

Aug. 9, 1927.

1,638,197

E. E. HEINTZ

WINDOW REGULATOR

Filed Aug. 27, 1923

2 Sheets-Sheet 1

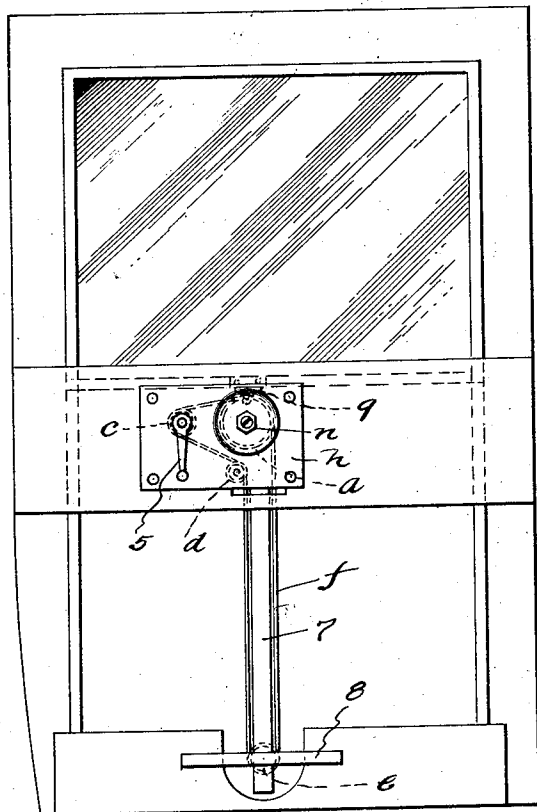


*Fig. 1*

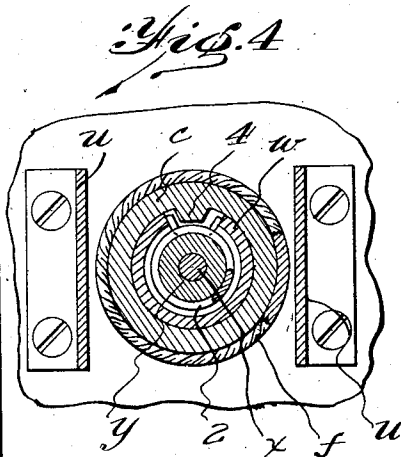


*Fig. 4*

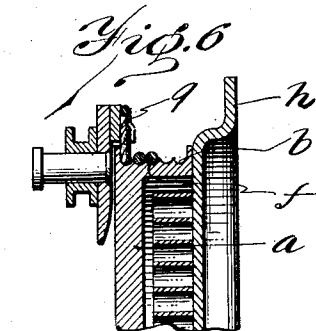
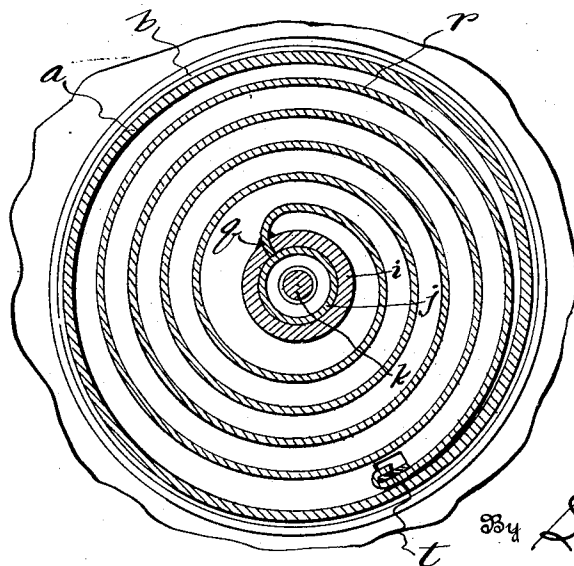


*Fig. 6*

*Fig. 5*

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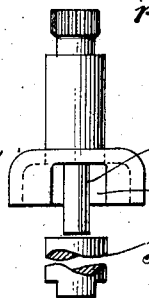
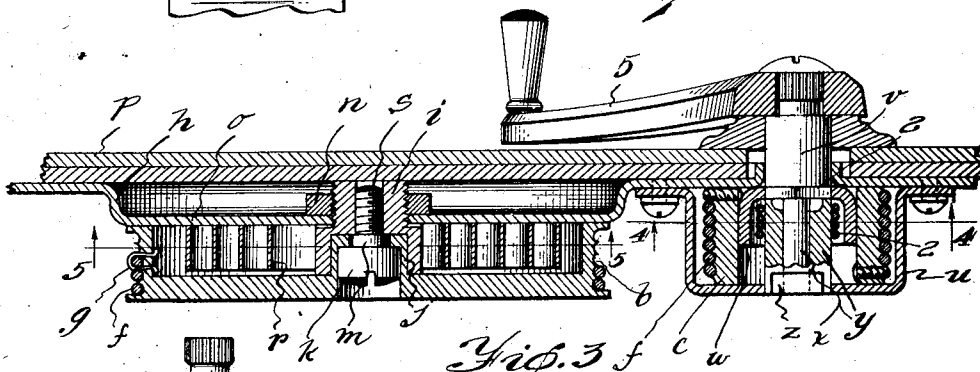
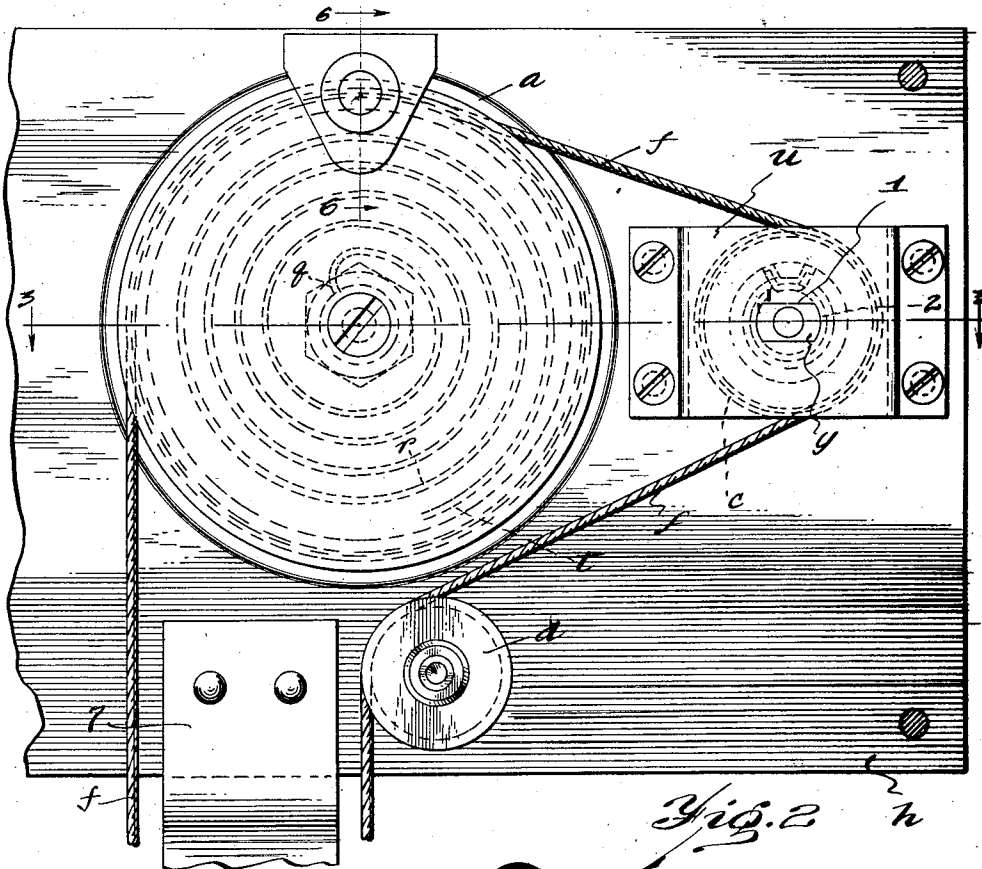
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## UNITED STATES PATENT OFFICE.

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## WINDOW REGULATOR.

Application filed August 27, 1923. Serial No. 659,449.

This invention relates to window regulators and has for its object an improved window regulator that is specially constructed to qualify it for low priced cars. Window regulators are quite commonly made to operate by means of chains and gears. These regulators are fairly satisfactory but the chains are expensive to construct and they make the window regulator somewhat high priced for low priced cars. The chain also is inclined to be noisy. It is the object of the present invention to make a practical, silent, and economically constructed regulator.

In the drawings:

Fig. 1 is an elevation of a door with the trimming removed showing the regulator installed.

Fig. 2 is a fragmentary front elevation of a regulator.

Fig. 3 is a section on the line 3—3 of Fig. 2.

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

Fig. 5 is a section on the line 5—5 of Fig. 3.

Fig. 6 is a section on the line 6—6 of Fig. 2.

Fig. 7 is a detail of the clutch parts.

*a* designates a drum having a helical groove *b* in its periphery. This is the driven drum. *c* represents a spool provided with a helical groove in its periphery. *d* designates a sheave. *e* is another sheave; an aeroplane cable *f* is anchored to the center of the periphery of the drum *a* by a clip *g*. The cable then coils about substantially half of the periphery of the drum and runs down and turns under the sheave *e* running back up over the guide sheave *d* and thence coils around and substantially fills the helical groove of the spool *c*. One end of the cable is anchored at one end of the helical groove of the spool and the other end of the cable is anchored at the other end of the helical groove of the spool.

The driven drum is rotatably mounted upon the regulator plate *h* by means of a special screw machine stud *i*. The drum itself is provided with a central bearing boss or journal *j* which is adapted to be rotatably supported in the journal bearing formed by the hollow interior of the stud *i*. A cap screw *k* provided with a spacing collar *m* passes through the bearing boss or journal

of the drum and screws into the tapped interior of the stud *i*. The spacing collar prevents the head of the cap screw from binding on the boss or journal. An enlarged recess in the center of the drum permits the head of the cap screw to retreat into the drum so as to be completely sunk below the interior surface of the drum.

A lock nut *n* screws on to the threaded exterior of the stud *i* and tightly binds the stud to the pressed in portion *o* of the regulator plate. This pressed in portion permits the end of the stud and the lock nut to lie largely below the surface of the face of the regulator plate so as to permit the trimming *p* to cover the same without being bulged out. By loosening the nut *n* the stud *i* which at *q* anchors the inner end of the spiral counterbalancing spring *r* may be turned to tighten or loosen the spring for adjustment. A screw driver slot *s* is provided in the end of the stud for this purpose. The other end of the counterbalancing spring is bent over the struck out lug *t* of the drum. Preferably the drum will be a heavy stamping with the groove rolled in it.

At one side of the drum *a* is located a stamped metal clutch housing *u* which comprises simply a strip of metal secured by small screws to the regulator plate. The driving stud *y* has riveted on to the inner end, a cap-like collar. A reduced portion *x* forms a journal for the drive stud *v* and is arranged to fit into the stationary stud *y* which has a flattened end *z* adapted to fit into the non-circular opening *L* in the housing plate. The housing plate abuts against the shoulders formed on the stationary stud *y* by the flats *z* and consequently neither the stationary stud *y* nor the driving stud *v* can move longitudinally inwardly and the collar *w* prevents either stud moving longitudinally outwardly. The spring *2* is coiled about the stationary stud *y* and has its opposite ends turned radially outwardly to engage in the opening *3* of the collar *w* (see Fig. 4). The spool *c* has a lug *4* inwardly projecting and located between the two ends of the coil spring. This spring is a clutch spring. Where the driving effort comes through the handle *5* and the driving collar *w*, there is a tendency to open up the coils of the spring due to the slight amount of lost motion that exists before the driving

collar picks up the lug 4 of the spool. This occurs whether the driving effort is applied through the handle clock-wise or counter-clock-wise. On the other end if driving effort comes from the window through the cable and driving spool, the lug 4 in applying this effort to the driving collar, tends to wind the coil spring up or contracts it on the stationary stem and establishes a clutching action.

Now this clutch in action is simply a friction one and is not absolutely positive. It is of sufficient positivity to resist the ordinary road vibration in holding the window in partly open position. In order, however, to positively lock the window when in its uppermost position, the connection 9 between the cable and the window sash is such that when the window is in its uppermost position this connection is on a vertical line passing through the center of the drum. Inasmuch as the window can only slide vertically downward, it will be apparent that this is a dead center in an effort to apply force to the drum by thrusting the window downward, the consequence is that it forms an effective lock.

The spacer bar 7 connects the regulator plate with the foot strap 8 of the regulator. The sheave *d* located as it is below the upper drum at the side of the spacer bar 7 serves to cause both runs of the cable to run vertically along the spacer bar. This is advantageous both in taking up the tension of the cable by sliding the lower sheave *e* downwardly and also in making the device compact by preventing the spreading out of the cable into a triangle.

It will be apparent that the manufacturer may easily adapt this regulator for any window condition or body condition that may exist in any given car. The off-set of the driving handle from the center of the drum may be made at any distance from the drum by simply lengthening or shortening the cable and placing the screw holes for the clutch housing screws and the hole for the driving stud at any desired position on the regulator plate. This is not possible where gears are used as the size of the gears will have to be altered and this may affect the transmission ratio.

The desirable feature of this regulator is that no chain and no gears are utilized. At the same time a regulator is afforded in which the driving member may be set at any desired position along the regulator plate to accommodate itself to varied body positions. This can and has been done with a sprocket and chain-regulator where there is a positive connection between each sprocket and chain, but so far as we are aware, it has never been done with a cable regulator where no positive driving connection between the drum and spool and the cable is effected by

simply passing the cable over the same. By the arrangement of the helical grooves and anchors on the driving spool and on the drum, a positive driving connection is effected for both the drum and the spool.

There is believed to be novelty in the special bearing which is provided for the upper drum and also this bearing in connection with the pressing in of a section of the regulator plate. The subject matter, however, is thought to involve a separate invention and is included in a co-pending application No. 659,491.

There is thought also to be novelty in the bearing for the lower sheave and this is also made the subject of a separate application No. 659,450.

I am aware that it is not broadly new to employ a drum on which a cable winds in a helix for raising a window, but so far as I am aware in such a construction the window has always been hung on the cable when in its uppermost position, thereby putting a constant strain on the cable tending to wear it, and also putting a constant stress on the clutch, if there be a clutch. One of the features of my invention is that my cable drum is so arranged that it forms the same positive driving arrangement that is inherent in a sprocket wheel and the window-supporting connection 9 rides directly up the drum. This puts the weight of the window onto the drum and relieves the cable of the wearing tension. Furthermore, in my construction the window-supporting connection 9 rests at the top of the drum when the window is in its uppermost position, thereby substantially locking the window against descending, from any force applied to the window. This does away with the necessity of a clutch in the uppermost position and relieves the clutch parts, if a clutch is used, of all stresses.

No claim is made in this application to the window lifting connection that rides over the flange of the drum, as this might be used with an entirely different form of regulator, and is therefore thought to involve a separate invention. It is claimed in my co-pending application, Serial No. 672,793.

What I claim is:

1. In a window regulator, the combination of a frame, three rotatable members supported on the frame, a cable running over the three rotatable members positively anchored to two of the same, a window lifting connection carried by the cable and arranged to run part way over one of the rotatable members, and means by which the other rotatable member may be turned to drive the parts.

2. In a window regulator, the combination of three rotatable members, a frame for carrying the same upon which the rotatable members are supported at the points of a

triangle, a flexible cable running over said three rotatable members and so arranged on one of them as to be positively tied thereto, a window lifting connection carried on the cable and arranged to run part way over one of the rotatable members, and means by which the rotatable member positively tied to the cable may be turned to drive the parts.

3. In a window regulator, the combination of a frame, three rotatable members rotatably supported thereon at the points of a triangle, a flexible cable passing over the three members and having its two ends anchored to one of the members and wound there around in a helix, and an intermediate portion of the cable helically wound around one of the other rotatable members.

4. In a window regulator, the combination of a frame, three rotatable members supported thereon at the apexes of a triangle, a flexible cable passing over the rotatable members and wound on two of them in helices and having the two ends anchored to one rotatable member and an intermediate portion anchored to the other rotatable member.

5. In a window regulator, the combination of a frame including a plate, a drum supported on said plate rotatably, a lower sheave supported at the lower end of the frame, a driving spool supported on the plate in a position off-set to the drum, a flexible cable means connecting the lower sheave and the drum by means of a vertical run of cable and positively connecting the off-set drive spool and the drum so that the latter drives the drum, and a window lifting connection located on the vertical run of cable and supported in the top of said drum when the window is in raised position.

6. In a window regulator, the combination of a frame including a window regulator plate and a spacer bar, a drum supported on the plate rotatably, a lower sheave rotatably supported near the lower end of the spacer bar, a driving spool supported in an off-set

position on the window regulator plate at the side of the drum, cable means for connecting the drum and the lower sheave provided with a vertical run of cable and connecting the spool and the drum in a positive driving connection, and a window lifting connection secured to the vertical run of cable and running partially over the drum when the window is in raised position.

7. In a window regulator, the combination of a regulator frame including a regulator plate and a spacer bar, a drum rotatably supported on the plate, lower sheave rotatably supported on the lower end of the spacer bar, a driving spool helically grooved and supported in an off-set position to the drum on the regulator plate, the said drum being likewise provided with a helical groove, cable means connecting the drum and the lower sheave and also connecting the spool and the drum, said cable means winding helically on the said helical grooves in both the drum and the spool, and a window lifting connection supported on the run of cable between the upper drum and the lower sheave and running partially over the drum when the window is in uppermost position.

8. In a window regulator, a frame including a spacer bar, three rotatable members arranged at the apexes of a triangle and rotatably supported on said frame including one supported at the lower end of the spacer bar, a flexible linear member running over the three rotatable members and positively connected to one of them, and a fourth rotatable member for bending said flexible linear member out of its natural triangular position so as to carry two vertical runs of the linear member along the vertical spacer bar, and a window lifting connection secured on one of the vertical runs of the linear member and supported in the drum when the window is in raised position.

In testimony whereof I affix my signature.  
ERNEST E. HEINTZ.