

Sept. 1, 1959

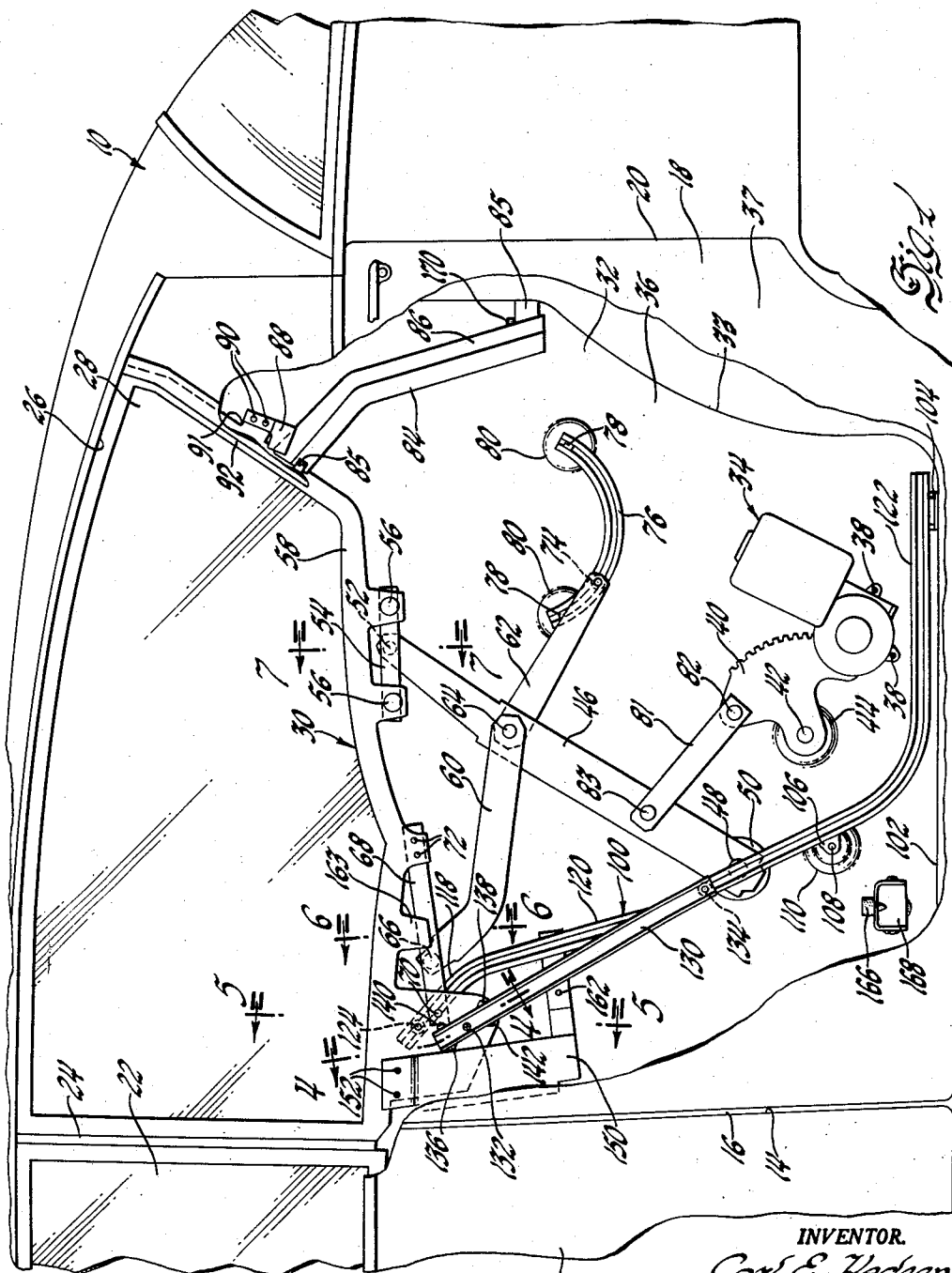
C. E. HEDEEN

2,902,277

WINDOW REGULATOR

Filed Sept. 26, 1957

4 Sheets-Sheet 1



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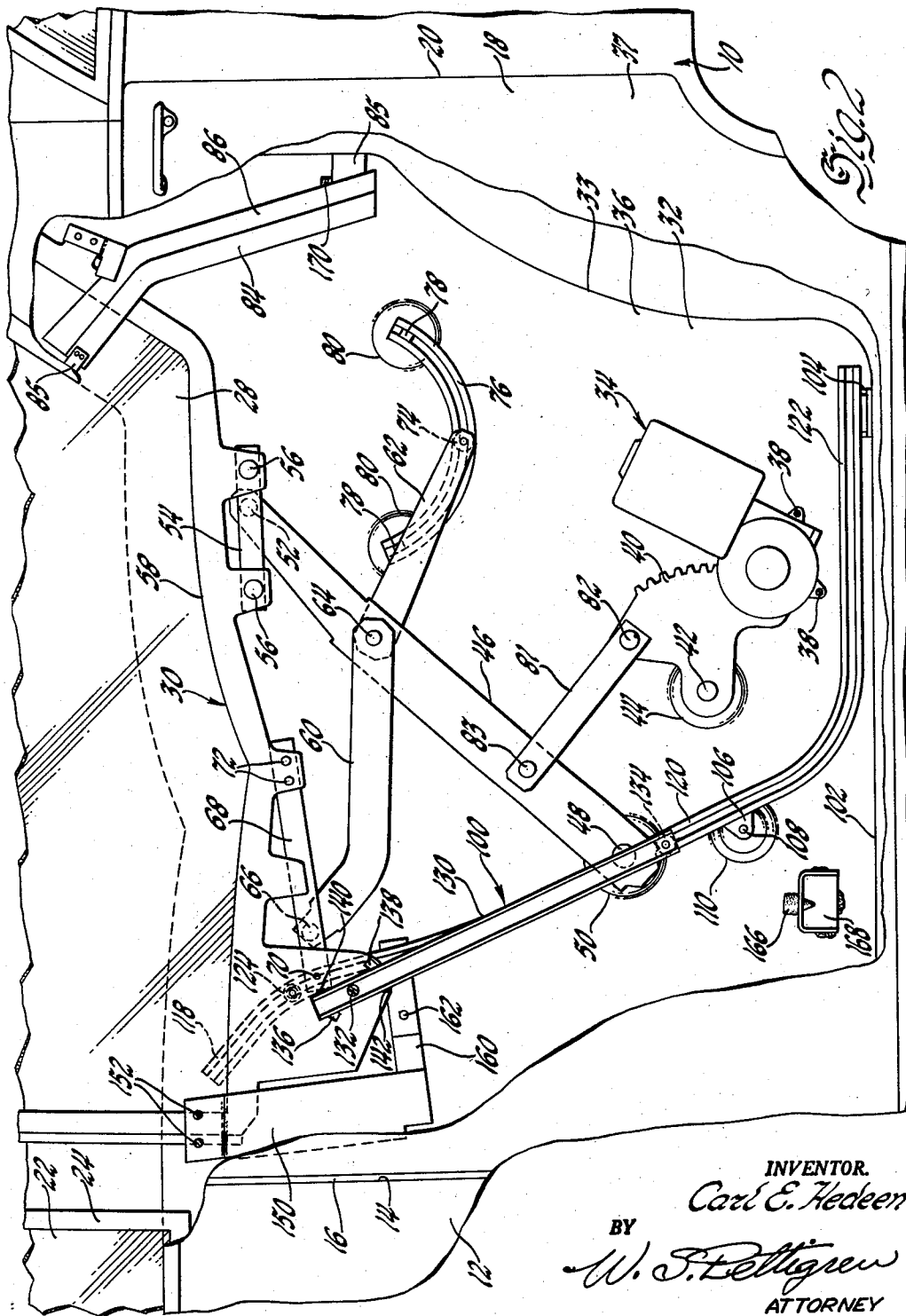
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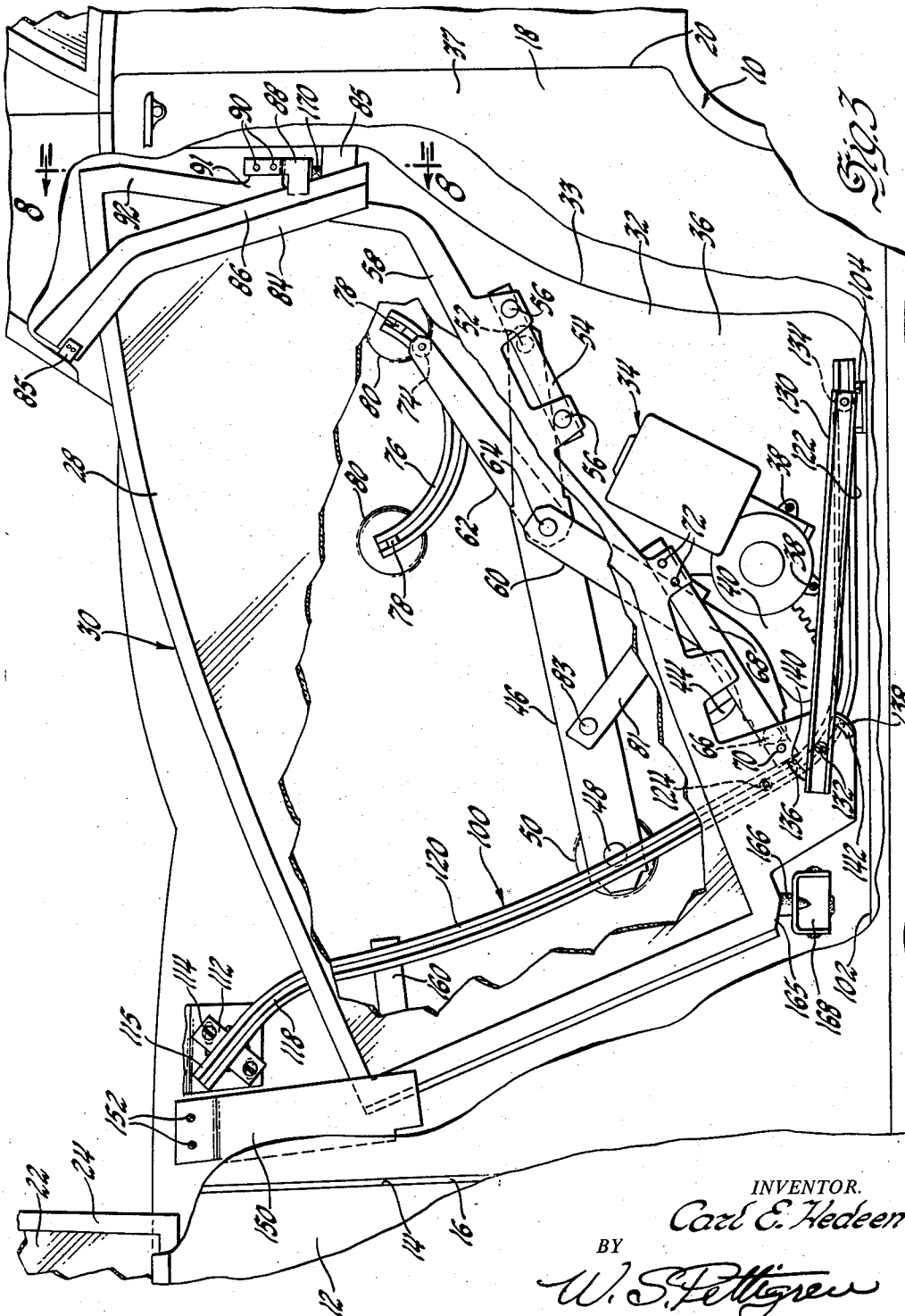
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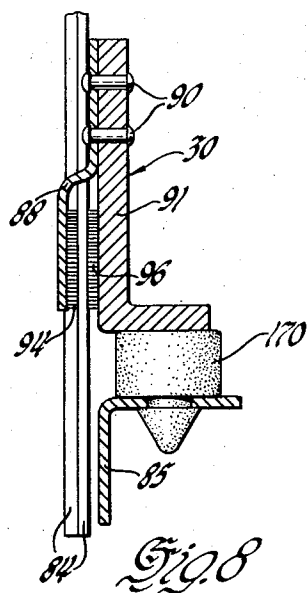
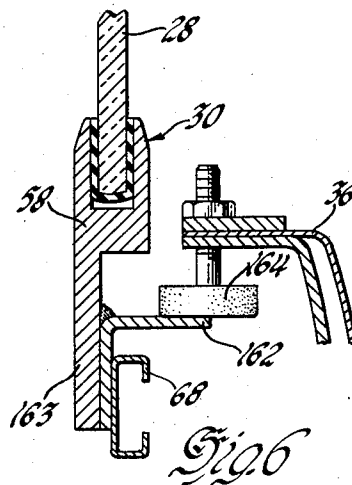
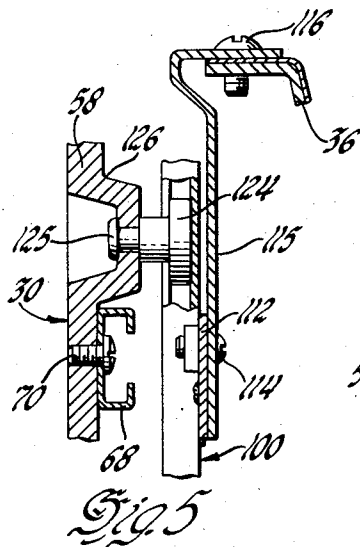
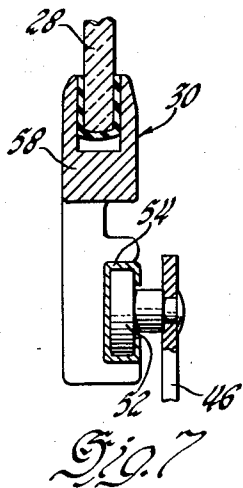
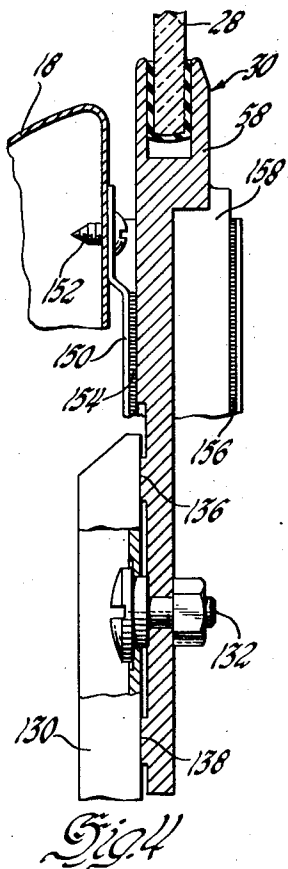
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WINDOW REGULATOR

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Application September 26, 1957, Serial No. 686,434

5 Claims. (Cl. 268—124)

This invention relates to window regulators and more particularly to a window stabilizer to stabilize a vehicle window during movement thereof and in any position thereof.

In many present window regulator systems, the window is moved generally vertically between open and closed positions by a suitable window regulator linkage arrangement which is usually both pivotally and slidably connected to the window. Vertical guides at opposite edges of the window opening slidably receive the front and rear edge portions of the window and act as both longitudinal and lateral stabilizers for the window when in open or closed position or during movement thereof between these positions.

The recently introduced four door hard top sedan body has several body conditions which prevent the use of a window regulator system including the usual vertical guides which slidably receive the front and rear edge portions of the window. In this type of body, there is no rear door window structure above the body belt line at opposite edges of the window opening and some means must therefore be provided to prevent lateral tilting movement of the rear door window when in closed position. Additionally, the sealing conditions between the front and rear door windows and also the stowage conditions within the rear door window well require that the rear door window move along an irregular curvilinear path during movement thereof between open and closed positions. Thus, the rear door window regulator linkage system must impart both rotational and translational movement to the window in order for the window to move between open and closed positions and also to be stowed within the door well when in open position. Thus, it is not possible to stabilize windows of this type by the use of the usual vertical guides which slidably receive front and rear edge portions of the window.

The window stabilizer of this invention is primarily intended for use with windows of this type which have both rotational and translational movement during movement between open and closed positions. The stabilizer acts to hold the window against lateral tilting movement in any other position of the window and also acts to prevent tilting of the window laterally of the body during movement of the window between various positions. The longitudinal shifting movement of the window is prevented by a guide arrangement which acts in combination with the window stabilizer of this invention so that the window remains in any position thereof without tilting or shifting and also moves easily between various positions without tilting or shifting and without interfering with the window regulator linkage system or with other body hardware within the window well.

The primary object of the invention is to provide a new and improved window stabilizer. Another object of the invention is to provide a new and improved window stabilizer to prevent lateral tilting movement of a window during movement thereof and also when the window is in any position. A further object of this in-

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vention is to provide a new and improved lateral window stabilizer for vehicle windows which have both translational and rotational movement during movement thereof.

These and other objects of this invention will be readily apparent from the following specification and drawings, wherein:

Figure 1 is a side elevational view of a vehicle body having a window mounted within the rear door thereof for both translational and rotational movement and stabilized by a window stabilizer according to this invention, with the stabilizer being shown in position when the window is in closed position;

Figure 2 is a view similar to Figure 1 showing the window in partially open position and the position of the stabilizer when the window is in this position;

Figure 3 is a view similar to Figure 1 showing the window in open position and the position of the stabilizer when the window is in this position;

Figure 4 is an enlarged sectional view taken on the plane indicated by line 4—4 of Figure 1;

Figure 5 is an enlarged sectional view taken on the plane indicated by line 5—5 of Figure 1;

Figure 6 is an enlarged sectional view taken on the plane indicated by line 6—6 of Figure 1;

Figure 7 is an enlarged sectional view taken on the plane indicated by line 7—7 of Figure 1; and

Figure 8 is an enlarged sectional view taken on the plane indicated by line 8—8 of Figure 3.

Before proceeding with a description of the window regulator linkage arrangement, it will be understood that substantially the same arrangement is more clearly shown and described in application Serial No. 512,528, Leslie et al., filed June 1, 1955, and assigned to the assignee of this invention. Therefore, only a brief description of the window regulator linkage arrangement will be given, and it will be understood that reference may be had to the above-mentioned application for a further and more complete description.

Referring now to Figure 1 of the drawings, a vehicle body 10 includes a front door 12 hinged at its forward edge to the body and latched at its rearward edge 14 to the body center pillar 16, and a rear door 18 hinged at its forward edge to pillar 16 and latched to its rearward edge 20 to the body. The center pillar 16 extends only from the floor pan of the body to the body belt line, which is the upper edge of the front and rear doors.

A front door window 22 mounted within a window frame 24 is supported within the door 12 by a suitable window regulator mechanism for movement between closed position, as shown, and open position within the window well, not shown. The window 22 seals against the body roof rail 26 when in closed position. A rear door window 28 mounted within a window frame 30 is supported within door 18 by a window regulator linkage arrangement, hereinafter described, for movement between closed position, as shown, and open position within the well 32 of door 18, as shown in Figure 3. Window 28 also seals against the roof rail 26 when in open position. Since the pillar 16 extends only to the belt line of the body, there is no visible pillar above the body belt line when both the front and rear door windows are in open position, and this accounts for the name of this type of body, a four door hard top sedan.

Since there is no center pillar above the body belt line, the front and rear door windows must seal against each other when both are in closed position. This requires that the rear door window 28 overlap the center pillar 16 when in closed position, as shown, and thus this window cannot move in a generally vertical straight line path to open position. To further prevent this vertical movement of the rear door window, the rear wheel housing, not shown, projects forwardly of the body to require

that a portion 33 of the rear door be offset forwardly of the body within the well 32 to accommodate the wheel housing when the door is in closed position. Thus, the rear door window must have both rotational and translational movement in order to move from its position of Figure 1 to its position of Figure 3 so that the window moves along an irregular curvilinear path and pivots about a number of instantaneous pivotal centers.

The window regulator linkage arrangement for moving the window between open and closed positions will now be briefly described with reference to Figures 1 through 3 of the drawings. An electric motor and gear box assembly 34 is bolted at 38 to the door inner panel 36. The gear box drives a sector gear 40 which is pivotally secured at 42 to an embossment 44 on the door inner panel. A regulator drive arm 46 is pivoted at one end thereof at 48 to an embossment 50 of the door inner panel 36. The other end of the arm 46 pivotally mounts a roller 52, Figure 7, which is slidably and pivotally received within a channel 54 secured at 56 at either end thereof to the lower frame member 58 of the window frame 30. A pair of balance arms 60 and 62 are pivoted at one end thereof at 64 to the drive arm 46 by a shouldered bolt or otherwise so that the arms swing as a unit about pivot 64. The other end of arm 60 mounts a roller 66 which is slidably and pivotally received within a channel 68 secured to frame member 58 at 70, Figure 5, and 72. The other end of arm 62 mounts a roller 74 which is slidably and pivotally received within an arcuate guide channel 76 secured at 78 at the ends thereof to embossments 80 of the door inner panel 36. A link 81 is pivoted at one end thereof at 82 to sector 40 and at the other end thereof at 83 to drive arm 46 in order to swing arm 46 about its pivotal connection 48 upon operation of the electric motor and gear box assembly 34 to swing sector 40 about its pivot 42.

It will be noted that the connections 52 and 66 between the window regulator linkage arrangement and the window are both slidable and pivotal connections. Thus, the window can shift longitudinally of the body with respect to the arms 60 and 46 during its movement, and some guide means must be provided in order to control this longitudinal shifting movement of the window. This guide means will now be described, with reference particularly to Figures 1 through 3.

The rear guide means includes a knife guide 84 secured at its upper and lower ends to the door outer panel 37 by suitable brackets 85. As can be seen particularly in Figure 8 of the drawings, the guide is offset laterally to provide a flat guide flange 86. An offset bracket 88 is secured at 90 to the offset tab 91 of the rear window frame member 92 of frame 30 and mounts a guide shoe 94, Figure 8, of suitable construction which engages the outboard surface of flange 86. A like guide shoe 96 secured to tab 91 opposite shoe 94 engages the inboard surface of flange 86 so that the shoes 94 and 96 provide a sliding clamp connection between the window and the rear guide.

The front guide means includes a guide 100 of channel-shaped cross configuration secured adjacent the lower end thereof to the bottom wall 102 of the door well 32 by a suitable bracket 104. An intermediate portion of guide 100 includes a lateral tab 106 which is secured at 108 to an embossment 110 of the door inner panel 36. As best seen in Figures 3 and 5, a bracket 112 is welded or otherwise secured to guide 100 adjacent the upper end thereof and is bolted at 114 to a plate 115 secured at 116 to the door inner panel. As can be seen from a comparison of Figures 1, 2 and 3, the guide 100 includes an upper generally forwardly and upwardly extending portion 118, an intermediate generally downwardly and rearwardly extending portion 120, and a generally straight rearwardly extending portion 122. The portions 118 and 120 define the path of one point on the forward portion of the window. All points on the window do not move in the same path since the window moves along an irregular

curvilinear path and pivots about a number of instantaneous pivotal centers during its movement as previously mentioned.

As can be seen in Figure 5, a roller 124 is pivotally secured at 125 to an offset portion 126 of frame member 58 and is slidably and rotatably received within the guide 100. The pivot connection between the roller and the window is the point on the forward portion of the window which moves in the path prescribed by the portions 118 and 120 of the guide 100.

The connection between the rear portion of the window and the guide 84 is a slidable connection permitting longitudinal shifting movement of the window relative to the body in either direction and only limiting longitudinal shifting movement of the window in a forward direction whenever the bracket 88 happens to engage the offset of the guide. Thus, this connection can only limit the longitudinal shifting movement of the window in forward directions and then only within a rather wide limit. However, the slidable and pivotal connection 124 between the forward portion of the window and the guide 100 will limit longitudinal shifting movement of the window in both forward and rearward directions within rather narrow limits, so that the combined use of the rear guide and slidable rear connection with the forward guide and slidable and pivotal forward connection acts to control shifting movement of the window longitudinally of the body in any position thereof and during movement thereof.

Since the only connections between the window regulator linkage arrangement and the window are through the rollers 62 and 66, it is relatively easy for the window to tilt laterally of the body and of the regulator linkage about these connections whether stationary or during movement thereof. The slidable connection between the rear guide 82 and the rear portion of the window and also the slidable and pivotal connection 124 between the forward guide and the front portion of the window act in some respect to laterally stabilize the window. However, since the window is rather large and of some weight, and since the connections between the window and the guides and regulator linkage are generally located at the lower edge portion of the window, the window is still subject to lateral tilting movement, particularly when in up position, due to the lack of any door window frame member above the belt line to support the guides for the edge portions of the window. In order to prevent this lateral tilting movement of the window in any position thereof, particularly when the window is in closed position and also during movement of the window between various positions, a window stabilizer is provided according to this invention.

Referring now particularly to Figures 1 and 4 of the drawings, the window stabilizer will be described. The stabilizer includes an arm 130 of channel-shaped configuration which is pivotally secured at one end thereof at 132 to the lower frame member 58 of window frame 30 by means of a shouldered bolt, best shown in Figure 4. The other end of the stabilizer arm pivotally mounts a roller 134 which is slidably and rotatably received within the front guide 100. The window frame member 58 is provided with a pair of integral wedges 136 and 138 which are adapted to engage the stabilizer arm 130 in all positions thereof, but which releasably lock the stabilizer arm to the window frame 58 in only the raised position of the window since the wedge 136 has its high area at 140 and the wedge 138 has its high area at 142.

When the window is in closed position, as shown in Figure 1, the stabilizer arm 130 is effectively locked to the window frame 58, as previously mentioned, by means of the wedges 136 and 138 since the arm engages the high areas 140 and 142, respectively, of the wedges. It will be noted that the stabilizer arm is pivoted to the window at a different point than the window is pivotally connected to the guide 100 and that the pivotal connec-

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tion between the stabilizer arm and the guide 100 is some distance below the pivotal connection of the stabilizer arm to the window. Thus, the stabilizer arm acts as a depending lever arm from the window and the two point connection of the window and stabilizer arm to the guide 100 in conjunction with the one point connection between the stabilizer arm and the window together with the locking of the stabilizer arm to the window effectively prevents the window from tilting laterally with respect to the window regulator linkage or to the body. The clamping action between the window and the rear guide 84 also aids to prevent this tilting movement as does an additional clamping means provided between the forward portion of the window and door 18, as will now be described with reference to Figures 1 and 4. A channel-shaped member 150 is secured at 152 to the door outer panel and opens rearwardly with respect to the body, as viewed in Figures 1 through 3. The channel-shaped member mounts an outboard guide shoe 154 of suitable construction which engages the outboard surface of the lower window frame member 58 when the window is in raised position and also mounts a guide shoe 156 opposite the guide shoe 154 which engages a lug or boss 158 of the window frame member 58, as shown in Figure 4 of the drawings. The inboard leg of the channel-shaped member is further provided with an extension 160 which is secured at 162 to the door inner panel to provide additional stability to the channel-shaped member. The clamping action of the guide shoes 154 and 156 of member 150 in combination with the stabilizer arm 100 and the clamping action between the window and the rear guide 86 act to hold the window against lateral tilting movement when in closed position.

Referring now particularly to Figures 1 through 3 of the drawings, the operation of the stabilizer arm during movement of the window between closed and open positions will now be described. When the window is in closed position, as shown in Figure 1, the forward portion of the window overlaps the center pillar 16. Thus, in order to move the window toward an open position, the rear portion of the window must initially be moved downwardly away from the roof rail 26 to allow the forward portion of the window to move out of overlapping engagement with the pillar 16 and out of engagement with the roof rail 26. Thus, the rear portion of the window initially moves downwardly at a greater rate than the forward portion of the window and thereafter the forward portion of the window swings downwardly and rearwardly at a greater rate than the rearward portion of the window until the window comes to rest in its open position, as shown in Figure 3. When the window initially moves from a closed to a partially open position, as can be seen from a comparison of Figures 1 and 2, there is only a slight movement of the stabilizer arm 100 in a counterclockwise direction about its pivotal connection 132 to the window frame member 58. This action is slight since initially the rearward portion of the window moves downwardly at a greater rate than the forward portion of the window. Thus, the locking action of the stabilizer arm 130 to the window remains effective since the stabilizer arm 130 is in engagement with the wedges 136 and 138 immediately adjacent their high areas 140 and 142. Thereafter, as the window moves downwardly from its position of Figure 2 to its fully open position of Figure 3, the stabilizer arm continues to rotate in a counterclockwise direction about the pivotal connection 132, but this swinging movement of the stabilizer arm is rather slight until the roller 134 starts to move around the arcuate juncture bend between the portions 120 and 122 of the guide 100. Thereafter, the stabilizer arm 100 swings at a greater rate about its pivotal connection 132 since the pivotal connection 124 between the window and guide 100 does not move along the portion 122 of the guide 100 when the window reaches its fully open

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position. The operation of the stabilizer arm when the window is moved between open and closed positions is the reverse of that immediately hereinbefore described.

In order to locate the window in both open and closed positions, a number of stops are provided. When the window is in closed position, an angular bracket 162 which is secured to a depending ear 163 of frame member 58 engages an adjustable rubber bumper 164 mounted on the door inner panel in order to accurately locate the forward portion of the window. When the window is in open position, the lower edge portion 164 of frame member 58 engages a bumper 166 mounted on a bracket 168 secured to the door inner panel to accurately locate the forward portion of the window, and a similar bumper 170 secured to bracket 85 engages the offset tab 91, as shown particularly in Figure 8, to accurately locate the rear portion of the window.

Thus, this invention provides a new and improved window stabilizer which is particularly intended for use with vehicle windows which move along an irregular curvilinear path and which cannot be provided with vertical guides which receive the front and rear edge portions of the window. The stabilizer effectively prevents lateral tilting movement of the window in any position thereof, particularly in the closed position thereof, and also prevents any tilting movement of the window during movement thereof between various positions.

I claim:

1. In combination with a vehicle window movable into and out of a window well to open and closed positions, a window control mechanism comprising, a stabilizer member pivotally secured to said window, guide means supported within said well and defining a path of movement other than the path of movement of the pivotal connection between said stabilizer member and said window, locking means releasably locking said stabilizer member to said window in depending relationship thereto when said window is in closed position, and means pivotally and slidably securing said stabilizer member to said guide means to swing said stabilizer member relative to said window during movement of said window between open and closed positions to release said member from said locking means and thereby unlock said stabilizer member from said window.

2. In combination with a vehicle window movable into and out of a window well to open and closed positions, a window control mechanism comprising, a stabilizer member swingably secured to said window, guide means supported within said well and defining a path of movement other than the path of movement of the connection between said stabilizer member and said window, gradually releasable locking means locking said stabilizer member to said window when said window is in closed position, and means pivotally and slidably securing said stabilizer member to said guide means to swing said stabilizer member relative to said window during movement thereof to gradually release said member from said locking means and thereby unlock said stabilizer member from said window.

3. In combination with a vehicle window movable into and out of a window well to open and closed positions, a window control mechanism comprising, guide means supported within said well and defining the path of movement of one portion of said window, means on said one portion of said window slidably engageable with said guide means to guide said window during movement thereof, a stabilizer member pivotally secured to said one portion of said window at a point offset from said means on said window, locking means releasably locking said stabilizer member to said window when said window is in closed position, and means pivotally and slidably securing said stabilizer member to said guide means to swing said stabilizer member relative to said window during movement of said window between said open and closed positions to release said member from said locking

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means and thereby unlock said stabilizer member from said window.

4. In combination with a vehicle window movable into and out of a window well to open and closed positions, a window control mechanism comprising, a stabilizer member pivotally secured adjacent one end thereof to said window, a guide channel within said well defining a path of movement other than the path of movement of the pivotal connection between said stabilizer member and said window, locking means on said window engageable with said stabilizer member to releasably lock said stabilizer member to said window in depending relationship thereto when said window is in closed position, and means secured to said stabilizer member adjacent the other end thereof and slidably received within said guide channel to swing said stabilizer member relative to said window during movement thereof to thereby move said member out of engagement with said locking means and unlock said member from said window.

5. In combination with a vehicle window movable into and out of a window well to open and closed positions, a window control mechanism comprising, a guide channel

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supported within said well and defining the path of movement of one point of said window, means secured to said window at said one point thereof and slidably engageable with said guide channel to guide said window during movement thereof, a stabilizer arm pivotally secured adjacent one end thereof to said window at a point offset from said one point on said window, locking means on said window adjacent the pivotal connection of said arm thereto for releasably locking said stabilizer arm to said window in depending relationship thereto when said window is in closed position, and means secured to said stabilizer arm adjacent the other end thereof and slidably received within said guide channel for swinging said stabilizer arm relative to said window during movement thereof to thereby move said stabilizer arm out of engagement with said locking means and unlock said stabilizer member from said window.

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