May 10, 1932. E. L. ACKERMAN 1,858,070

CENTER LIFT WINDOW REGULATOR

Filed May 17, 1930 2 Sheets-Sheet 1

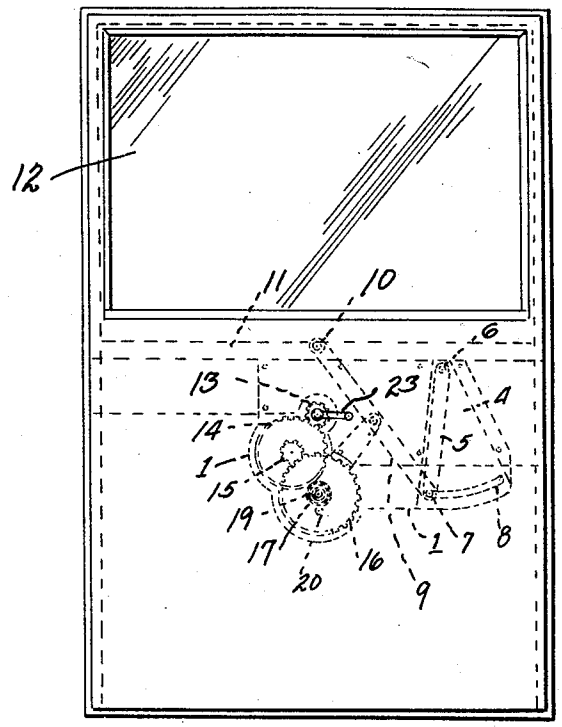

Fig. 1

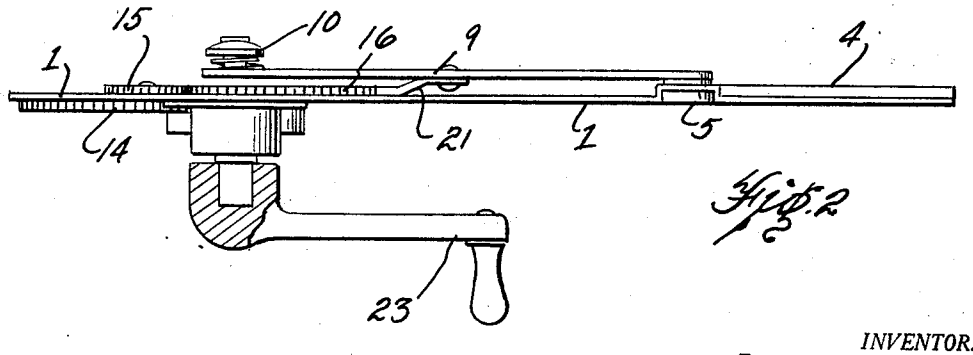

Fig. 2

INVENTOR.
EDWARD L. ACKERMAN

BY

Charles E. Wilson

ATTORNEY.

May 10, 1932. E. L. ACKERMAN 1,858,070

CENTER LIFT WINDOW REGULATOR

Filed May 17, 1930 2 Sheets-Sheet 2

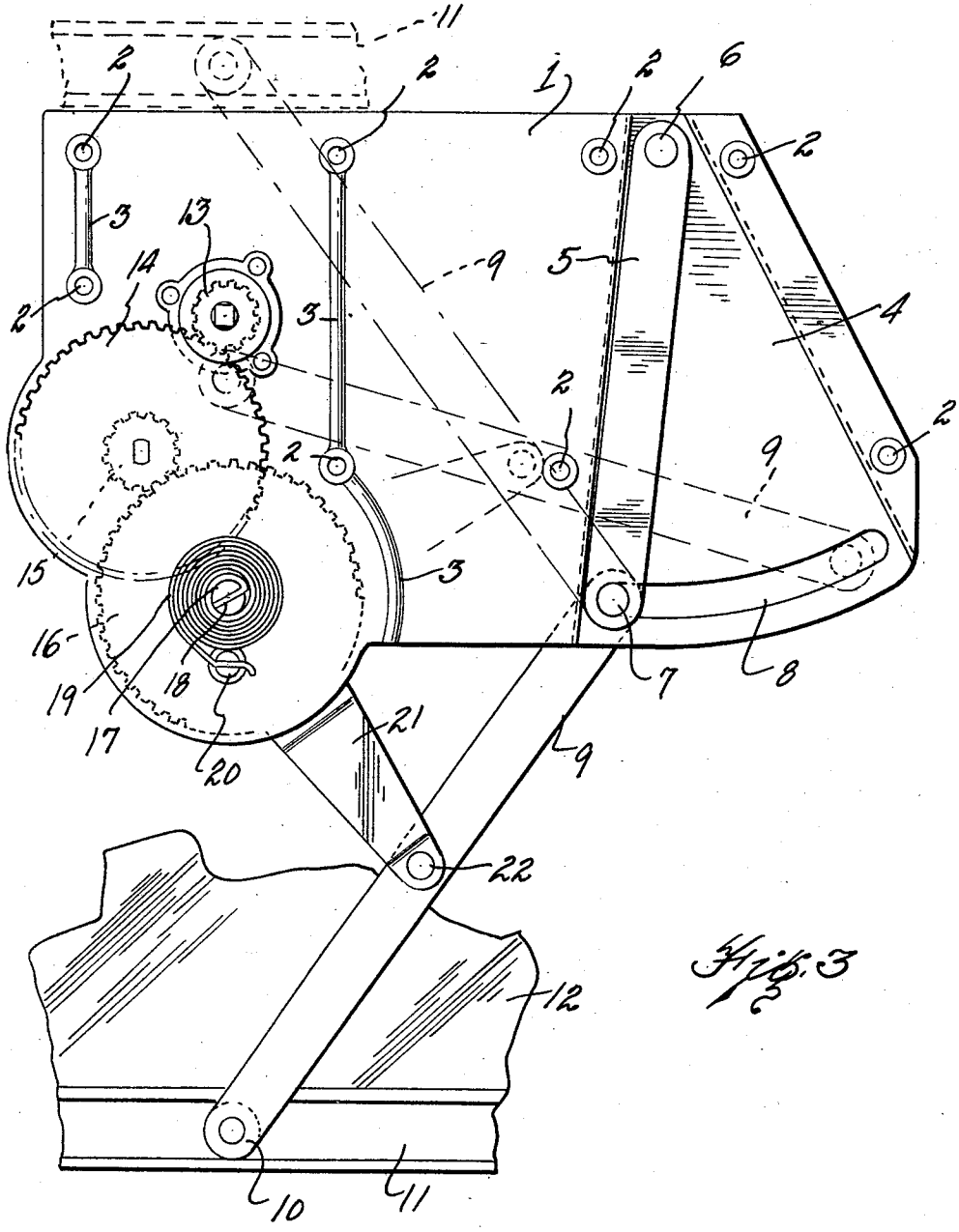

Fig. 3

INVENTOR.
EDWARD L. ACKERMAN

BY

ATTORNEY.

Patented May 10, 1932

1,858,070

UNITED STATES PATENT OFFICE

EDWARD L. ACKERMAN, OF DETROIT, MICHIGAN, ASSIGNOR TO ACKERMAN-BLAESSER-FEZZY, INC., OF DETROIT, MICHIGAN, A CORPORATION OF MICHIGAN

CENTER LIFT WINDOW REGULATOR

Application filed May 17, 1930. Serial No. 453,115.

This invention relates to center lift window regulators, and the object of the invention is to provide a regulator for raising and lowering the window of an automobile body and in which the support for the window is maintained at all times at the center of the window.

Another object of the invention is to provide a window regulator in which a pivoted arm is utilized for raising and lowering the window and in which the pivotal point for the lifting arm is movable on a radius to maintain the connection between the lifting arm and the window at the center of the window throughout the path of travel of the lifting arm.

A further object of the invention is to provide a window regulator arranged to support the sash at the center so that the window will not bind in the channels provided therefor while being raised or lowered.

Another object of the invention is to provide an oscillating arm, to the free end of which the lifting arm is pivotally connected, the arrangement being such that as the lifting arm is turned on its axis, the oscillating arm may move through an arc to maintain the opposite end of the lifting arm centrally of the window during raising and lowering of the window.

These objects and the several novel features of the invention are hereinafter more fully described and claimed and the preferred form of construction by which these objects are attained is shown in the accompanying drawings in which—

Fig. 1 is an elevation of the inside of an automobile door showing the window regulator in dotted lines.

Fig. 2 is an enlarged plan view of the window regulator.

Fig. 3 is an enlarged elevation of the window regulator showing the different movements of the lifting arm.

The device comprises a sheet metal plate 1 having screw holes 2 for attachment to the automobile door frame, and this plate is provided with embossed strengthening ribs 3 to strengthen and stiffen the plate. The plate is provided with an angular depressed portion 4 in which the oscillating arm 5 may swing. This arm 5 is pivoted to the plate 1 at 6 and the lower end of the arm 5 is provided with a pin 7 adapted to swing in the arcuate slot 8 in the depressed portion 4 of the plate 1. This pin 7 extends through the slot 8 and the lifting arm 9 is pivotally mounted on the pin 7 on the opposite side of the plate from the arm 5. The outer end of the lifting arm 9 is provided with a roller 10 mounted thereon which rides in the metal channel 11 secured to the lower edge of the window 12. A crank operated gear 13 is rotatably mounted in the plate 1 and meshes with a gear 14 which is also rotatably mounted on the said plate. A small gear 15 is secured to the shaft of the gear 14 on the opposite side of the plate 1 and meshes with a gear 16 which is secured to a pin 17 which is rotatably mounted in and extends through the plate 1.

The pin 17 is provided with a slot for the end 18 of a coiled spring 19 and the outer end of this coiled spring 19 is secured in a slotted pin 20 which is secured to the plate 1. The gear 16 is provided with an arm 21 extending from the periphery thereof and the end of the arm 21 is pivotally secured at 22 to the lifting arm 9 intermediate its ends.

By turning the crank 23 shown in Fig. 2, the gear 13 shown in Fig. 3 is rotated thus rotating the gear 14 on its axis. As the gear 15 rotates with the gear 14 the gear 16 which meshes with the gear 15 is rotated thereby. Rotation of the gear 16 moves the arm 21 through an arc as will be understood from Fig. 3. With the parts in the position shown in Fig. 3, upward movement of the arm 21 in a counterclockwise direction will move the arm 9 upwardly to lift the sash. At the same time, the pivot 7 which is free to move in the slot 8, allows the pivoted end of the lifting arm 9 to move in the slot 8 toward the right of Fig. 3. As the arm 21 is turned upwardly toward the dotted positions shown in Fig. 3, the end of the arm 9 will move back in the slot to about the dotted position shown in said figure, thus maintaining the roller 10 at the center of the channel 11 and beneath the center of the window so that the lift is directly

vertical and the window will not tend to bind in its channels.

Reverse rotation of the crank 23 lowers the lifting arm and window and by attaching the arm 21 to the pivot 22 centrally of the arm 9 the longitudinal movement of the lifting arm 9 will automatically maintain the roller 10 beneath the center of the window. By means of the oscillating arm 5, the weight and thrust of the different parts are carried by this arm so that the pin 7 is free at all times to move in the slot 8. The spring 19 which is secured at the end 18 in the gear pin 17 and is attached to the stationary pin 20 at the opposite end provides a means for counter-balancing the weight of the window. As the arm 21 is turned downwardly, the spring is wound up to increase its tension and as the arm 21 is turned upwardly, the spring 19 assists in the upward movement of the arm to aid in raising the window.

From the foregoing description, it becomes evident that the device is very simple and efficient in operation, will not easily get out of order, will maintain the window in proper relation in the guide channels to prevent binding, and provides a device which accomplishes the objects described.

Having thus fully described my invention, its utility and mode of operation, what I claim and desire to secure by Letters Patent of the United States is—

1. In a window regulator, a plate having an angular depression, an arm pivotally mounted in the angular depression, the angular depression being provided with an arcuate slot adjacent the free end of the said arm, a pin carried by the free end of the said arm and extending through the slot, a lifting arm pivotally connected at one end to the pin on the opposite side of the arcuate slot from the first named arm, the free end of the lifting arm being adapted for engagement against the lower edge of a window, a gear rotatably mounted on the plate, an arm formed integrally with the gear and pivoted to the lifting arm intermediate its ends, crank operated means for turning the said gear on its axis and yieldable means resisting rotation of the gear to lower the window and assisting rotation of the gear to raise the window.

2. In a window regulator, a plate having an angular depression, an arm pivotally mounted in the angular depression, the angular depression being provided with an arcuate slot adjacent the free end of the said arm, a pin carried by the free end of the said arm and extending through the said slot, a lifting arm pivotally connected at one end to the said pin on the side of the said slot opposite the first named arm, the opposite end of the lifting arm being adapted for engagement beneath a window, a gear rotatably mounted on the plate, an arm movable with and extending from the gear, the arm being pivotally connected to the lifting arm intermediate its ends and crank operated means for turning the said gear on its axis.

3. In a window regulator, a vertically movable window provided with a horizontal channel at the lower edge, a plate, an arm pivoted to the plate and movable through an arc, the plate being provided with an arcuate slot adjacent the free end of the arm, a pin carried by the free end of the arm and riding in the said slot, a lifting arm pivotally mounted at one end of the pin, a roller rotatably mounted on the opposite end of the said arm and riding in the channel of the window, a gear rotatably mounted on the plate, an arm formed integrally with and extending from the said gear, the last named arm being pivotally connected to the lifting arm intermediate its ends and a crank operated reduction gear train for turning the said gear on its axis.

4. In a window regulator, a plate, an arm pivotally mounted on the plate and movable through an arc, the plate being provided with an arcuate slot adjacent the free end of the arm, a pin carried by the free end of the arm and riding in the said slot, a lifting arm pivotally mounted on the pin, a gear rotatably mounted on the plate, an arm extending from the said gear and pivotally connected to the lifting arm intermediate its ends and crank operated means for turning said gear on its axis.

5. In a window regulator, a plate, an arm pivotally mounted on the plate and movable through an arc, a lifting arm pivotally connected to the free end of the aforesaid arm and adapted for engagement with the lower edge of a window sash, said plate having an arcuate slot and the pivotal connection between the first and second named arms including a pin riding in the slot, an arm pivotally connected to the lifting arm intermediate its ends, a gear carried by the last named arm and crank operated means for turning the said gear on its axis.

6. In a window regulator, a plate, an arm pivotally mounted on the plate and movable through an arc, a lifting arm pivotally connected to the free end of the aforesaid arm and engaging beneath the window, said plate having an arcuate slot and the pivotal connection between the first and second named arms including a pin riding in the slot an arm pivotally connected to the lifting arm intermediate its ends and means for turning the last named arm about an axis.

In testimony whereof I sign this specification.

EDWARD L. ACKERMAN.