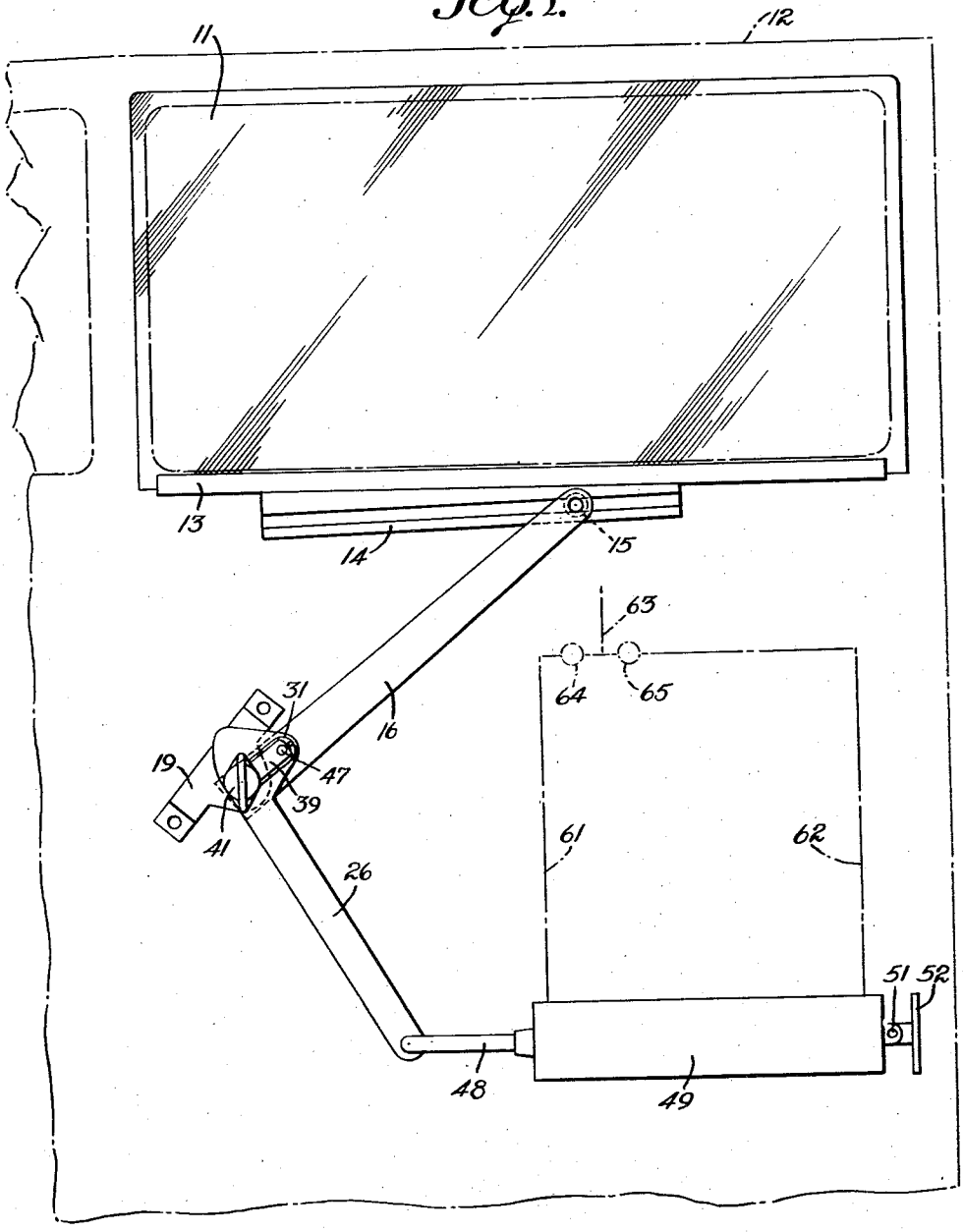
Oct. 3, 1944. A. RAPPL 2,359,490

WINDOW OPERATOR

Filed Jan. 15, 1941 4 Sheets-Sheet 1

FIG. 1.



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Filed Jan. 15, 1941 4 Sheets-Sheet 2

Fig. 2.

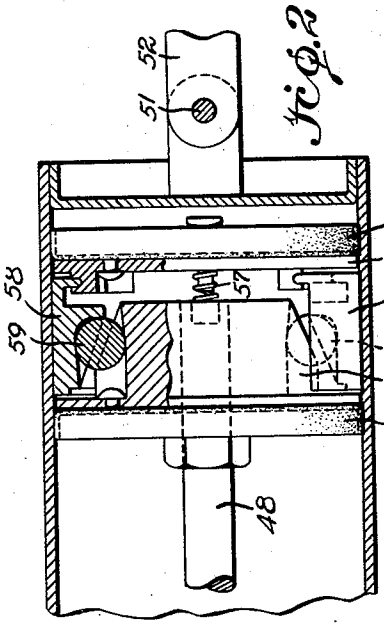


Fig. 3.

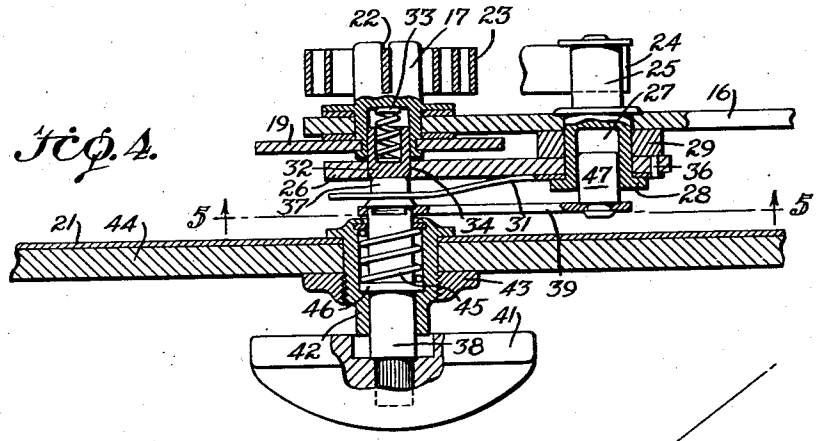
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WINDOW OPERATOR

Filed Jan. 15, 1941 4 Sheets-Sheet 3

FIG. 4.



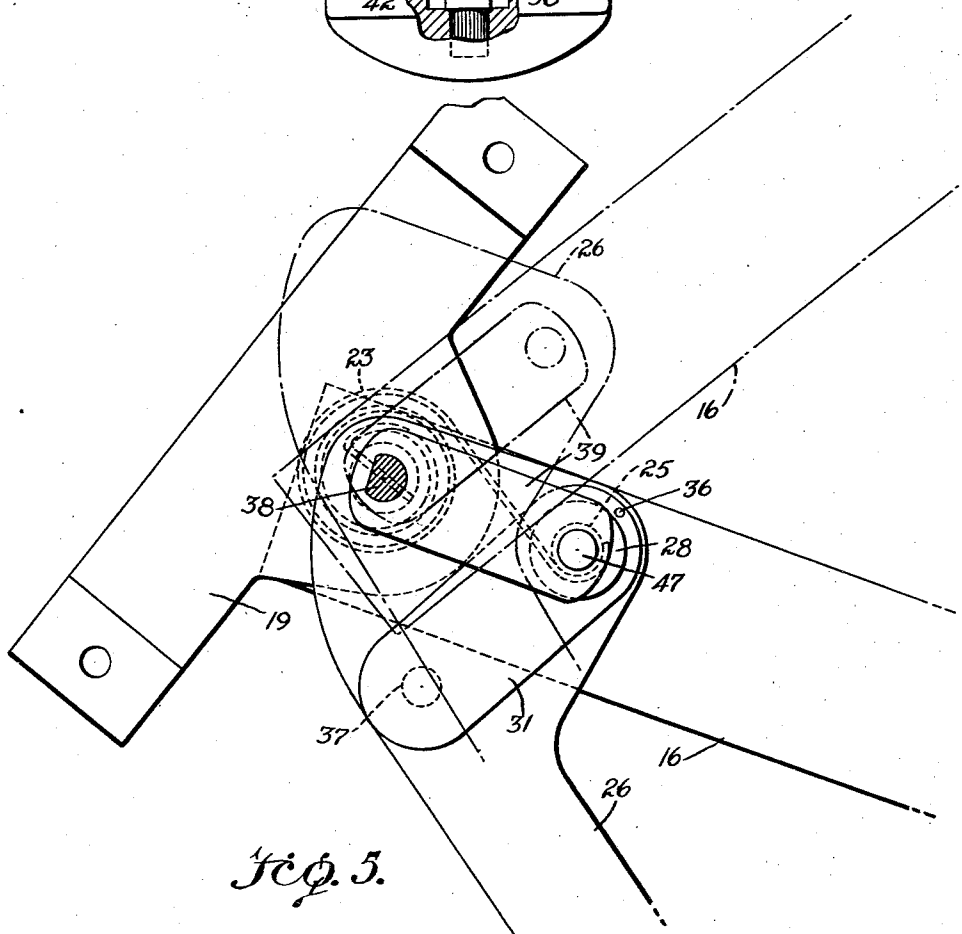


FIG. 5.

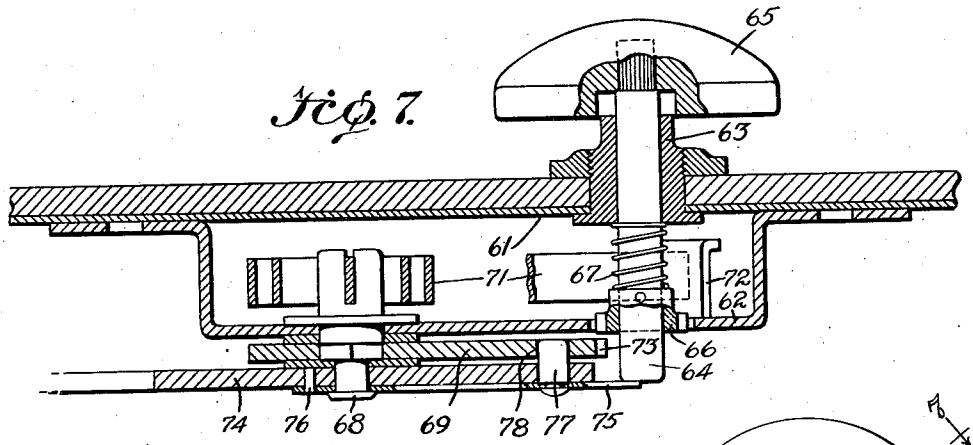
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WINDOW OPERATOR

Filed Jan. 15, 1941 4 Sheets-Sheet 4

Fig. 7.



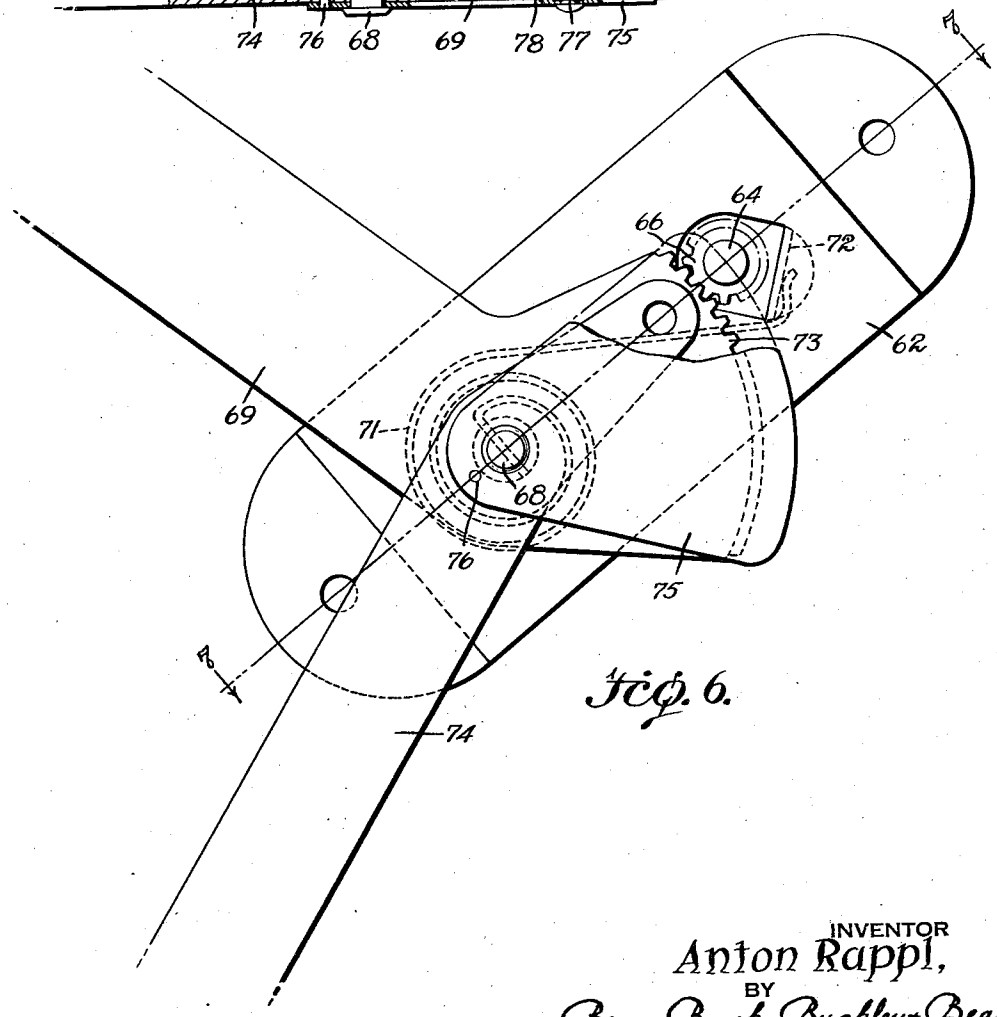


Fig. 6.

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UNITED STATES PATENT OFFICE

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WINDOW OPERATOR

Anton Rappl, Buffalo, N. Y., assignor to Trico Products Corporation, Buffalo, N. Y.

Application January 15, 1941, Serial No. 374,523

12 Claims. (Cl. 268—125)

The present invention relates to window operating mechanisms, and has particular relation to mechanisms ordinarily operated by power but adapted to be operated manually when desired or necessary.

The invention contemplates a window operator having a power unit, such for example as a suction operated power unit, which may not be adapted to be moved manually, and the mechanism is therefore provided with means for enabling a disconnection between the power unit and the window lift lever when the latter is to be operated manually. The invention provides novel arrangements of parts wherein a spring, to partially or wholly counterbalance the weight of the window, is effective both when the mechanism is power operated and when it is manually operated.

The mechanism may be changed from power to manual operation by merely pressing upon a knob or handle provided for this purpose, the manual window adjustment then being accomplished by turning the knob or handle; and the change from manual to power operation is effected automatically.

These and other objects and advantages will become apparent from the following description of the typical embodiments of the invention shown in the accompanying drawings, wherein:

Fig. 1 is a side elevation of an operating mechanism;

Fig. 2 is a fragmentary vertical section through the operating cylinder of the power unit of the mechanism;

Fig. 3 is a pulled-out perspective view showing certain parts of the mechanism in disassembled relation;

Fig. 4 is a substantially horizontal sectional view through the portion of the mechanism adjacent the pivot axes of the operating levers;

Fig. 5 is a vertical section taken along the line 5—5 indicated on Fig. 4;

Fig. 6 is a side elevational view of a modified operating mechanism; and,

Fig. 7 is a sectional view taken along line 7—7 of Fig. 6.

As shown in Fig. 1 the window glass 11, indicated as applied to a motor vehicle body 12, may be received in a channel carrier bar 13, to which is secured a track 14 for a roller 15 mounted on the end of a window lift lever 16. The latter may be pivotally mounted upon a pin or stud 17 which is fixed to a bracket 19 that constitutes a part of the framing structure of the window, the frame also comprising, for example, a side plate 21.

Engaging in a slot 22 in the fixed pivot pin is one end of a volute spring 23 whose opposite end 24 bears upon a crank pin 25. The spring serves to counterbalance the weight of the window assembly 13, 14, and the pin 25 serves to pivot the window lift arm to a power operated arm 26 eccentrically of the axis of pin 17. One end of pin 25 is provided with a bore 27 and this end may be riveted over, as indicated at 28, to secure the pivot assembly. A washer 29 is provided on the pin 25 between the levers 16 and 26 to space them. A normally flat leaf spring 31 is held between the rivet head 28 and the lever 26, and has a pin 36 locking it against movement relative to the lever about the axis of pin 25.

Slidable axially of the pin 17, in a bore therein, is a latch 32 backed by a coiled spring 33. The latch is adapted to engage in a recess or opening 34 in the power operated lever 26 to hold the levers 16 and 26 together for movement as a unit about the axis of pivot pin 17. The leaf spring 31 carries a stud 37 in alignment with opening 34. The coil spring 33, however, is sufficiently stiff to hold the leaf spring 31 flexed and the stud 37 retracted from the opening 34 when the parts are in the position shown in Fig. 4.

A manually operated member, comprising a shaft 38 having a crank arm 39 fixed to its inner end and a knob 41 to its outer end, is journaled for angular and also axial motion in a bushing 42. The latter may be clamped by a nut 43 to the frame member 21, which, if desired, may be provided with a covering 44. A coiled spring 45 within the bushing bears against a shoulder 46 on the shaft 38 holding it normally in the retracted position shown in Fig. 4. A stud 47 carried by crank arm 39 is slidingly received in the bore 27 of the pin 25, and, with the latter, constitutes a crank pin connecting the manually operated member 38 with the window lift arm 16 and the power operated arm 26.

Connected to the free end of arm 26 is the piston rod 48 of a fluid operated power device. The latter includes a cylinder 49 pivoted at 51 to a bracket 52 constituting a part of the frame structure. A piston in the cylinder includes cup packing members 53 and 54 carried by piston sections 55 and 56, respectively, separated by a light spring 57. Shoes 58 carried by section 56 are pressed against the cylinder walls by rollers 59, which coact with the shoes 58 and piston

section 55 to lock the piston against movement in the cylinder when any attempt is made to move the piston sections apart, but allowing free movement of the piston when fluid pressure urges the sections 55 and 56 toward one another.

For actuating the device the ends of the cylinder are connected by conduits 61 and 62 to a suction line 63 leading to a source of lower-than-atmospheric pressure, valve means 64 and 65 being provided to selectively disconnect the respective conduits from the suction line and to simultaneously admit atmospheric air to the disconnected conduit. Suction normally will be applied to both ends of the cylinder, so that the action of spring 57, urging the piston sections apart, will lock the latter against movement in the cylinder. However, should valve 64 or valve 65 be depressed, atmosphere would be applied to either the left or right ends of the cylinder (as the parts are viewed in Figs. 1 and 2), thereby moving the piston and piston rod 48 to the right or to the left, respectively.

In normal operation, as above described, the window will be raised and lowered by movement of the piston and piston rod, since the levers 16 and 26 are latched together by latch 32, and move together as a unit about the axis of pivot pin 17.

When it is desired, or necessary, to operate the window manually, the knob 41 is pressed inwardly, against the resistance of springs 45 and 33. This unlatches the levers 16 and 26, since the end of shaft 38 presses the stud 37 into opening 34, displacing the latch pin 32 therefrom, and hence allowing the power operated arm 26 to pivot freely about the eccentric or crank pin 25, 47. Turning of the knob will effect similar turning of window lift lever 16, the turning effort being applied through crank arm 39. If turned counterclockwise (as viewed in Fig. 1) the window will be closed, the lever 16 being raised from the full line to the broken line position shown in Fig. 5 and the other parts likewise moving from the full to the broken line positions.

After initiation of the manual turning of the knob 41, the latch 32 will move out of alignment with recess 34, and hence, the manual operation may be continued without maintaining the knob pressed inwardly against the resistance of spring 45.

When the mechanism is next operated by power, with the knob 41 released and in its normal position, the lever 26 will move free of the lever 16 until these parts reach their normal positions, at which time the latch 32 will drop into recess 34, locking the levers for movement together, as a unit, until they again are released as a result of manual depression of the knob.

In the form of the invention illustrated in Figs. 6 and 7, the frame member may include plate 61 and bracket 62, supporting a bushing 63 in which a manually operated shaft 64 is angularly and axially movable. A knob 65 is affixed to one end of the shaft, a pinion 66 is secured adjacent the other end, and a coiled compression spring 67 is mounted on the shaft between the pinion and the bushing.

Journaled for angular movement about its longitudinal axis in bracket 62 is a pivot pin 68 to which a window lift lever 69 is secured. A volute spring 71 for counterbalancing, either wholly or partially, the weight of a window operated by lever 69, has one end anchored to the pin 68 and its opposite end bearing upon an ear 72 struck out from the body of the bracket 62. The lift lever 69 has formed thereon gear teeth 73 adapted to mesh with the pinion 66.

A power operated lever 74 freely pivoted on the pin 68 carries a leaf spring 75 of substantially sector shape, the spring being secured to the lever 74 by engaging the pin 68 and also a pin 76 which extends into the lever. Carried by the spring is a latch pin 77 that extends through an opening in lever 74 and into a recess 78 in the window lift lever 69. The arcuate edge portion of the leaf spring is adapted to be engaged and moved by the inner end of shaft 64 when the latter is pressed inwardly, the extent of this edge portion being sufficient to permit such engagement in any possible angular position which the power operated arm 74 may assume.

Normally the mechanism is operated by power applied to lever 74 by any suitable device, such as the suction motor shown in Figs. 1 and 2. The lever 69 will normally move with the lever 74 by reason of the latch pin 77 engaging in recess 78, the shaft 64 being retained by the springs 67 and 75 in the position shown in Fig. 7, wherein the pinion 66 is disengaged from the teeth 73. Spring 67, which is lighter than spring 75, serves to retain the shaft in engagement with spring 75.

In order to effect manual operation, the knob 65 is pressed inwardly, engaging the pinion with the gear teeth 73 on the window lift lever, the end of shaft 64 engaging and flexing the spring 75 to shift the latch pin from engagement with the window lift lever. This will allow the latter to move free of power operated lever 74, the movement, effected by turning the knob 65, being transmitted through the gear elements. Upon release of the knob the shaft 64 will be returned to the normal position shown in Fig. 7 by the spring 67, and during a subsequent power operation of the lever 74 the latch pin will drop into the recess 78, latching the levers for movement together, as a unit. During both manual and power operation the spring 71 will be effective upon the window lift lever to counterbalance an associated window.

It will be understood that the mechanisms herein shown and described are merely illustrative of the inventive principles involved and that these principles may be otherwise embodied without departing from the spirit of the invention or the scope of the appended claims.

What is claimed is:

1. In a window operating mechanism, a frame member, a window lift lever pivoted thereto, a counterbalancing spring anchored to said frame member and connected to said window lift lever for counterbalancing the weight of an associated window, a power operated lever pivotally related to said window lift lever, means normally and detachably latching said levers for movement together about a common axis and comprising a spring backed latch pin, and a manually operable member journaled in said framework for angular and axial movement upon an axis eccentric to the axis upon which said power operated lever is pivoted to said window lift lever, said manually operable member acting when moved axially from its normal position to effect displacement of said latch pin from the recess to permit movement of the window lift lever independently of said power operated lever and being movable angularly to move the window lift lever about its pivot.

2. In a window operating mechanism, a frame member, a pin journaled for rotation therein, a window lift lever secured to said pin, a volute

counterbalancing spring anchored to said frame member and having one end portion engaging the pin to urge rotation of the latter to counterbalance the weight of a window associated with the lift lever, a power operated lever mounted for rotation upon said pin, one of said levers having a recess and a spring backed latch carried by the other of said levers normally engaging in said recess, a manually operable member journaled for axial and angular motion in said frame member, gear elements on said lift lever and manually operable member, and the latter member being axially movable to release said latch from said recess and angularly movable to transmit motion to the window lift lever through said gear elements.

3. In a window operating mechanism, a frame member, a window lift lever and a power operated lever pivoted on a common pivot axis to said frame member, the lift lever having a recess therein and the power operated lever having a leaf spring of substantially sector shape, a latch pin held by said spring in said recess for latching said levers together, a manually operable member mounted for angular and axial motion relative to said frame member, said manually operable member being engageable with said spring to displace the latch pin from the recess, and means for transmitting angular motion of the manually operable member to the lift lever.

4. In a window operating mechanism, a window lift lever and a power operated lever pivoted on a common axis, said levers having aligned recesses spaced from said axis, a latch pin normally extending into said recesses securing the levers together for movement about the common pivot axis, a leaf spring anchored to one of said levers and having a free end portion connected to said latch pin, said spring being flexible to permit withdrawal of the pin from one of said recesses to enable independent movement of the levers about said common axis, and a member spaced from said common axis for engaging and flexing said leaf spring to effect such withdrawal of the latch pin, the portion of said leaf spring that is engageable by said member being substantially elongated whereby engagement may be effected when the lever anchoring the spring is in various positions of movement about said axis.

5. In a window operating mechanism, a frame member, a window lift lever and a manually operated member pivoted upon a common axis to said frame member, a crank pin eccentric from said axis connecting said lift lever and manually operated member for movement together about said axis, a power operated lever pivoted to said lift lever on the axis of said crank pin, and a latch member for normally connecting said levers for movement together, said latch being mounted for movement between engaged and disengaged positions substantially along said common axis.

6. In a window operating mechanism, a frame member, a window lift lever and a manually operated member pivoted upon a common axis to said frame member, a connection between the lift lever and the manually operated member eccentric of said axis, a power operated member pivoted to said lift lever eccentrically of said axis, and latch means movable along said axis for connecting and disconnecting the lift lever and the power operated lever.

7. In a window operating mechanism, a frame member, a window lift lever and a manually operated member pivoted upon a common axis to said frame member, a connection between the lift lever and the manually operated member eccentric of said axis, a power operated member pivoted to said lift lever eccentrically of said axis, and a latch normally securing said lift lever and power operated levers for movement together about said common axis.

8. In a window operating mechanism, a frame member, a window lift lever and a manually operated member pivoted upon a common axis to said frame member, a connection between the lift lever and the manually operated member eccentric of said axis, a power operated member pivoted to said lift lever eccentrically of said axis, a latch normally securing said lift lever and power operated levers for movement together about said common axis, and said manually operated member being movable axially along said common axis to engage and release said latch.

9. In a window operating mechanism, a frame member, a window lift lever and a pivot connecting the lever to the frame member, a counterbalancing spring anchored to said frame member and connected to the window lift lever for counterbalancing the weight of an associated window, a power operated lever pivoted to said window lift lever eccentrically of the first pivot, a latch movable along the axis of the first pivot for normally engaging and connecting the lift lever and the power operated lever, and a manually operated member mounted upon the frame member for angular motion about the axis of the first pivot and also for axial motion to shift said latch from engagement with one of said levers to permit movement of the window lift lever independently of the power operated lever, and means to impart angular movement of the manually operated member to said window lift lever.

10. In a window operating mechanism, a frame member, a window lift lever and a pivot connecting the lever to the frame member, a power operated lever pivoted to said window lift lever eccentrically of the first pivot, a spring backed latch carried by the lift lever, said latch normally engaging said power operated lever and being movable axially of said first pivot from engaged position, a spring backed member carried by the power operated lever adapted to engage the latch to effect such axial movement thereof, and a manually operated member mounted upon the frame member for angular motion about the axis of the first pivot and also for axial motion, said manually operated member being adapted for axial movement to engage and move the spring backed member into a position disengaging the latch from the power operated lever, and means to impart angular movement of the manually operated member to said window lift lever.

11. In a window operating mechanism, a frame member, a window lift lever pivoted thereto, a counterbalancing spring anchored to said frame member and connected to said window lift lever for counterbalancing the weight of an associated window, a power operated lever for actuating said window lift lever, releasable connecting means normally connecting the two levers for movement as a unit about a common axis, and manual means for operating the lift lever independently of the power operated lever, said manual means mounted on said frame member for angular and axial movement and being disposed in a normally inoperative position but movable axially to an operative position, said manual means having a part engaging the connecting means and operable by and during the movement of the manual means to its other position for rendering said

connecting means inoperative whereby said window lift lever and its associated window may be manually operated with the assistance of the counterbalancing spring independently of the power operated lever.

12. In a window operator mechanism, a support, a window-lift lever pivoted thereon, a manually operable member mounted on said support for both rotary and axial sliding movements, spring means yieldably acting to hold said manual member in a normal position and against sliding movement, a power transmitting element extending radially from said member and constituting a driving connection between the latter and said lift lever when said member is moved axially from its normal position, a power operated lever pivotally related to the lift lever, and a latch device normally connecting said levers for movement in unison, said member having a part acting to move the latch device from an engaged to a disengaged position by and during such axial sliding movement of the member whereby to disconnect the levers for the manual operation of said lift lever.

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