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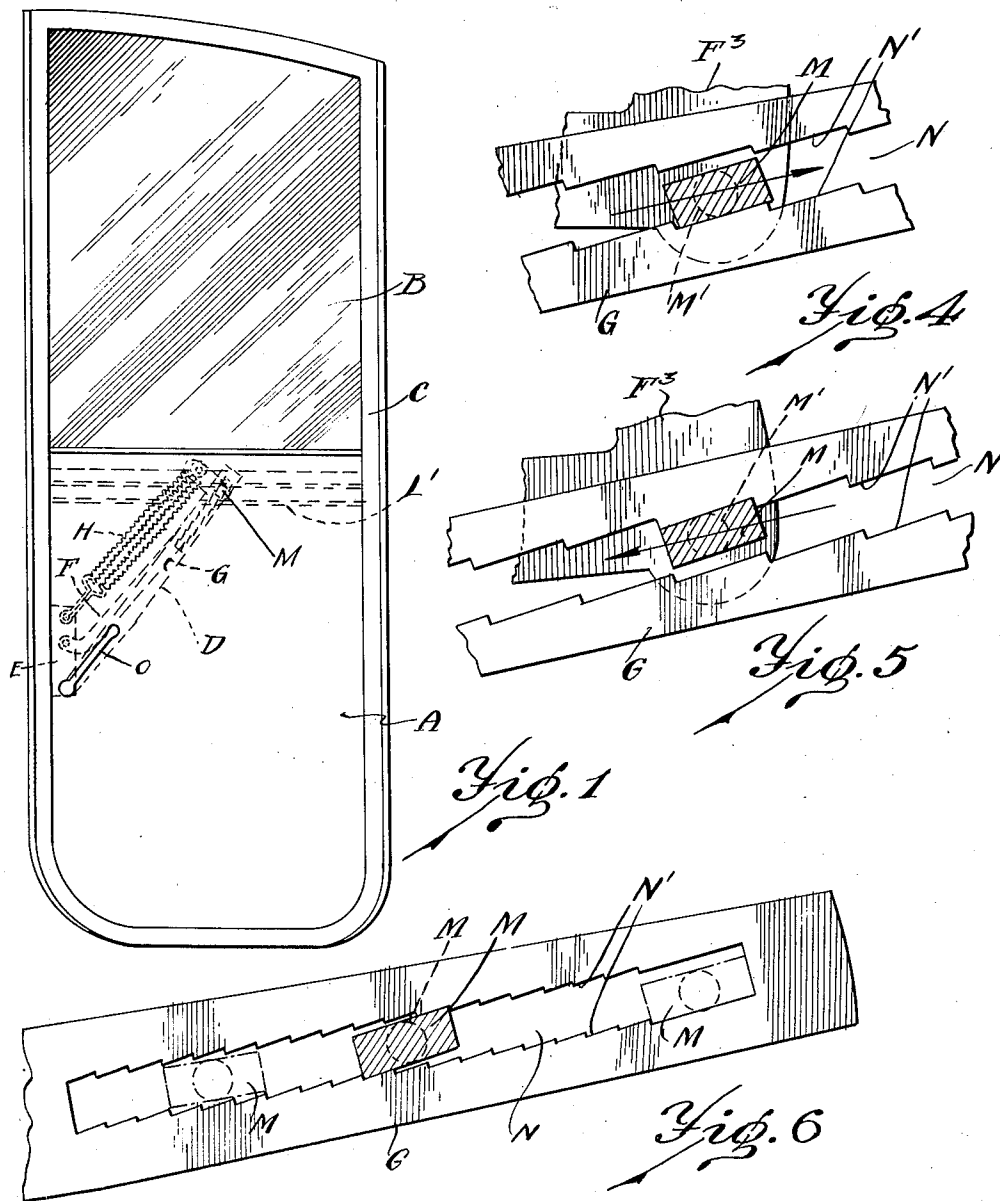
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S. W. NICHOLSON

WINDOW CONTROLLING DEVICE

Filed June 19, 1920

2 Sheets-Sheet 1



Inventor

STANLEY W. NICHOLSON.

By Whittamers, Hubbert and Whittamers

Attorneys

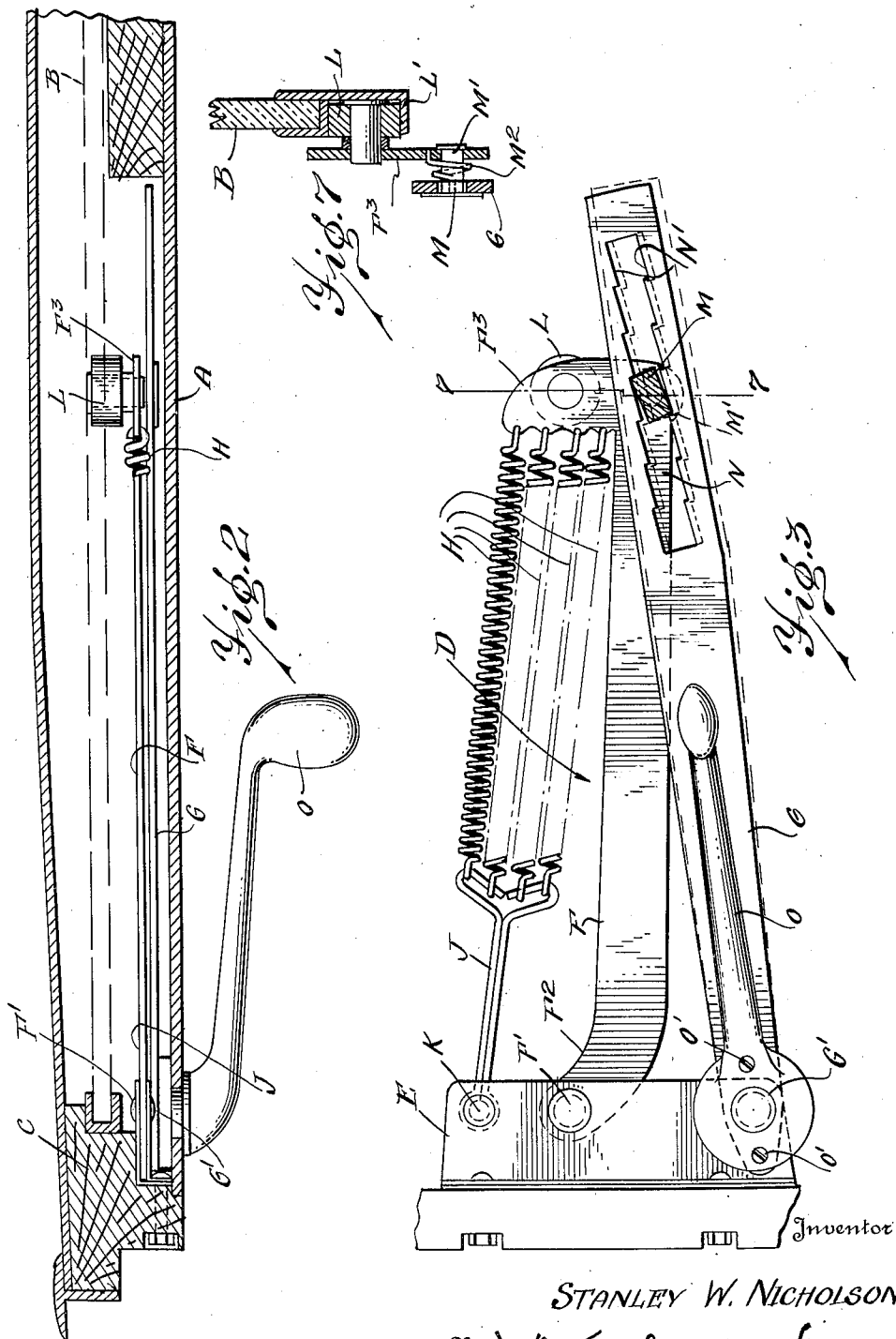
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STANLEY W. NICHOLSON.

By *Whittemore, Spulbert, and Whittemore*
Attorneys

UNITED STATES PATENT OFFICE.

STANLEY W. NICHOLSON, OF TOLEDO, OHIO, ASSIGNOR TO THE DURA COMPANY, OF TOLEDO, OHIO, A CORPORATION OF DELAWARE.

WINDOW-CONTROLLING DEVICE.

Application filed June 19, 1920. Serial No. 390,056.

To all whom it may concern:

Be it known that I, STANLEY W. NICHOLSON, a citizen of the United States of America, residing at Toledo, in the county of Lucas and State of Ohio, have invented certain new and useful Improvements in Window-Controlling Devices, of which the following is a specification, reference being had therein to the accompanying drawings.

The invention relates to devices for raising and lowering windows, and more particularly windows of automobiles or other vehicles.

Among the objects of the invention are; to provide a device of the aforesaid character which may be compactly mounted upon a vehicle door between the outer casing and inner trimming; to provide adjacent pivot points upon a single support for a counterbalanced spring lifter arm and a control arm for the lifter arm, angularly engaging the latter; to provide a connection between the control arm and lifter arm and adapted to either operate the latter from the former or automatically lock the device to maintain its position of adjustment; and to provide a location for the locking means remote from the actuating means. The device herein described is especially applicable for use in connection with a type of windows commonly used in closed automobiles, and adapted to be opened by a lowering movement.

Although the invention will be fully described in the following specification, I do not wish to be limited to the preferred embodiment shown as in its broader aspects it is capable of embodiment in numerous forms.

In the drawings:

Figure 1 is an interior view of a door of a closed car to which the invention is applied to control a window in the upper portion of said door, the upper limiting position of the device and the corresponding closed position of the window being shown.

Figure 2 is an enlarged top view of the lifter device in its mid-position of adjustment;

Figure 3 is a corresponding view in side elevation;

Figures 4 and 5 are detail views, showing the positions of the pivoted locking dog and indicating the travel thereof, upon upward

and downward actuation respectively of the control arm.

Figure 6 shows a modified construction of the ratchet toothed slot in the control arm.

Figure 7 is a vertical section taken on line 7-7 of Figure 3.

In these views, A represents a closed car door having the window B and frame C and being of the usual hollow construction. Within said door, is arranged a lifter device D, attached to the frame C preferably by a bracket E upon which the lifter arm F and control arm G are pivotally mounted at F' and G' respectively. The lifter arm F as shown is provided at its pivotal end with a slightly curved portion F² and at its outer end with an enlargement or head F³, which formation of the ends is preferable for the installation of a counterbalance spring means comprising the springs H secured at their outer ends to the head F³, and at their inner ends to a wire anchorage member J, which in turn engages a fixed pin K upon the bracket E. Upon the head F³ is journaled a roller L, which transmits the weight of the window B to the lifter arm by engaging a metal channel L' secured to the lower edge of said window and a rectangular dog M is also pivoted upon said head at M' and engages in a slot N in the outer end portion of the control arm G, the upper and lower edges of said slot being formed with reversely arranged ratchet toothed racks N'. Said dog is acted upon by spring M² coiled upon the pin M' and tending to shift the dog to the diagonal locking position shown in Figure 2.

In the construction thus far described, the weight of the window B, acting upon the lifter arm F through the roller L is counterbalanced by the pull of the springs H upon said arm, so that little effort is needed to shift the window either up or down. To apply this effort and to also control the locking means, there is provided an operating lever O, secured to the control arm G by bolts O', the trimming being cut away at the attachment point, to permit the lever to extend through and be operated at the inside of the door. The slot N in the control arm G is slightly wider than the dog M, engaging therein, so that said dog may slide along either rack N' without engaging the other or may assume the locking position

shown in Figure 2 wherein it is inclined to both racks.

Upon rotation of the operating lever O, the control arm G is similarly rotated and relative movement occurs between the connected ends of the control arm and lifter arm, since said arms have different pivot points. Thus, the dog M as the control arm is swung upward, will bear against the lower rack N', as shown in Figure 1 and will slide outwardly in the slot N, while upon downward actuation of the control arm, said dog assumes the position shown in Figure 5 and slides inward in the slot N. Thus, it is seen that adjustability of the dog M in the slot N permits the necessary relative movement between the control arm and lifting arm when the former is actuated and that the teeth N do not interfere with this adjustability. The dog M additionally functions to automatically lock the device, upon release of the lever which it does by assuming the position shown in Figure 3, to which position it is shifted by the coiled spring M².

The modification shown in Figure 6 provides smaller teeth in the racks forming the edges of the slot and thus secures a more silent operation, since, when sliding against either of said racks, the dog bears always upon several of the rack teeth and consequently cannot give rise to the slight clicking noise such as may occur as the dog in the first described form of the device drops from one tooth to another of said racks.

A desirable feature of the above described mechanism lies in the location of the locking means at a point remote from the actuating means, the stresses acting in the locked members being thus exerted longitudinally rather than transversely and a lesser strain being exerted upon the supporting bracket.

Also the device, when locked resists both upward and downward movement so that in case the counterbalancing spring exerts either a somewhat excessive force or an insufficient force, the parts will, nevertheless, be maintained properly adjusted.

What I claim as my invention is:

1. In a window lifting device, the combination with a pivotal lifter arm, and a pivotal control arm for the lifter arm inclined thereto, of a dog pivoted upon one of said arms and engageable with the other forming a means for actuation of the lifter arm by the control arm and establishing a lock maintaining the lifter arm adjusted.

2. In a window lifting device, the combination with a pivotal lifter arm and a pivotal control arm inclined to said lifter arm, one of said arms being provided with opposed racks of ratchet teeth, of a dog carried by the other of said arms engaged between said racks of teeth and serving both to actuate the lifter arm from the control arm and to maintain the lifter arm adjusted.

3. In a window lifting device, the combination with a pivotal lifter arm, of a pivotal control arm inclined to said lifter arm and having a slot therein, one edge of which forms a rack of ratchet teeth, and a dog pivoted upon said lifter arm and engaging in said slot to form an actuating connection between the two arms and also engageable with said rack to lock the two arms against swinging in one direction about their respective pivots.

4. In a window lifting device, the combination with a bracket member, of a lifter arm and slotted control arm therefor pivotally mounted on said bracket member, a dog mounted upon the lifter arm and engaging in said slot and locking means for the device engageable by said dog.

5. In a window lifting device, the combination with a supporting bracket and a lifter arm, and a control arm having a ratchet toothed slot, pivotally mounted at different points upon said bracket, of a pivoted dog engaging in said slot mounted upon said lifter arm, and an operating lever engaging said control arm, said dog and ratchet slot forming both an operating and automatic locking means upon movement and release respectively of said operating lever.

6. In a window lifting device, the combination with a supporting bracket and counter-balance spring, of a lifter arm under tension of said spring, a ratchet slotted control arm, an operating lever secured to said control arm, a dog secured to said lifter arm, adapted to slide freely over the ratchet teeth on the control arm upon operation of the control lever and to engage said ratchet teeth to form a locking means upon release of said lever.

7. The combination with a window lifter mechanism and an actuating means therefor, of a support for said lifter mechanism and actuating means, and an automatic locking means remote from said support and from said actuating means for retaining the lifter mechanism in different positions of adjustment, said locking means taking effect when relieved of actuating force and being released upon the initial application of said force in either direction.

8. In a window lifting device, the combination with a pivotal lifter arm, a controlling element engaging said arm at a distance from the pivot thereof, a pivotal locking element at the juncture of said lifter arm and controlling element, and a spring urging said locking element into locking position, said locking element being releasable through actuation of the control arm.

9. In a window lifting device, the combination with a pivotal lifter arm and a pivotal arm inclined to said lifter arm, one of said arms being formed with a slot, one edge

of which forms a rack of ratchet teeth, a dog pivoted upon the other arm engaging in said slot and forming an actuating connection between the two arms and engageable with said rack to lock the two arms against swinging in one direction about their respective pivots.

10. In a window lifting device, the combination with a pivotal lifter arm, a controlling element engaging said arm at a distance from the pivot thereof, and means at the juncture of the said lifter arm and controlling element for locking the same against relative movement, said means being releasable through actuation of the controlling element.

11. In a window lifting device, the combination with a pivotal lifter arm, of a controlling element engaging said arm at a distance from the pivot thereon, one of said parts being slotted, and an element pivotally carried by the other part engaging in said slot establishing an actuating connection from the controlling element to said arm and further functioning as a latch under automatic control of said controlling element.

12. In a window lifter mechanism, the combination with a sliding member, of a pivotal control arm therefor, a pivotal lifter arm angularly engaging said control arm at a point remote from the pivots of said arms, and locking means at the juncture of said arms automatically releasable by the control arm on initial actuation of the latter in either direction.

13. In a window lifting mechanism, a sliding window member, an actuating means and an automatic locking means remote from said actuating means and releasable by the latter responsive to initial actuation.

14. In a window lifting mechanism, the combination with a vertically sliding window member, a chamber receiving said window member in lowered position thereof, a pivotal lifter arm within said chamber, an actuating element exterior to said chamber, and a locking means within the chamber remote from the pivot of said lifter arm and automatically releasable responsive to initial actuation.

15. In a window lifting mechanism, a vertically sliding window member, a chamber receiving said window member in lowered position thereof, and an actuating unit for said window member disposed within said chamber and comprising an angularly movable control arm, an actuating handle for said arm, and a drive connection from said handle to said arm engaging the latter between its fulcrum and its free end, a mounting for said arm, handle and drive connection adapting the same for insertion as a unit in said chamber.

16. In a window lifter mechanism, the combination with a vertically sliding win-

dow member, and a chamber receiving said member in the lowered position thereof, and an actuating unit for said window member disposed within said chamber and comprising a fulcrumed lifter arm, an actuating handle for said arm, a member establishing a drive connection from the handle to the arm engaging the latter between its free end and fulcrum, and means establishing a drive connection from said drive member to the arm opposing reverse actuation.

17. A window lifting device comprising a pivotal lifting arm, a pair of coacting locking elements for said arm, and a counterbalance spring exerting an upward effort upon said arm and further urging engagement of said locking elements.

18. A window lifting device comprising a pivotal lifter arm, a locking element on said arm, a coacting locking element having a rack of teeth for engagement by the first mentioned locking element, and a spring exerting an upward effort upon said lifter arm and urging the locking element upon said arm into engagement with said rack.

19. A window lifting device comprising a pivotal lifter arm, a locking element on said arm, a coacting locking element having a rack of teeth for engagement by the first mentioned locking element, a spring exerting an upward effort upon said arm and urging the locking element upon the arm into engagement with said rack, a unitary mounting for said lifter arm, counterbalancing spring and the rack forming locking element.

20. A window lifting device comprising a pivotal lifter arm, a locking element on said arm, a coacting locking element having a rack of teeth for engagement by the first mentioned locking element, a mounting for said arm, and a spring extending from the outer end portion of said arm to said mounting exerting an upward effort upon the arm and urging the locking element thereon into engagement with said rack.

21. The combination with a pivotal window lifter arm, of a counterbalancing spring for said arm extended above the arm and substantially in the plane thereof from the outer end of the arm to a point adjacent the pivot of the arm.

22. In a window operating device, a unit assembly comprising a lifter arm, a counterbalance spring therefor acting thereupon in the various positions thereof with approximate uniformity, an operating handle and locking mechanism for said arm, and a bracket member forming the one point of attachment and a single support for the entire mechanism.

23. In a window operating device, a unit assembly comprising a lifter arm and a counterbalance spring therefor acting thereupon in the various positions thereof with

approximate uniformity, a lever mechanism for operating and locking said lifter arm, and a bracket member forming the one point of attachment and single support for said device.

24. In a window operating device, a unit assembly comprising a lifter arm, a bracket forming a pivotal support for said arm, and a counterbalance spring extending from said arm to said bracket, and acting upon said arm in the various positions thereof with approximate uniformity.

25. In a window operating device, a unit assembly comprising a lifter arm, a bracket forming a pivotal support for said arm, and a counterbalance spring extending from the outer end of said arm to a point on said bracket eccentric to the pivot.

26. In a device of the character described, the combination with a window actuating means, of a substantially uniform counterbalancing means therefor, locking means actuated by said counterbalancing means for retaining the window actuating means in different positions of adjustment, and a single support for all of said means whereby they may be installed as a unit.

27. In a window operating device, the combination with a window lifting arm, a bracket upon which said arm is pivotally mounted, of a tension counterbalance spring longitudinally extended upon said arm and terminally anchored respectively to said arm and to said supporting bracket.

28. In a window operating device, the combination with a window lifting arm and a bracket upon which said arm is pivotally mounted, of a tension counterbalance spring secured at one end to the outer extremity of said arm and at its other end to said bracket in proximity to the pivot of said arm.

29. In a window operating device, the combination with a window lifting arm and a bracket upon which said arm is pivotally mounted, of a tension counterbalance spring extending in the plane of said arm between the outer end thereof and said supporting bracket.

30. In a window operating device, a pivotal window lifting arm, and a counterbalancing coiled spring attached to the outer portion of said arm and extending substantially longitudinally of the arm in all positions of the arm.

31. In a window operating device, a pivotal window lifting arm, and a counterbalancing coiled spring attached at one end to the outer portion of said arm and anchored at its other extremity in proximity to the pivot of said arm.

32. In a window operating device, a pivotal window lifting arm, and a counterbalancing spring exerting an upward effort upon the arm in all positions thereof and

also stressing said arm in the direction of its pivot in all positions thereof.

33. In a window regulator, an operating arm, a handle for actuating the same and a spring adapted to counterbalance the weight of the window and to force said arm into locked position.

34. In a window regulator, an operating arm, one end of which is adapted to move with a window, and a spring acting on the said arm to counterbalance the weight of the window and to force the said arm into locked position.

35. In a window regulator, the combination with means for locking a window in adjusted position, of counterbalancing means for the window operative to effect the locking.

36. In a window regulator, means for actuating the window, means for locking the window in different positions, and a spring for counterbalancing the weight of the window and for effecting the locking operation.

37. In a window regulator, an operating arm, means for actuating the same, and a common means for counterbalancing the weight of the window and causing the locking of said arm in adjusted position.

38. In a window regulator, an operating arm, means for actuating the same, a common means for counterbalancing the weight of the window and locking said arm in adjusted position, and a single support for said arm and counterbalancing and locking means.

39. In a window operating device, a unit assembly comprising a lifter arm, a counterbalance spring extending longitudinally thereof and acting thereupon, an operating handle, locking mechanism for said arm, and a single support for the entire mechanism.

40. In a window operating device, a unit assembly comprising a lifter arm, means for counterbalancing the weight of the window including a coil spring acting upon said arm in the various positions thereof with approximate uniformity, mechanism for operating and locking said arm, and a single support for the entire mechanism.

41. In a window operating device, a pivotal lifter arm, means for actuating said arm, means for locking said arm in adjusted position including a locking member engageable therewith, said arm and locking member being relatively movable into and out of locking engagement with each other, and a common means for counterbalancing the weight of the window and causing the locking engagement of said arm and locking member.

In testimony whereof I affix my signature.
STANLEY W. NICHOLSON.