

July 10, 1951

B. LERMONT ET AL
WINDOW ACTUATING MECHANISM

2,560,179

Filed Dec. 5, 1947

5 Sheets-Sheet 1

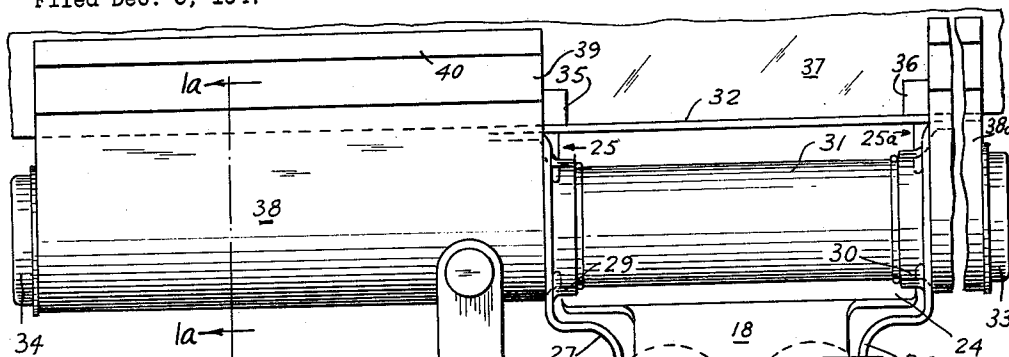


FIG. I.

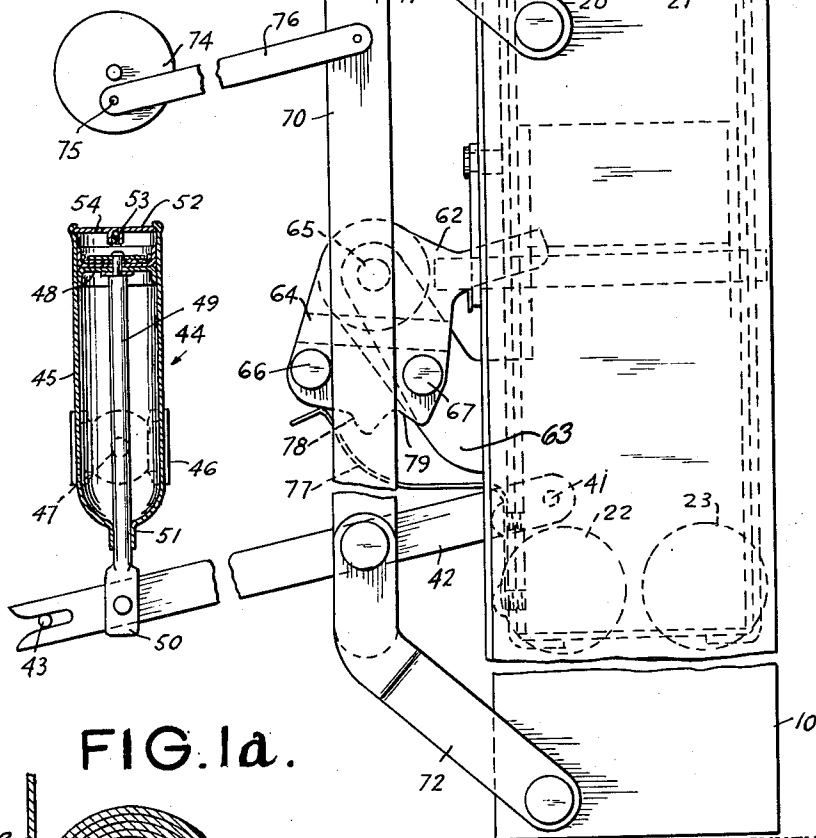
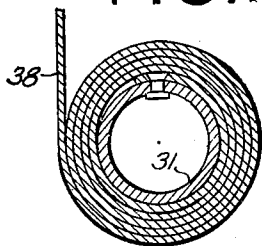


FIG. Ia.



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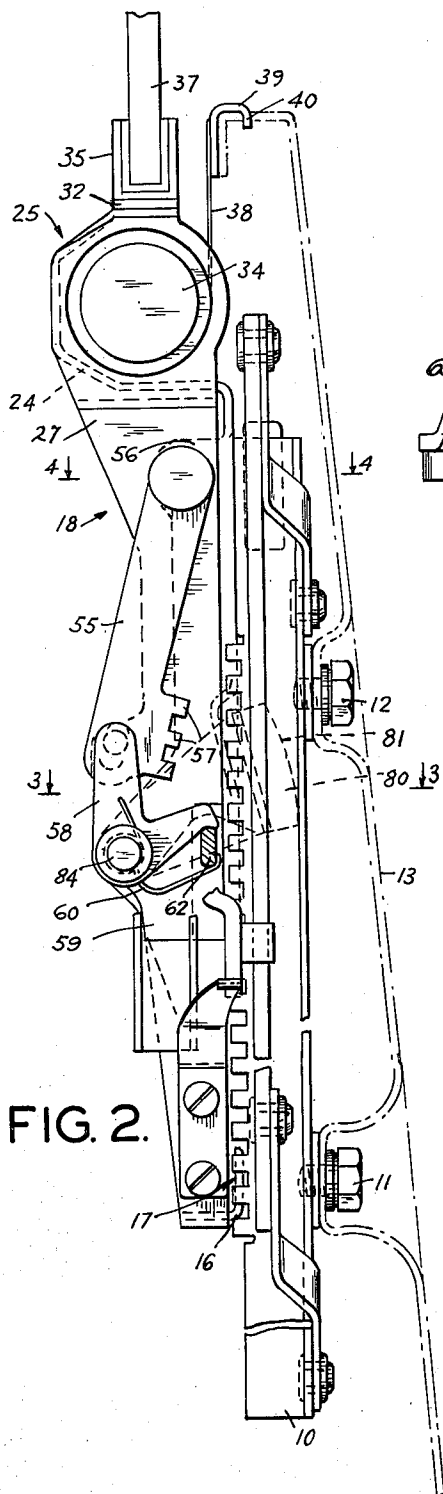


FIG. 2.

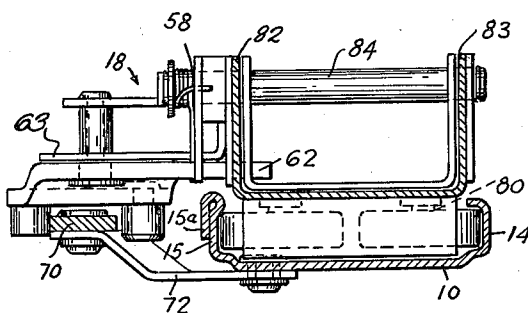


FIG. 3.

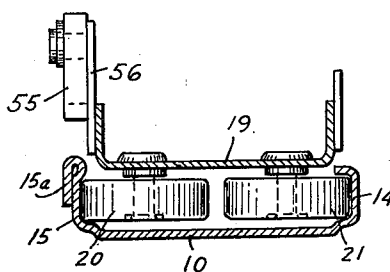


FIG. 4.

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FIG. 6.

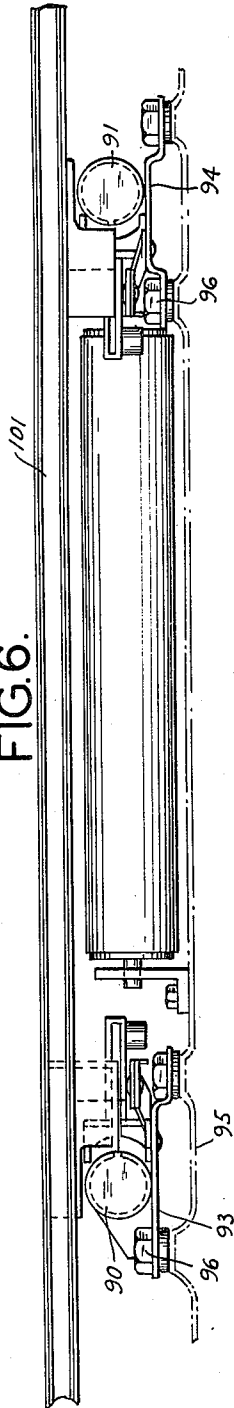
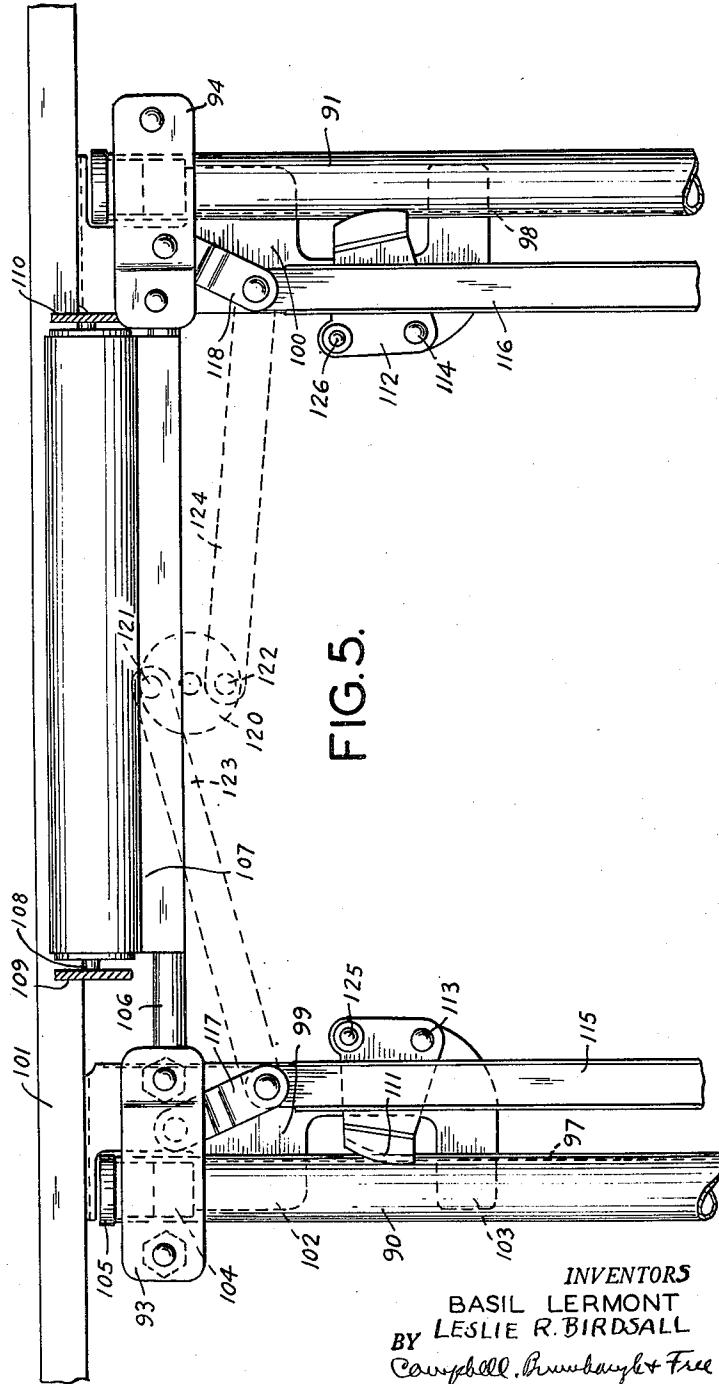


FIG. 5.



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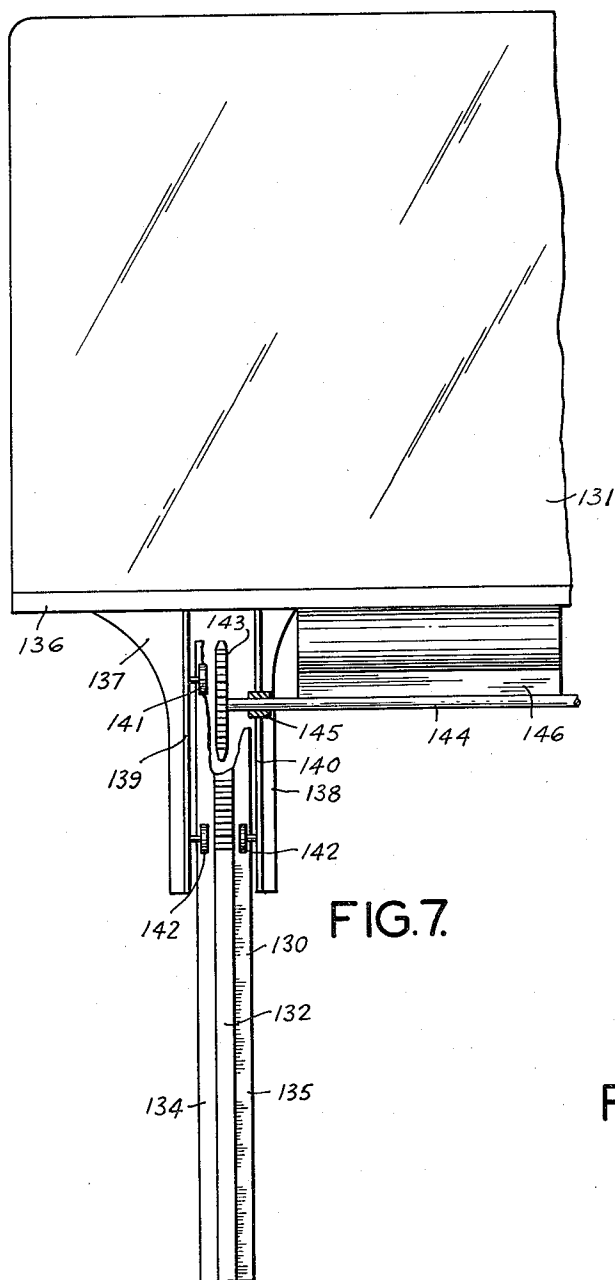


FIG. 7.

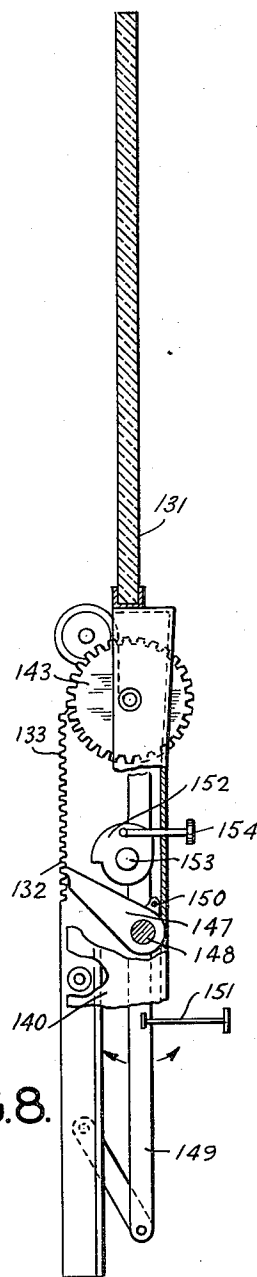


FIG. 8.

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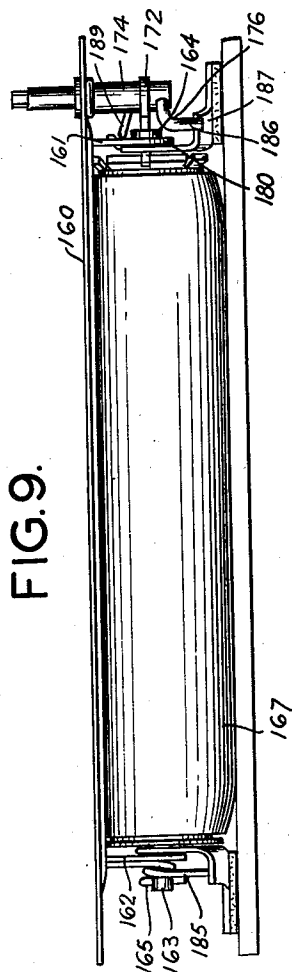
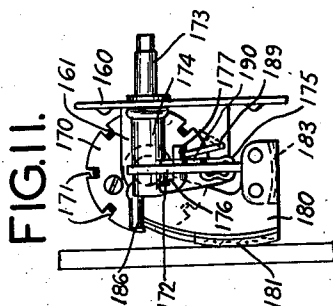
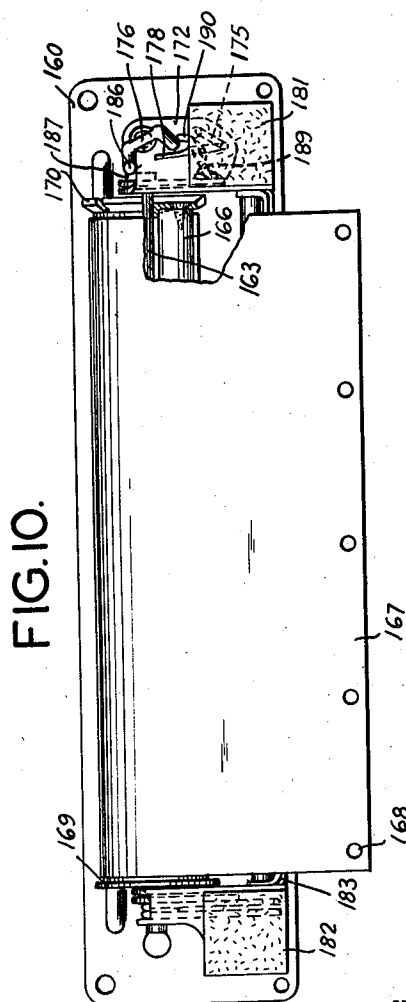
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UNITED STATES PATENT OFFICE

2,560,179

WINDOW ACTUATING MECHANISM

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Application December 5, 1947, Serial No. 789,906

9 Claims. (Cl. 16-197)

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This invention relates to mechanisms for actuating windows, door panels and other closure members, and it relates particularly to a mechanism whereby the panel or closure is actuated in one direction by spring means.

In the Basil Lermont application Serial No. 717,707, filed December 21, 1946, now Patent Number 2,543,785, issued March 6, 1951, a panel control mechanism is disclosed wherein a spring having a uniform resistance to straightening is utilized for moving the panel or window in one direction. In the form of the invention disclosed in the Lemont application, the spring is mounted for free rotation about an axis within the spring so that the spring may be uncoiled or unwound and straightened as the panel is moved to an open position, thereby tensioning the spring and normally urging the panel to closed position. A braking member is provided to engage and maintain the panel in an open or partially open position. Upon release of the braking member, the spring winds up due to the tension thereof and urges the panel toward closed position.

The above-described panel control mechanism is very useful under many conditions, but even so, it has certain deficiencies. For example, in order to assure the closing of the panel or the moving of the panel to closed position, it is necessary to provide a spring sufficiently powerful to assure the movement of the panel regardless of the friction between the panel and its guide elements. Under humid, or cold conditions, the friction may be relatively high, and, therefore, a rather powerful spring is required to overcome friction. On the other hand, under dry or warm conditions, the friction may be relatively low, and the powerful spring therefore will urge the panel very quickly to closed position, causing it to slam as it reaches closed position.

Another deficiency of the prior device for some purposes is that the braking mechanism engages the panel itself, and, if the panel is a glass panel, used, for example, in a vehicle door, the grit that accumulates on the panel and on the braking member may cause the panel to become scratched after prolonged use.

Another deficiency of the prior device is that it is not particularly well adapted to use in vehicles which lack guide channels for the windows above the level of the door. Thus, in convertible vehicles and even in some varieties of 4-door vehicles, there is no pillar between the front and rear doors, and the glass panel or window is left largely unsupported when it is moved toward closed position. The prior device does not include

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guide elements, and, therefore, it cannot be used in vehicles of the type referred to above.

An object of the present invention is to provide improved forms of window or panel actuating devices in which the deficiencies of the panel actuating device described above are largely overcome.

Another object of the present invention is to provide a window actuating mechanism for vehicles in which a positive locking of the window in any of its closed, open or partially open positions is obtained.

A further object of the invention is to provide a window-actuating mechanism in which slamming of the window as it moves to closed position is overcome.

Other objects and advantages of the invention will become apparent from the following description of typical forms of window and panel actuating devices described hereinafter.

In accordance with the present invention, window actuating devices are provided which are based generally upon principles of operation similar to those disclosed in the Lermont application referred to above but in which positive locks are provided for retaining the panel in any of its adjusted positions. Moreover, in certain forms of the invention, dampening devices are provided to prevent slamming of the panel or window as it moves to closed position. In addition, in the preferred forms of the device, the supporting mechanism for the panel is housed completely within the door panel of the vehicle so that the window can be lowered and projected without the necessity of providing additional guide means for the edges of the window when it is in its projected position.

For a better understanding of the present invention, reference may be had to the accompanying drawings, in which:

Fig. 1 is a view in elevation of a typical form of window actuating mechanism for use in vehicles embodying the present invention with parts broken away and parts shown in section to disclose details thereof;

Fig. 1a is a view in section taken on line 1a-1a of Fig. 1;

Fig. 2 is a view in side elevation of the mechanism disclosed in Fig. 1;

Fig. 3 is a view in section taken on line 3-3 of Fig. 2;

Fig. 4 is a view showing the roller structure of the device;

Fig. 5 is a view in side elevation showing a portion of a modified form of window actuating mechanism;

Fig. 6 is a plan view of the device shown in Fig. 5;

Fig. 7 is a view in elevation of a portion of a modified form of window actuating mechanism;

Fig. 8 is a side view of the mechanism shown in Fig. 7 with parts broken away to disclose details thereof;

Fig. 9 is a plan view of a further modification of the window actuating or panel control mechanism;

Fig. 10 is a view in elevation of the mechanism disclosed in Fig. 9; and

Fig. 11 is an end view of the mechanism shown in Figs. 9 and 10.

A preferred embodiment of the invention is disclosed in Figs. 1 to 4 of the drawings, this embodiment of the invention being particularly useful for supporting the windows of vehicles which lack guide channels at opposite edges of the window openings. The device is particularly adapted for use, for example, in convertible coupes and sedans, which do not have a center pillar extending from the top of the door to the top of the vehicle to guide and support the window panels of the two adjacent doors of the vehicle.

Referring now to Figs. 1 and 2, a typical mechanism embodying the present invention may include a channel member 10 which is adapted to be secured by means of the screws 11 and 12 to bosses struck out from the door panel 13 of a vehicle, these bosses being so arranged that the channel 10 extends substantially parallel with the intended direction of movement of the window panel. As shown in Figs. 3 and 4, the channel 10 has edge flanges 14 and 15, the flange 14 extending generally perpendicular to the base of the channel and having an inturned edge. The flange 15 also extends substantially perpendicular to the base of the channel 10 and has a rolled edge 15a provided with a series of notches 16 extending along its length to form a rack member 17. The channel 10 is adapted to support and guide a carriage member 18 which consists of a U-shaped member 19, as shown in Fig. 4, having adjacent its upper and lower corners a plurality of rollers 20, 21, 22 and 23 which bear against the inner surfaces of the flanges 14 and 15 and thereby prevent relative rocking movement of the carriage 18 in all directions. The upper end of the carriage is provided with a frame portion 24 which is bent upwardly and to the right, as viewed in Fig. 2 joined to the plate members 26 and 27 secured to the flanges of the channel 19. The members 26 and 27 are of generally annular formation and form journals 29 and 30 for receiving rotatably a tubular shaft or roller 31. The upper edges of the flange members 29 and 30 are joined by means of a cross bar 32 which in turn is joined to the upwardly bent portion 24 to form a strong, rigid structure.

The shaft 31 is closed at its outer ends by means of disk-like cap members 33 and 34 which are welded or otherwise secured to the opposite ends of the shaft 31. Mounted upon the frame portion 24 and the cross-bar 32 are the channel members 35 and 36 which are adapted to receive the lower edge of the window panel 37. The roller 31 is connected to the inner ends of normally coiled spring members 38 and 38a of the type disclosed more particularly in the Lermont applications Serial Nos. 717,707 now Patent No. 2,543,785, and 747,189, now abandoned. The spring members 38 and 38a are normally tightly

coiled for the reason that every increment of these springs is bent on the same radius of curvature. However, inasmuch as all of the convolutions of this spring cannot occupy the same space, the various convolutions must lie in a tightly coiled spiral form. These springs are secured at their inner ends to the shaft 31 in any conventional way, such as for example, by riveting, welding or by means of screws.

The springs 38 and 38a are tensioned by exerting a force or stress on the outer free ends of these springs. Such a stress tends to straighten out the springs and unwind them much like a strip of paper can be unwound from a freely rotating roll of paper. Inasmuch as the action of the stress is primarily at the point of tangency of the straightened portion of the spring to the coiled remainder of the spring, and each portion of the spring is equally bent, the stress required to straighten the spring is substantially the same for any portion of the length of the spring and is non-accumulative.

If the stress tending to straighten and unroll the spring is relieved slightly, the spring will rewind itself on the shaft by rotating the shaft.

The upper ends of the springs 38 and 38a may be provided with hook-like members 39 for engagement in slots 40 in the upper end of the door panel 31. The structure described thus far normally urges the window 37 to closed position but permits the window to be opened by pulling it downwardly and thereby unrolling the springs 38 and 38a from the shaft 31 to which the inner end of the spring is connected. In any lowered position of partially lowered position of the window, the spring tends to urge the window to closed position with a constant force.

In order to prevent the window from slamming as it moves to closed position, the carriage 19 may be provided with a projecting pin 41 to which is connected a lever 42 having a sliding pivot connection with a pin 43 projecting from the door panel 13 so that the lever rocks up and down as the carriage 19 moves up and down the channel 10. To cushion the upward movement of the carriage, a dash pot mechanism 44 is provided which is supported on the door panel 13. The dash pot 44 consists of a cylinder 45 which is supported by means of a bracket 46 and a pivot 47 on the door panel 13 so that it can rock about the pivot to accommodate itself to the position of the lever 42. The cylinder 45 is provided with a piston 48 of any desired construction which is mounted on the end of a piston rod 49. The outer end 50 of the piston rod is pivotally connected to the lever 42. The fit between the piston rod 49 and the reduced end 51 of the cylinder may be such as to permit ready flow of air out of the cylinder so that downward movement of the link is not appreciably retarded or resisted by the movement of the piston 48 in the cylinder.

The opposite end 52 of the cylinder 45 is provided with an air check valve 53 permitting air to be drawn into the cylinder as the piston moves downwardly so as to not appreciably retard or resist the movement of the piston. Movement of the piston in an upward direction is retarded by providing a small air passage 54 in the end 52 of the cylinder which limits the rate of escape of air from between the piston and the upper end of the cylinder as the piston moves upwardly. The speed of upward movement of the carriage 19 can be controlled by adjusting the size of the passage 54.

The device described is also provided with a

locking mechanism and a braking mechanism for regulating or adjusting the position of the window. As best shown in Fig. 2, a lever or pawl member 55 is pivotally mounted on a lug 56 projecting outwardly from the carriage. The pawl member is provided with one or more teeth 57 which are adapted to engage between the teeth of the rack 17 and thereby lock the carriage to the channel member 10. The pawl 55 can be moved out of engagement with the rack by means of a bell crank lever 58 which is pivotally mounted on another lug 59 also projecting outwardly from the carriage 19. The bell crank is normally urged in a clockwise direction by means of a spring 60 having one end engaged in an aperture in the bell crank and the other end engaged beneath a lever member 62 which is mounted at a right angle to the bell crank 58 on a bracket 63 extending laterally from the carriage 19 behind the channel member 10. The lever 62 forms a part of an element 64 which is pivotally supported on a pivot member 65 on the bracket 63 and is provided with a pair of outwardly projecting lugs 66 and 67 in spaced apart relation near the lower end of the member 64. The lugs 66 and 67 cooperate with a link member 70 which is supported on a pair of lever members 71 and 72 which are pivotally mounted in substantially parallel relationship on the member 10 so that when the link member 70 is moved outwardly, or inwardly, it is maintained in substantially parallel relation with the channel member 10. Such movement of the link 70 may be produced by means of a rotary member 74 which has an eccentric pin 75 thereon supporting a link 76 which is pivotally connected to the link 70. The disk or rotary member 74 is mounted on the door panel and may be provided with a knob or handle exposed at the interior of the door so that it can be rotated by an occupant of the vehicle.

The link member 70 is disposed between the lugs 66 and 67 so that when the link 70 is moved to the left, as viewed in Fig. 1, the lever 62 is rocked in a clockwise direction. When the link member 70 is moved to the right, it engages the lug 67 and thereby rocks the lever 62 in a counter-clockwise direction, as viewed in Fig. 1. This motion of the lever 62 is transmitted to the bell crank lever 58 (Fig. 2) and moves the lock pawl 55 into engagement with the rack 17. When the lever 62 is rocked counter-clockwise or upwardly, the pawl 55 is disengaged. When the lever 62 is rocked in a clockwise direction or downwardly, the pawl 55 is moved into engagement with the rack 17.

The lever 62 may be maintained in either of its adjusted positions by means of a spring member 77 which engages in notches 78 and 79 in the lower edge of the member 64.

Movement of the lever 62 is also utilized to actuate a friction braking member 80 which is mounted coaxially with the bell crank lever 58 and is provided with an eccentric surface 81 that is engageable with the bottom of the channel 10 when in its lowermost position. The braking member 80, as best shown in Fig. 3, has substantially parallel rearwardly projecting arms 82 and 83 which rotatably receive the shaft 84 on which the bell crank 58 is also mounted. Also, as shown in Fig. 3, the lever 62 is in a position to engage the lever and arm 82 of the brake member so that when the arm 62 moves upwardly, the surface 81 of the brake member is disengaged from the bottom of the channel. When the lever 62 moves downwardly, the brake member 80 also moves

downwardly to engage the surface 81 with the base of the channel 10, thereby frictionally bringing the carriage 19 to a stop before the pawl member 55 engages the rack 17.

The above-described mechanism, because of its structure, is capable of supporting the glass panel during its movement between its open and closed positions, and may be used readily in vehicles which do not have guide channels to engage the edges of the panel during its upward and downward movement. The device also has all of its operating mechanism concealed within the panel and in such relationship to the panel or window that it will not under any circumstances mar or damage the panel or the window. Moreover, the device assures proper and strong locking of the panel in any of its adjusted positions and the presence of the dash pot mechanism prevents slamming of the panel even when the friction in the mechanism is reduced to a minimum.

While the above-described embodiment is the preferred form, it is possible to modify the window or panel actuating means considerably to conform to different types of door constructions, one modified form of the device being disclosed in Figs. 5 and 6 of the drawings. This form of the device includes a pair of spaced apart tubular elements 90 and 91 which are provided with brackets 93 and 94 at their upper and lower ends, only the upper brackets being disclosed. The brackets 93 and 94 are secured to the door panel 95 at the inside portion of the door by means of suitable bolts or screws 96 or the like. The tubular members are provided with slots 97 and 98 on their opposing sides for receiving the laterally projecting brackets 99 and 100 at the opposite ends of the channel member 101 which receives the lower edge of the window panel. The flanges 99 and 100 are similar and essentially are mirror images of each other providing a pair of spaced apart arms 102 and 103 which extend through the slot 97, for example, into the interior of the tubular member 90 so as to provide a guide for the window panel. The upper end of the arm 102 is provided with a piston member 104 which fits slidably within the tubular member 90, and when the window receiving channel is in the position shown, that is, corresponding to the closed position of the window, it is disposed within the upper end portion of the tubular member 90.

The slot 97 terminates at the upper edge of the arm 102 in the position shown in Fig. 5, so that the piston member 104 is disposed within a closed tubular portion at the upper end of the member 90. The upper end of the member 90 may be closed by means of a cap 105 so that when the piston 104 moves into the upper end of the member 90, it is cushioned by the air within that portion to prevent slamming of the window. The lower arm 103 of the bracket may also be provided with a piston-like member for guiding the bracket 99 slidably in the tubular member 90. The bracket 100 is similarly constructed and operates in a similar way with the tubular guide member 91.

Extending between the brackets 99 and 100 is a shaft 106 to which is secured one end of the uniform tension spring 107 of the type described above. The spring 107 is normally coiled around a roller 108 which is rotatably mounted in brackets 109 and 110 which are secured to the panel 95 of the door. The spring thus tends to urge the window panel upwardly toward closed position but can be unwound from the roller 108

by downward movement of the window panel by means of a handle secured to the window panel, not shown. In order to retain the window panel in any desired open or partially open condition, the brackets 99 and 100 are provided with friction brake members 111 and 112 which are pivotally connected to the brackets 99 and 100 by means of the pivot pins 113 and 114, respectively. The brake members 111 and 112 may be retracted out of engagement with the opposed surfaces of the tubular members 90 and 91 or moved into engagement with them by means of the link members 115 and 116 which are supported by means of the links 117 and 118, respectively, at their upper and lower ends. The links 117 and 118 are pivotally connected respectively to the brackets 95 and 96 at the upper and lower ends of the tubular members 90 and 91. The links 115 and 116 may be moved simultaneously inwardly and outwardly by means of a rotary member 120 having eccentrically located pins 121 and 122 thereon which are connected by means of the links 123 and 124 to the upper ends of the links 115 and 116, respectively.

Inward and outward movements of the links 115 and 116 are used to actuate the brake elements 111 and 112 by engaging the laterally projecting pins 125 and 126 thereon. Thus, as the links 115 and 116 are moved inwardly, the brake elements are rocked away from the tubular members 90 and 91, and as the link members 115 and 116 move outwardly, the brake members 111 and 112 are permitted to rock into engagement with the tubular members 91 and 92, thereby retaining the window panel in a desired position.

While the above-described mechanism does not include a positive lock for the window, it will be understood that it can be modified to include locking mechanism similar to that of the device disclosed in Figs. 1 to 4 of the drawings.

The actuating mechanism is susceptible to still further modification, as disclosed in Figs. 7 and 8 of the drawings. In this form of window actuating mechanism, channel members 130 are provided adjacent opposite edges of the glass window panel 131, only one of the channel members being disclosed in the drawings for purposes of illustration. Each channel member 130 is secured to the door panel, not shown, in the manner described above. Each channel member 130 has a bottom portion 132 which may be stamped or otherwise formed to provide a series of gear or rack teeth 133 extending lengthwise of the channel. The channel 130 is also provided with laterally directed flanges 134 and 135 on opposite sides thereof.

The window glass 131 is mounted in a channel member 136 which is provided near each end with a pair of brackets 137 and 138 in spaced apart relationship which are disposed on opposite sides of the guide channel member 130. The brackets 137 and 138 are of L-shaped cross-section and have flanges 139 and 140 extending forwardly on opposite sides of the channel member 130. Each of the flanges 139 and 140 is provided with a pair of rotatably mounted rollers 141 and 142 which engage behind the flanges 134 and 135 on the channel member 130 to aid in retaining the panel in substantially parallel relation to the channel member 130. The glass panel 131 is prevented from rocking in the opposite direction by means of a gear member 143 which is disposed between the flanges 139 and 140 in a position to engage the rack teeth 133. If desired, other rollers similar to the rollers 141 and 142 may be provided to

engage the sides of the flanges 134 and 135 opposite the rollers 141 and 142. The gears 143 co-operating with each of the channels 130 are connected by means of a cross shaft 144 which is journaled in a bearing 145 in the flange 140 at each end so that the gears 143 rotate together. The shaft 144 is also rotatably received in a tubular sleeve at one end of the uniform tension spring 146 which is coiled upon a shaft or roll, not shown, the shaft being rotatably mounted in brackets, not shown, connected to the door panel.

Engagement of the gear 143 with the rack teeth 133 and engagement of the rollers 141 and 142 with the channel member prevents tilting of the window panel and its supporting carriage with respect to the door panel.

This form of window control mechanism is provided with a positive lock but does not include a friction brake as in the mechanisms described above. The positive lock includes a pawl member 147 which is pivotally mounted on a pin 148 that projects inwardly from the bracket member 138 and supports the pawl in a position to engage the rack teeth 133 below the gear 143. The pawl 147 can be rocked out of engagement with the teeth 133 by means of a link structure 149 like that described above, the link 149 engaging a laterally projecting pin 150 of the pawl 147 when the link 149 is moved to the right, as viewed in Fig. 8. Such movement may be produced by means of a push-pull plunger 151 which extends through the door panel into the interior of the car.

The pawl 147 may be locked against movement of engagement with the rack teeth 133 by means of a cam member 152 which is pivotally supported on a pin 153 projecting from the bracket member 138. The cam may be rotated by means of a plunger member 154 into and out of engagement with the upper surface of the pawl 147.

The above-described construction can be modified, of course, to include a friction brake of any of the types described above and also it can be provided with a dampening or dash pot arrangement of the type disclosed in Fig. 1 of the drawings.

All of the above-described forms of window actuating mechanisms are especially adapted for use in the doors of vehicles which do not include guide channels extending the length of the window opening. They are, however, useful in window constructions which do provide such guide channels, and, therefore, should not be considered as being restricted in their use to the guideless type of window construction.

In many other types of vehicles which include a window guide construction in the upper part of the door, less complex types of window actuating mechanisms may be used. An improved type of actuating mechanism for such purposes is disclosed in Figs. 9, 10 and 11 of the drawings.

This form of device includes a plate member 160 which is adapted to be secured to the inside panel of the door of the vehicle or other mechanism and is provided with a pair of outwardly projecting arms or brackets 161 and 162. These brackets receive a shaft 163 which is provided with a head 164 at one end and a removable cross pin 165 at its opposite end to permit it to be inserted lengthwise through the brackets 161 and 162 and retain it therein. As shown in Fig. 10, the cross pin supports a roller 166 which may be formed of wood or other desired material upon which the uniform tension spring 167 is coiled with its inner end fixed to the roller 166.

The opposite end of the spring is provided with a plurality of apertures 168 for securing it to a channel member, not shown, in which the lower edge of the window panel is mounted. The opposite ends of the roller 166 are provided with disk-like end plates 169 and 170 forming bearings for receiving rotatably the shaft 163.

The end plate 170 of the device forms one element of a locking mechanism for locking a window panel in an open, partially open or closed position. To this end, the end plate 170 is provided with a plurality of peripheral notches 171 which are adapted to receive the end of a hook-like pawl element 172. The pawl element is loosely supported on a shaft 173 which is mounted in a bushing 174 fixed to the plate 169 so that the shaft can rotate in the bushing. The pawl can move independently of the shaft 173, and may be moved inwardly against the periphery of the disk-like brake element by means of a spring 175 which cooperates with one arm of an S-shaped member or rod 176 that is fixed in the end of the shaft 173. One arm 177 of the S-shaped member is disposed substantially parallel with the shaft 173 and extends toward its inner end so that it can engage one end 178 of the spring 175 upon rotation in one direction to cause the end of the pawl 172 to engage in one of the notches 171. Upon movement of the arm 177 in the opposite direction, it engages the inner edge of the pawl 172 to rock the pawl out of engagement with the member 170, thereby releasing the roll 166 to permit the spring to coil up upon it.

The device is also provided with a friction braking mechanism which is adapted to engage the window panel. The friction braking mechanism includes a lever member 180 having a facing 181 of friction material. The lever 180 is pivotally supported on the shaft 163 between the bracket 161 and the end plate or disk member 170. The brake element 180 is also connected with another similar brake member 182 at the opposite end of the shaft 163 by means of a plate member 183 which extends between the spring 167 and the back plate 160, as best shown in Fig. 11. Thus, both of the brake members 180 and 182 move together and are normally urged against the panel by means of a spring member 185 carried on the shaft 163 and having legs bearing against the plate 160 and the brake member 182.

The brakes 180 and 182 may be moved out of engagement with the window panel by means of another oppositely directed arm 186 of the S-shaped rod 176. The arm 186 engages a shoulder 187 on the brake member 180 so that when the shaft 173 is rotated by means of a knob, not shown, inside the vehicle, the brakes 180 and 182 are retracted and also the pawl 172 is retracted. When the shaft 173 is rotated clockwise, as viewed in Fig. 10, the brakes 180 and 182 engage the panel and the pawl 172 engages the locking member 170.

The shaft 173 may be maintained in either the locked or unlocked position by means of a click spring 189 which is secured to the bracket 161 and has an arm 190 in the path of the arm 177 so that substantial effort is required to cause the arm 177 to pass by the end of the spring 189 in either direction of rotation.

From the preceding description of typical embodiments of window actuating mechanisms of the type embodying the present invention, it will be understood that these mechanisms are capable of operating a window or other panel member easily and positively and they also pro-

vide positive locking and braking to avoid damage to the windows during opening and closing operations. Devices of the type described above are especially suitable for actuating the windows of vehicles but they are also adapted to many other uses, such as, sliding panel constructions for furniture, houses, boats and many other purposes.

It will be understood that each of the above-described mechanisms is susceptible to further modification and change in dimensions and shape, as the purpose demands. Therefore, the forms of the invention described above should be considered as illustrative and not as limiting the scope of the following claims.

We claim:

1. A panel operating mechanism comprising means for engaging an edge of a panel, a supporting member adapted to be fixed to an element having an opening to be closed by said panel, a spirally coiled spring member having uniform tension when uncoiled, a roller connected to the inner end of said coiled spring member, means rotatably supporting said roller on one of said panel engaging means and said supporting member, and means connecting the outer end of said spring to the other of said panel engaging means and said supporting member, whereby movement of said panel engaging member relative to said supporting member in one direction unwinds said spring placing it under tension to move said panel engaging member in the opposite direction, pawl and ratchet means for retaining said panel supporting member in any of a plurality of positions relative to said supporting member, and means for manually releasing said pawl and ratchet means to release said panel supporting means for movement.

2. A panel operating mechanism comprising a fixed supporting and guide element, a carriage for supporting a closure panel movable along said guide element, means restraining said guide element and carriage against relative rocking movement, braking means mounted on said carriage for movement into and out of engagement with said guide element, manually operable means for moving said braking means into and out of engagement with said guide means, a rotary member, a spirally coiled spring wound on said rotary member and having its inner end connected to said rotary member, a member supporting said rotary member for rotation about its axis, and means connecting said supporting member in fixed relation to said carriage, and the outer end of said spring in fixed relation to said supporting and guide elements to cause said spring to unwind from said rotary member as said carriage is moved in one direction along said supporting and guide element, said spring winding upon said rotary member as said carriage moves in the opposite direction along said supporting guide element.

3. A panel operating mechanism comprising a fixed supporting and guide element, a carriage for supporting a closure panel movable along said guide element with said guide element located substantially centrally of said support, means restraining said guide element and carriage against relative rocking movement, braking means mounted on said carriage for movement into and out of engagement with said guide element, manually operable means for moving said braking means into and out of engagement with said guide means, a rotary member, a spirally coiled

spring wound in a plurality of overlying convolutions on said rotary member and having its inner end connected to said rotary member, a member supporting said rotary member for rotation about its axis, means connecting said supporting member in fixed relation to said carriage for movement therewith, and means connecting the outer end of said spring in fixed relation to said guide element, whereby movement of said carriage relative to said guide element in one direction unwinds said spring from said rotary member and thereby tending to move said carriage in the opposite direction.

4. A panel operating mechanism comprising a fixed supporting and guide element, a carriage for supporting a closure panel movable along said guide element, means restraining said guide element and carriage against relative rocking movement, a rack member fixed to said guide element and extending in the direction of movement of said carriage, a lock member mounted on said carriage for movement into and out of engagement with said rack member to lock said carriage to and release it from said guide member, respectively, manually operable means for moving said locking means, a rotary member, a spirally coiled spring wound in a plurality of convolutions on said rotary member and having its inner end connected to said rotary member, a member supporting said rotary member for rotation about its axis, and means connecting said supporting member in fixed relation to said carriage, and the outer end of said spring in fixed relation to said guide member.

5. A panel operating mechanism comprising a channel member adapted to be fixed to a structure having an opening to be closed, a carriage mounted on said channel member for movement longitudinally thereof, means on said carriage for receiving an edge of a closure panel, at least one spirally coiled spring mounted on said carriage for rotation about its axis, a rack extending lengthwise of said channel member, a toothed pawl member pivotally mounted on said carriage for movement into and out of engagement with said rack, a link member extending lengthwise of said channel member, and mounted adjacent thereto for movement toward and away from said channel member, means on said pawl member in the path of movement of said link member for disengaging said pawl member from said rack and engaging said pawl member and rack upon movement of said link member in opposite directions, means for moving said link member, and means at the outer end of said spring for connecting it fixedly to said structure adjacent to said opening whereby movement of said carriage to uncover said opening unwinds said spring and places it under tension urging said carriage in a direction to close said opening.

6. A panel operating mechanism comprising a pair of spaced apart tubular guide members, each having a slot therein terminating in spaced relation to adjacent ends of said guide members forming cylinders at said adjacent ends, a carriage for supporting a closure panel having end portions disposed in, guided by and movable along said slots, piston elements on said end portions movable into said cylinders to retard movement of said carriage as it approaches said adjacent ends of said guide members, spring means con-

nected to said carriage for urging said carriage toward said adjacent ends, and means on said carriage engageable with said guide members for retaining said carriage in any desired position along said guide members.

7. A panel operating mechanism comprising at least one channel member adapted to be fixed to a structure in spaced relation to an opening therein, a carriage having a plurality of rollers engaging said channel member to guide said carriage along said channel member, means on said carriage for receiving an edge of a closure panel for closing said opening, a brake member pivotally mounted on said carriage for movement into and out of engagement with said channel member, and normally spirally coiled spring means connected to said carriage for urging the latter toward said opening.

8. A panel operating mechanism comprising at least one channel member adapted to be fixed to a structure in spaced relation to an opening therein, a carriage having a plurality of rollers engaging said channel member to guide said carriage along said channel member, means on said carriage for receiving an edge of a closure panel for closing said opening, cooperating pawl and rack means on said channel member and said carriage for locking said carriage in any desired position along said channel member, means for releasing said pawl and rack means to permit movement of said carriage along said channel member, and normally spirally coiled spring means connected to said carriage for urging the latter toward said opening.

9. A panel operating mechanism comprising a fixed supporting and guide element, a carriage for supporting a closure panel movable along said guide element, means restraining said guide element and carriage against relative rocking movement, braking means mounted on said carriage for movement into and out of engagement with said guide element, manually operable means for moving said braking means into and out of engagement with said guide means, a rotary member, a normally coiled spring wound on said rotary member and having its inner end connected to said rotary member, a member supporting said rotary member for rotation about its axis, and means connecting said supporting member in fixed relation to said supporting and guide element and the outer end of said spring in fixed relation to said carriage to cause said spring to unwind from said rotary member as said carriage is moved in one direction along said guide element, said spring winding upon said rotary member as said carriage moves in the opposite direction along said guide element.

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REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
433,600	Marshall	Aug. 5, 1890
620,468	Lowery et al.	Feb. 28, 1899
652,394	Lagus	June 26, 1900
2,076,938	Chandler	Apr. 13, 1937