thereof and meshing with a pinion 12 which is secured or made fast to a gear or other toothed member 13. The gear 13 is pivoted to the support 9 preferably adjacent the central portion thereof as shown in Fig. 3.

A bearing sleeve 14, which together with the support 9 constitutes the stationary portion of the apparatus, is of general cylindrical shape and is provided with an annular flange 15 which is bolted or otherwise secured to the support 9 by bolts 16. Said sleeve 14 rotatably receives the hub member 17 of a crank or handle 18, said hub member and crank being herein termed the operating member. The hub 17 and sleeve 14 are provided therebetween with an annular groove 19, the hub 17 including a slot or opening 20 communicating with said groove, the support 9 is also provided with an annular opening rotatably receiving therein an operated member or plate 21, movement of which plate towards the crank or handle is prevented by the sleeve 14. A clutch member or spring 22, shown herein as a flat band spring of uniform section, is positioned in the groove 19, the spring being flexible and normally expanded into frictional engagement with the stationary member or sleeve 14. The clutch member is provided with ends or fingers 23 which are bent to extend away from said spring in substantial parallelism, preferably inwardly, the ends or fingers being loosely received within the slot or recess 20. The rotatable plate 21 is also provided with a lug 24 extending within the slot or opening 20 intermediate the engagement fingers 23 of the spring 22 for limited rotative movement with respect to said clutch member. It will accordingly be seen that the lug 24 and the portion of the hub 17 encircled by the clutch member 22 constitute interlocking projections permitting only limited rotative movement of the hub 17 and

operated member 21. The numeral 25 indicates a pinion carried on the end of a shaft or bolt 26 which extends loosely longitudinally through the hub 17. One end of said bolt passes through the annular rotatable plate 21 while the other end terminates in a head received by a suitable opening in the hub as shown. Said pinion and plate are made fast to each other in a manner to be presently described.

For raising or lowering the window 3 in its channels or guideways 2 the crank or handle 18 is rotated in a direction depending on the direction of movement it is desired to give the window. When so rotated a side wall of the opening or slot 20 in the hub first engages the outer side of either of the ends 23 of the clutch spring 22 and the drag of the other end of the spring tends to contract said spring away from the sleeve 14 to release the clutch and permit free rotation of the hub. Continued rotation of the crank and of the hub carries the lug 24 with it as said lug engages within the slot 20, the said spring being contracted then merely sliding in the groove 19. Inasmuch as the lug 24 is part of the plate 21 and the plate is fast to the pinion 25, motion is then transmitted through the pinion 25, gear 13, pinion 12, segment 11, operating arm 7 and roller 6 which slides in the channel or guide 5 resulting in a movement of the window in an obvious manner.

On the other hand, if the crank or handle is released and power is applied to the driven member, or in other words, the window, the spring 22 acts to lock the window against movement for the reason that the lug 24 on the plate 21 engages either of the inner sides of the ends 23 of the spring 22, thus expanding the spring and locking or jamming it into secure frictional engagement with the stationary or fixed member of the apparatus, that is, against the inner wall of the sleeve 14 whereby rotation of said hub is prevented. I have found in practice that while the specific system of gearing employed in itself acts to a large extent to prevent movement of the window when power is applied to the window itself, the specific construction of lock, to wit: the spring, absolutely and effectively acts to perform its desired locking function.

To counterbalance the weight of the window, that is to assist in the raising operation thereof, I have provided one or more springs 27 one of the ends of which are hooked to an eye 28 on the end of the operating arm 7, while the other ends are hooked to a corresponding eye on an arm 29. One end of said arm is pivoted to the support 9 adjacent its upper portion while the other end is pivoted on the pivot 8. As is customary I prefer to cover the lower part of the window or the window sill with upholstery 30 or other material so that the operating mechanism with the exception of the handle is hidden from view.

In Fig. 5, I have shown in detail my specific and improved method of securing the pinion 25 to the supporting plate 21, said pinion 25 being provided with a hub 31, as is illustrated. In said figure the supporting plate 21 is punched or depressed so as to provide a depression 32 having openings therein, said depression and openings being of a size adapted to receive and interfit with the pinion 25 and the teeth on the pinion 25 respectively. Said supporting plate is also provided with an opening or bore 33 adapted to receive the hub 31 of said pinion. To connect the parts together the hub 31 is slipped into the opening 33 so that the pinion 25 will enter the depression 32 and the teeth of said pinion will enter the openings in said depression. The outer edge of said hub 31 is then riveted over onto the face of said supporting plate as indicated in dotted lines at 34. I prefer in practice also and it is desirable to connect the gear 13 and pinion 12 in the same manner as is shown in Fig. 3.

In Fig. 6, I have shown a metallic blank from which the shaft 26, hub 31 and pinion or gear 25 are formed. This blank is machined down to produce an annular portion 25′ as shown in Fig. 7, the hub 31 and the shaft 26 all of which are an integral structure. The annular portion 25′ is then stamped out to form teeth therein and produce a pinion or gear 25 as shown in end view in Fig. 8.

What I claim as my invention is:

1. In combination, an operating member, a stationary member, a flexible clutch member positioned within said stationary member and normally expanded into frictional engagement therewith, said clutch member including engagement fingers extending from the body of said clutch member, and an operated member including means positioned for engagement with said engagement fingers, and means operatively associated with said operating member and constructed for engagement with said fingers for moving said clutch member and operated member.

2. In combination, an operating member, a stationary member, a flexible clutch member positioned within said stationary member and normally expanded into frictional engagement therewith, said clutch member including engagement fingers extending inwardly from the body of said clutch member, and an operated member including means positioned between said fingers for engagement therewith, and means carried by said operating member and constructed for engagement with the outer faces of said fingers for moving said clutch member and operated member.

3. In combination, an operating member, a stationary bearing sleeve rotatably supporting said operating member, a flexible clutch member positioned between said operating member and said sleeve and normally in frictional engagement with the latter, said clutch member including engagement fingers extending from the body thereof, and an operated member, said operating member including means constructed for engagement with said fingers for releasing said clutch member from engagement with said sleeve, said operated member including means for engagement with said fingers for causing said clutch members to more securely engage said bearing sleeve.

4. In combination, an operating member, a fixed member, a flat band spring normally tensioned for frictional engagement with said fixed member, said spring including engagement fingers extended from the body thereof, and means movable with said operating member for engaging said fingers for releasing said spring from said fixed member, an operated member including a part positioned for engagement with said fingers to be moved thereby, said operated member causing said spring to more firmly engage said fixed member when moved into engagement with either of said fingers.

5. In combination, a fixed cylindrical sleeve, a spring member normally expanded into frictional engagement therewith, and including inwardly extended engagement fingers, a rotatable hub, said hub being provided with an opening loosely receiving said fingers and having limited rotative movement relatively to said spring member, an operated member provided with an extension positioned within said opening and between said fingers and having limited rotative movement relatively to said spring member.

6. In combination, a fixed substantially cylindrical bearing sleeve, a circular band spring normally expanded into engagement therewith and including engagement fingers extended away from the body of said spring in substantial parallelism, an operating member having means for engagement with one face of each of said fingers for releasing said spring from engagement with said sleeve, and an operated member having means for engagement with the opposite face of said fingers to be moved thereby.

7. In combination, a rotatable hub, a shaft extending loosely axially through said hub, an operated member secured to said shaft for rotation relatively to said hub, said operated member and hub having interlocking projections permitting limited rotative rotation of said hub and operated member, a fixed member, a clutch spring normally expanded into engagement with said fixed member and including extensions positioned between the interlocking projection of said hub and operated member.

8. In combination, a cylindrical bearing sleeve, an operating member including a hub portion provided with a stop shoulder for engagement with said sleeve, an operated member provided with a shoulder constructed for engagement with a portion of said sleeve spaced axially from the point of engagement of said hub portion and sleeve, a longitudinally extending shaft normally preventing axial separation of said hub and operated member but permitting relative rotation thereof, said hub and operated member being provided with interlocking projections permitting limited rotative movement of the former relative to the latter, and an automatic friction clutch constructed to be engaged by said hub and operated member to be released by the former and to be locked by the latter.

9. In a device of the character described, a driving member provided with a recess therein, a handle connected to said driving member, a circular band spring positioned within said recess and provided with free ends turned inwardly and disposed between the walls of said recess, and a driven member provided with a projection entering said recess and adapted to engage the ends of said spring.

10. In combination, an operator, a fixed member, said operator and fixed member being provided with a circular opening therebetween, a spring of substantially uniform section within said opening and having its ends extending toward the center thereof, and an operated member provided with means extending intermediate the ends of said spring for forcing said spring into locking engagement with said fixed member.

11. In combination, an operator, a fixed bearing sleeve, a hub member rotatably supported by said sleeve and connected to said operator and provided with a groove therein and with a slot communicating with said groove, an operated member provided with a portion positioned within said slot, a spring within said groove, said spring being normally expanded into engagement with said bearing sleeve and adapted to be engaged by said operated member and said hub member to cause said spring to be engaged with or disengaged respectively from said sleeve.

12. In combination, a support, a rotatable plate carried thereby, a pinion fixed to said rotatable plate, a fixed bearing sleeve secured to said support, a crank, a hub member for said crank mounted in said sleeve, a spring normally frictionally engaging a portion of said sleeve, a lug carried by said rotatable plate and adapted to engage said spring when moved in either direction to cause the same to more firmly engage said

sleeve, said hub embodying means for releasing the frictional engagement of said spring with said sleeve.

13. In a window regulator, an operating member, an operated member, a fixed member, a circular band spring normally frictionally engaging said fixed member, said operating member and operated member having means for releasing and locking said spring respectively, a window moving element, and means including a plurality of pairs of interlocking gears for causing said element to be moved when said operated member is actuated.

14. In a window regulator, an operating member, an operated member, a fixed member, a circular band spring normally frictionally engaging said fixed member, said operating member and operated member having means for releasing and locking said spring respectively, a window moving element, means including a plurality of pairs of interlocking gears for causing said element to be moved when said operated member is actuated, and spring means for counterbalancing the weight of said window.

15. In a window regulator, an operating arm, a toothed member carried thereby, a rotatable pinion meshing with said toothed member, a gear fixed to said pinion, a second pinion meshing with said gear, a crank, means connecting said crank and said second pinion, a fixed member, a spring-pressed friction device normally engaging said fixed member, means controlled by said crank for releasing said spring-pressed device from said fixed member and means associated with said second pinion for causing said device to be more firmly engaged with said fixed member.

16. In combination, a fixed member, a rotatable operating member, a rotatable operated member, a circular clutch element normally engaged with said fixed member and including terminal projections, said operating member and operated member including means positioned for engagement with said projections for causing said clutch element to be respectively released from or more securely engaged with said fixed member.

17. In combination with a movable window, a window regulator comprising an operating member, a driven member operatively connected to said window and to said operating member, a friction clutch and engagement means therefor, means carried by said operating member for releasing said friction clutch from said engagement means, and means carried by said driven member for forcing said friction clutch into more secure engagement with said engagement means.

18. In combination with a movable window, a window regulator comprising an operating member and an operated member, means for operatively connecting said operated member with said window, releasable friction mechanism for normally preventing movement of said operated member, means operated by said operating member for releasing said friction mechanism and moving said operated member.

Signed at New York, in the county of New York, and State of New York, this 15th day of May, A. D. 1923.

EMIL KOEB.