

March 25, 1941.

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WINDOW GUIDE

Original Filed June 29, 1938

2 Sheets-Sheet 1

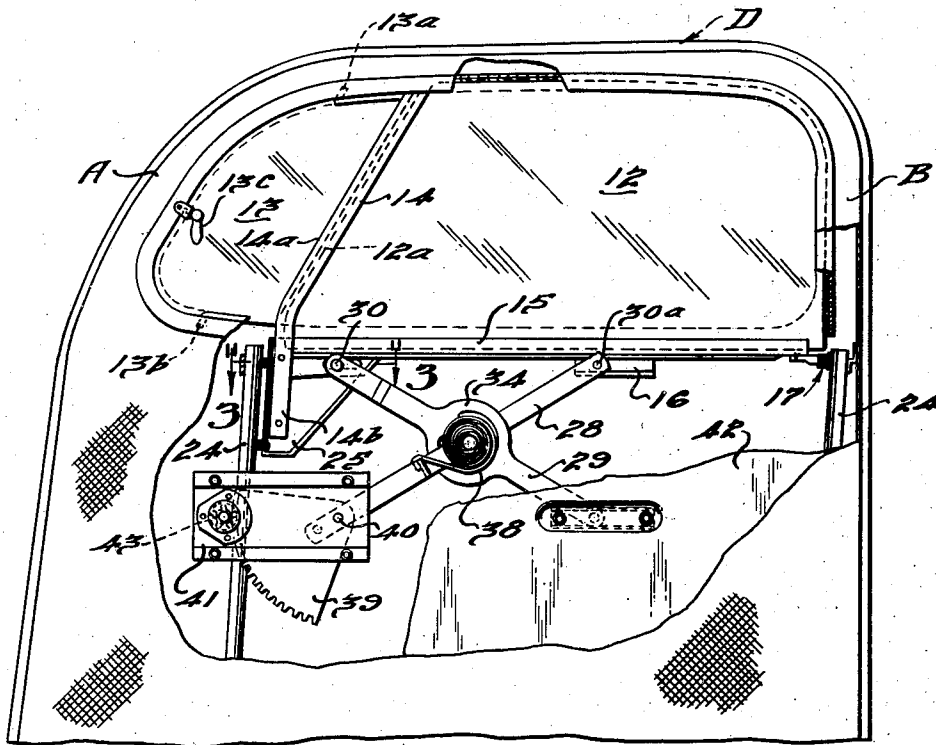


FIG. 1.

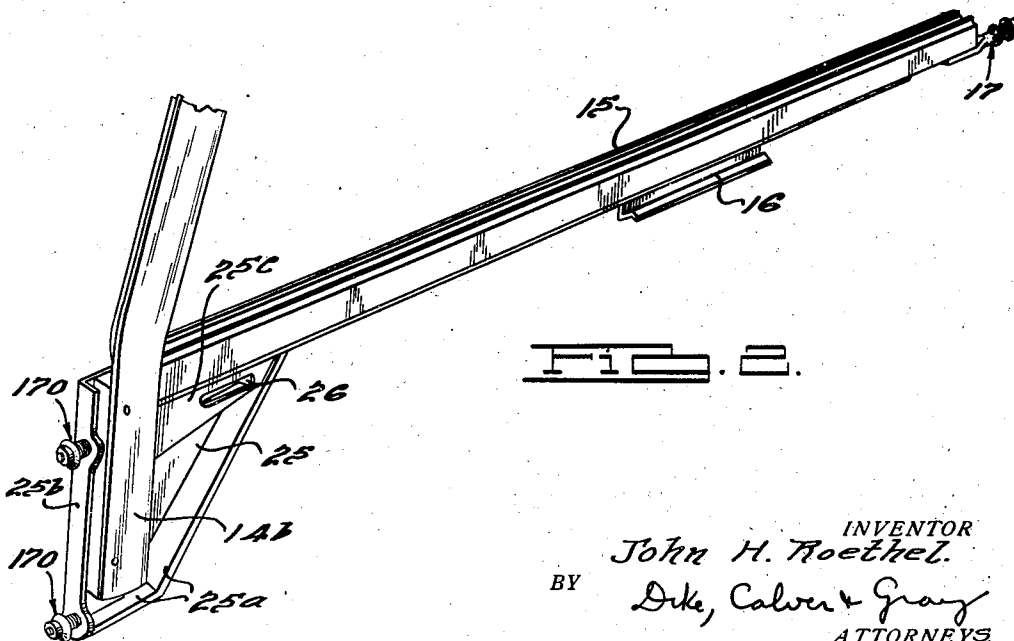


FIG. 2.

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**March 25, 1941.**

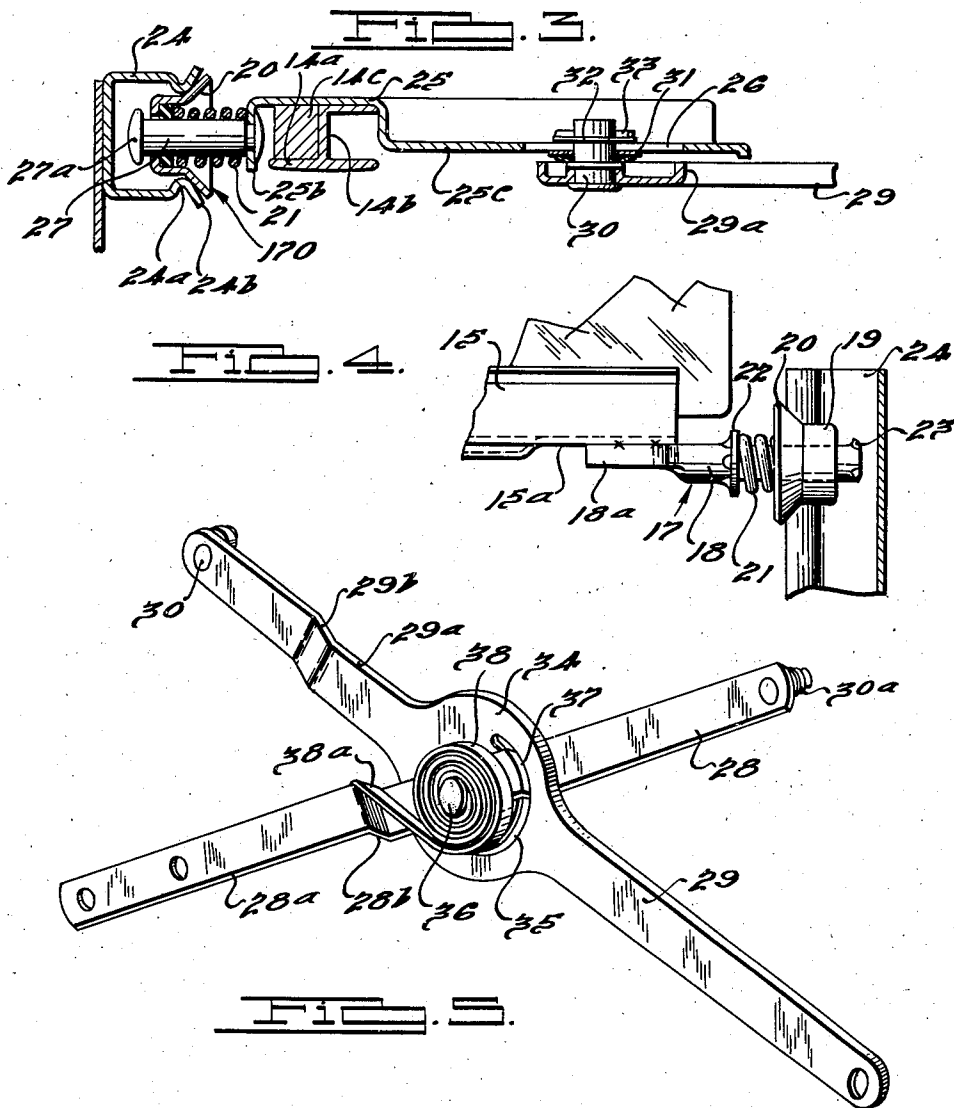
**J. H. ROETHEL**

**2,236,450**

## WINDOW GUIDE

Original Filed June 29, 1938

2 Sheets-Sheet 2



## UNITED STATES PATENT OFFICE

2,236,450

## WINDOW GUIDE

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Application June 29, 1938, Serial No. 216,534  
Renewed November 2, 1939

20 Claims. (Cl. 296—44)

This invention relates to means for guiding and controlling glass or transparent panels of windows, particularly windows of automobiles, in which the transparent panels or panes are adapted to be raised and lowered. The invention is especially useful as applied to the window structure for a vehicle body having a window frame of which the upper portion is in the form of a closed figure defining a window opening with a window well therebelow formed between inner and outer body or door panels within which the guiding mechanism of the present invention as well as the window regulator mechanism are installed and concealed from view.

An object of the invention is to provide improved guide mechanism within the window well for the window glass, which mechanism includes compression devices mounted on the bottom of the glass at opposite ends thereof movably or slidably cooperating with fixed upright guides for spring suspending the glass within the well and operating to resist displacement of the glass in directions angular to the path of movement of the glass when raised and lowered, one important feature of the invention residing in the provision of a three point spring suspension means for the window glass within the window well.

Another object of the invention is to provide improved means for guiding the window glass into and out of the window opening and window well, which means is relatively simple in construction, capable of effecting substantial savings in material and labor costs, highly efficient in use and effective to permit and facilitate installation of the window glass from the side of the window opening downwardly into the window well.

The present application is a continuation in part of and embodies certain improvements over my co-pending applications Serial No. 175,780, and Serial No. 213,871, to which reference may be made to all features of construction of the present application common to said co-pending applications.

Other objects and advantages of this invention will appear in the following description and appended claims, when considered in connection with the accompanying drawings forming a part of this specification, wherein like reference characters designate corresponding parts in the several views.

Fig. 1 is an inner fragmentary side elevation, partly broken away and partly in section, of an automobile door, such as a front door, embodying the invention.

Fig. 2 is a perspective view of the glass retainer channel with the compression guide devices installed thereon.

Fig. 3 is an enlarged horizontal section taken substantially through lines 3—3 of Fig. 1 looking in the direction of the arrows.

Fig. 4 is an enlarged detail view partly in section showing one of the compression guide devices.

Fig. 5 is a perspective view of the cross arms of the window regulator.

Before explaining in detail the present invention it is to be understood that the invention is not limited in its application to the details of construction and arrangement of parts illustrated in the accompanying drawings, since the invention is capable of other embodiments and of being practiced or carried out in various ways. Also it is to be understood that the phraseology or terminology employed herein is for the purpose of description and not limitation, and it is not intended to limit the invention claimed herein beyond the requirements of the prior art.

In the drawings there is illustrated a certain embodiment of the invention applied, by way of example, to a front and a rear automobile door. It will be understood, however, that the embodiment herein exemplified in part or in whole may be utilized in other relations and in other structures, and in particular that other window regulator mechanism may be employed for raising and lowering the window glass panel.

In Fig. 1 there is illustrated an automobile door D which may be a front door including a front sloping pillar A and a rear upright pillar B of rounded or sloping contour at the upper end thereof. The upper portion of the door is provided with a main window opening adapted to be closed by means of a vertically slidable glass or other transparent panel 12 and a laterally swinging glass or other transparent panel 13. In the present instance the panel 13, which is of so-called wing type, is disposed at the forward part of the window opening and the panels 12 and 13 are preferably arranged so that when in fully closed positions they extend in the same or in substantially parallel planes and cooperate together to close the main window opening. The wing type panel may be pivoted at points 13a and 13b so as to swing laterally about an up and down axis substantially bisecting the wing and inclined substantially in accordance with the direction of inclination of the forward edge of the panel 12. The upper pivot 13a may be offset outwardly from the plane of the glass and the lower pivot 13b

may be offset inwardly from the plane of the glass and the construction and mounting of the wing may be substantially in accordance with my co-  
 pending application Serial No. 213,871, filed June  
 15, 1938. In the present embodiment, by way of  
 example, the forward upright edge 12a of the  
 panel 12 is inclined downwardly and forwardly  
 at an angle preferably substantially correspond-  
 ing to the angle of inclination of the front pillar  
 10 A and to the rear edge of the wing panel 13. Se-  
 cured to the edge 12a is a channel bar 14 which  
 at its inner side has a forwardly projecting lip  
 or overlap flange 14a against which the rear edge  
 of the wing seats when the window is fully closed.  
 15 Secured to the lower edge of the glass panel  
 12 is a channel bar or glass retainer member 15  
 which carries intermediate its ends a channel-  
 like depending horizontal guide member 16 of  
 conventional construction adapted to receive a  
 20 stud or roller or the like on the outer end of one  
 of the regulator arms. The glass retainer mem-  
 ber 15 which usually comprises a lined channel  
 embracing the lower edge of the glass 12 (see  
 Fig. 8) carries at its rear end a compression  
 25 guide device indicated generally by the numeral  
 17.

As shown in Fig. 4, the member 16 has a flat-  
 tened bottom end portion 16a. A round elon-  
 gated stud 18 is spot welded to the portion 16a  
 30 through a flattened portion 16b of the stud. A  
 cylindrical cup shaped washer or compression  
 device 19 is freely slidable upon the cylindrical  
 end of the stud 18, this washer having an an-  
 nular flared or tapered portion 20. Mounted  
 35 upon the stud is a compression spring 21, this  
 spring being retained under compression at all  
 times between a shoulder 22, swaged out or  
 formed from the metal of the stud, and the washer  
 member 19. The construction of the washer  
 40 and the relation of the spring thereto together  
 with the manner in which the washer is mounted  
 upon the stud is similar to that shown in Fig. 3.  
 The washer 19 of Fig. 4 is retained upon the end  
 of the stud by lugs or projections 23 swaged or  
 45 struck out from the metal of the stud. The com-  
 pression guide device 17 cooperates with a chan-  
 nel guide 24 fixed within the window well  
 through the medium of suitable brackets. This  
 rear channel guide is inclined slightly to clear  
 50 the lock handle shaft. A similar channel guide  
 24 parallel to the rear guide is mounted within  
 the well adjacent the forward guided edge of  
 the sliding panel 12, see Figs. 1 and 3. As shown,  
 the channel guide in each instance comprises a  
 55 channel opening toward the compression guid-  
 ing device and having its outer edges formed with  
 a constricted neck 24a and outwardly flared or  
 tapered terminal portions 24b forming tracks  
 60 slidingly engaged along preferably line contacts  
 by the annular flared portion 20 of the guide de-  
 vice. It will be understood that when the win-  
 dow is installed the compression member 19 is  
 forced back upon the stud 18 to further com-  
 press the spring 21.

Referring particularly to Figs. 1, 2 and 3, the  
 forward edge of the glass panel 12 is preferably  
 guided within the window well through the medi-  
 um of vertically spaced compression guide devices  
 indicated generally by the numeral 17 and gen-  
 70 erally similar in construction to the guide de-  
 vice 17. The bar 14 is provided with a depend-  
 ing extension 14b lying within the window well.  
 Secured to the forward end of the retainer  
 member 15 is a generally triangularly shaped  
 75 bracket 25. This bracket is pressed from sheet

metal and at its upper end is spot welded to  
 the outer face of the channel 15. The bracket  
 has reinforcing marginal flanging 25a and 25b  
 and also has an inwardly extended horizontal  
 embossment 25c provided with an elongated  
 5 horizontal guide slot 26. The bar extension 14b  
 extends downwardly along the inner face of the  
 bracket 25 and is secured thereto by screws ex-  
 tending through the flange 14a and filler blocks  
 14c. The guide devices 17 are fastened at verti-  
 10 cally spaced points to the forward flange 25b.  
 Each device 17 comprises a cylindrical stud 27  
 riveted to the flange 25b and terminating in a  
 head 27a. A cup-shaped washer-like compres-  
 sion member 20 is freely slidable upon the stud  
 15 27, and between an anti-rattle washer of leather,  
 rubber or the like fitted within the base of the  
 member 20 and the flange 25b is anchored the  
 compression spring 21. The washer 20 is re-  
 tained upon the stud 27 under compression  
 20 against removal from the stud by the head 27a.  
 As shown in Fig. 3, the compression device 18  
 slidingly cooperates with the channel guide 24.  
 It will thus be seen from Figs. 3 and 4 that  
 when the window glass 12 is installed and guid-  
 25 ingly supported within the window well at three  
 points by the compression guide devices 17 and  
 17b, the washer members 20 will be pressed back  
 upon the studs 18 and 27 thereby suspending the  
 window within the well yieldingly under spring  
 30 pressure.

It will be understood that the invention in cer-  
 tain aspects thereof may be utilized where the bar  
 14 is fixed within the window opening and forms  
 a guide for the glass panel 12. It will also be  
 35 understood that the term "glass" is used herein  
 in a generic sense and is intended to comprehend  
 any panel regardless of the material movable up  
 and down to close a window opening.

The window regulator mechanism includes a  
 40 pair of intersecting cross arms or lever arms 28  
 and 29. The outer end of the arm 28 is provided  
 preferably with a projecting headed stud 30a  
 riveted to the end of the arm and adapted to  
 have the head thereof interlocked within the  
 45 guideway 16. This stud preferably carries a slid-  
 able conical or flared washer engaging the inner,  
 upper and lower longitudinal edges of the guide-  
 way 16 and urged thereagainst for sliding en-  
 gagement therewith by a compression spring  
 50 mounted upon the shank of the stud. This con-  
 struction being conventional is not illustrated  
 herein in detail. The arms 28 and 29 may be re-  
 inforced by continuous marginal flanging 28a  
 and 29a, respectively. To the outer end of the  
 55 arm 29 is fixed as by riveting a stud 30 which  
 preferably has a smooth cylindrical shank slid-  
 ingly extending through the guide slot 26 in the  
 bracket 25. At one face of the slot the stud 30  
 carries a flat spring pressed washer 31 and at  
 60 the opposite face of the slot the stud carries a  
 similar washer 32 retained upon the stud by a  
 removable cotter pin 33. Thus, the stud 30 may  
 be readily anchored within the guide slot 26 for  
 limited sliding movement by simply applying the  
 65 washer 32 and the cotter pin 33.

The arm 29 intermediate its ends has a widened  
 or enlarged portion 34 formed with an arcuate  
 slot 35. The arm 28 is pivoted through the medi-  
 um of a stud 36 to the portion 34 at the center  
 70 of curvature of the slot 35 and is formed with  
 an offset 37 extending through the slot 35 there-  
 by positioning the inner end portion of the arm  
 at one face of the arm 29 and the outer portion  
 thereof at the opposite face. The offset 37 may  
 75

be formed on a radius so as to have a transverse curvature corresponding to or approximating the curvature of the slot 35. When the arms swing in raising and lowering the window the offset 37 will travel within the slot 35, this slot being preferably of sufficient length to prevent engagement of the offset with either end of the slot in the extreme positions of the arms during normal operation so as to prevent chatter or vibratory noises when the regulator is idle in either of its extreme positions. The outer end of the arm 29 is offset at 29b so as to align the stud 29 with the stud 30 for operation in the aligned guide-ways 16 and 26. The inner end of the arm 28 is offset inwardly at 28b to provide both a mounting for the spring and also to bring the arm into position for securement to the mounting plate of the regulator.

In the present instance the pivot stud 36 is riveted to the arm 29 and provides a bearing or journal for the arm 28 which rotates thereon. The stud 36 terminates in a head and in back of this head the stud is provided with a kerf or slot within which is anchored the inner end of a spiral counterbalancing spring 38, the spring being retained on the stud by the head. The outer end 38a of this spring is bent to provide a hook which is hooked over the upper edge of the offset 28b thereby anchoring the spring to the arm 28.

The swinging arm 28, which may be termed the driving arm, is secured at its inner end at two spaced points to a gear segment 39 rotatable through a pivot stud 40 upon a pressed metal mounting plate 41 having screw bosses by which the mounting plate is secured by screws to the inner door panel 42. Meshing with the teeth of the gear segment 39 is a driving pinion 43 carried by a handle shaft journaled in the mounting plate. The handle shaft includes a conventional friction clutch device and carries at its inner end a conventional crank handle which may be turned to swing the cooperating arms to raise and lower the glass panel 12. The inner metal door or body panel 42 in practice extends longitudinally and connects the front and rear pillar structures below the main window opening. The inner end of the arm 29, which may be termed the guide or balance arm, is slidably mounted upon the inner door or body panel 42.

From the foregoing it will be seen that the sliding glass 12 of Fig. 1 is supported at the two relatively widely spaced points 30 and 30a and that in operation of the window regulator the cross arms 28 and 29 carry the window glass downwardly and upwards in substantially a straight line direction, thus avoiding any material tilting of the glass in its plane or shifting the glass endwise in its plane. In view of the substantially straight line path of movement of the glass 12 it is possible to suspend the glass within the window well through the medium of the compression guide devices 17 and 170 and at the same time insure smoothness and more efficient operation of the glass while holding the glass tightly in all positions thereof against wobbling or movement when a force is applied directly to the glass. It will be seen that the glass 12 is suspended under spring tension at three points 17 and 170. Increased smoothness of operation and elimination of any material tendency of the compression guide devices to bind at one side or the other against the channel guides 24 is accomplished by substantially equalizing the effort exerted by the springs 21 at opposite sides of the

glass. Preferably the springs 21 of the devices 170 exert a combined effort or force on the devices 20 substantially equal to the effort or force applied by the spring 21 of the compression device 17 at the opposite side of the glass. It is, therefore, preferred that each of the springs of the two compression devices 170 be substantially lighter or weaker than the spring of the single compression device 17, reference in this respect being made to the embodiment illustrated in Figs. 1 and 2. It will also be noted in connection with the foregoing embodiment that the bracket 25 serves the combined function of supporting the compression guide devices 170 and providing a connection through the guide slot 26 for the stud 30 at the outer end of the regulator arm 29. This construction not only simplifies the structure, providing economies in manufacture by eliminating a second channel guide 16 but also facilitates assembly of the window regulator with the glass retainer channel 15.

Important results are achieved by virtue of the present invention. Greater simplicity of construction, compactness and economies in production are achieved by the construction and mounting of the compression devices. By utilizing a window regulator capable of exerting a straight line lifting or lowering force on the glass, the regulator may be mounted at one side of the center of the glass to provide a more favorable handle location without interfering with the door handle. Off center location of the window regulator permits a direct connection of the arm 29 with the bracket 25. The construction and arrangement of the three point suspension means, i. e. the upright guides within the window well and the longitudinally yieldable compression devices, which are preferably mounted in the plane of the window panel, permits and facilitates installation of the window panel 12 from the side of the window opening in a closed body by passing the lower edge of the panel, upon which the glass retainer channel and guide devices are mounted, downwardly into the window well between the inner and outer body panels.

I claim:

1. In a window structure for a vehicle body having a window glass adapted to be lowered into a window well and raised therefrom, spring suspension devices at opposite ends of the glass within the window well for guiding the same comprising a pair of vertically spaced devices at one end of the glass and a single device at the opposite end, a glass retainer channel secured to the lower edge of the glass, one of said suspension devices comprising a longitudinal stud secured directly to the retainer channel, and a spring pressed compression member slidable between predetermined limits on said stud.

2. In a window structure for a vehicle body having a window frame of which the upper portion is in the form of a closed figure defining a window opening with a window well therebelow formed between inner and outer body panels and, an up and down sliding window panel movable into and out of said well and window opening; a pair of upright fixed guides within the well below said opening, guide devices on the bottom of the window panel at opposite ends thereof including a plurality of vertically spaced devices at one end of the window panel and a device on the bottom of the window panel at the opposite end thereof, said devices comprising yieldable means spring suspending the panel on the guides within the well and adapted to be assembled upon the

guides by shifting the lower edge of the window panel through the side of the window opening and downwardly through the upper end of the window well.

5 3. A structure according to claim 2 in which said guides are channels facing toward each other having flared edges slidably engaged by said devices, the upper ends of the channels being open for installation of the devices and the channels being arranged to hold the devices yieldingly pressed in toward one another against the action of their springs when the window panel is installed.

10 4. A guide structure for a vehicle window panel adapted to be mounted in a window frame for up and down sliding movement, said window frame having a window opening and a well therebelow, comprising a pair of fixed upright guides within the window well adjacent opposite upright edges of the window panel, guide devices fixed to the window panel at opposite ends thereof and extending longitudinally in opposite directions comprising a pair of vertically spaced devices at one end of the panel and a single device at the opposite end thereof, each device including a longitudinally yieldable spring pressed compression member cooperating with and movable along one of the guides, said compression members spring suspending the window panel within the well upon the guides and each cooperating with a guide to resist displacement of the panel in a direction transverse to the path of travel of the compression devices along the guides.

15 5. In a window structure for a vehicle body having a window frame of which the upper portion is in the form of a closed figure defining a window opening with a window well therebelow formed between inner and outer body panels and an up and down sliding window panel movable into and out of said well and window opening; a three point spring suspension means for guiding said panel within the well, said means comprising a pair of vertically spaced spring pressed devices adapted to be mounted on the bottom of the panel at one end and a single spring pressed device adapted to be mounted on the bottom of the panel at the opposite end, said devices being yieldable longitudinally of the panel and the pair of devices working in a longitudinal direction oppositely to the single device, the spring pressure of two of said devices being equal to, or approximately so, the spring pressure of the single device, said window panel being adapted to be assembled by passing the same through one side of the window opening vertically into the well.

20 6. Guide means according to claim 5 comprising a pair of fixed upright guides within the well, each of said devices engaging parallel guiding edges of a guide.

25 7. Guide means for a window panel adapted to be mounted for up and down sliding movement in a window frame, comprising a glass retainer member adapted to be secured to the lower edge of the panel, a pair of vertically spaced longitudinally yieldable spring pressed guide devices mounted at one end of said retainer member to lie substantially in the plane of the panel, a single longitudinally yieldable spring pressed guide device mounted at the opposite end of the retainer member also to lie substantially in the plane of the panel, the spring pressure of each of said pair of devices being less than said single device, each device of said devices comprising a coil spring and a compression member yieldable longitudinally and axially of the spring.

3. Guide means for a window panel adapted to be mounted for up and down sliding movement in a window frame, comprising a glass retainer member adapted to be secured to the lower edge of the panel, a pair of vertically spaced longitudinally yieldable spring pressed guide devices mounted at one end of said retainer member to lie substantially in the plane of the panel, a single longitudinally yieldable spring pressed guide device mounted at the opposite end of the retainer member also to lie substantially in the plane of the panel, the spring pressure of each device of said pair of devices being less than said single device, and a pair of guides in said well having parallel edges engaged by said devices.

8. In a window structure for a vehicle body having a window frame with a window opening and a well therebelow and a window glass adapted to be raised and lowered in said window opening and well, a window regulator adapted to be connected to the lower edge of the glass and constructed to raise and lower the glass in substantially a straight up and down path, upright guide members mounted in the window well adjacent opposite ends of the glass, a pair of vertically spaced longitudinally yieldable spring pressed compression devices mounted on one end of the bottom of the glass each cooperable with spaced parallel edges of one of said guide members, a single longitudinally yieldable spring pressed compression device mounted on the opposite end of the bottom of the glass for cooperation with spaced parallel edges of the other of said guide members, the spring pressure of each device of said pair of devices being less than said single device.

10. In a window structure for a vehicle body having a window frame with a window opening and a well therebelow and a window glass adapted to be raised and lowered in said window opening and well, upright guide members mounted in the window well adjacent opposite ends of the glass, a pair of vertically spaced longitudinally yieldable spring pressed compression devices mounted on one end of the bottom of the glass each cooperable with spaced parallel edges of one of said guide members, a single longitudinally yieldable spring pressed compression device mounted on the opposite end of the bottom of the glass for cooperation with spaced parallel edges of the other of said guide members, the spring pressure of each device of said pair of devices being less than said single device.

11. A guide structure according to claim 10 in which said guide members comprise channels facing toward each other and having their spaced parallel edges flared to provide tracks along which said devices travel.

12. A guide structure for a vehicle window panel adapted to be mounted in a window frame for up and down sliding movement, said window frame having a window well in the lower portion thereof, upright guide members adapted to be mounted in the window well adjacent opposite ends of the panel, means for spring suspending the window panel within the well upon said guides comprising a plurality of vertically spaced longitudinally yieldable spring pressed compression devices adapted to be mounted on one end of the bottom of the window panel movably engaging one of said guides and a longitudinally yieldable spring pressed compression device adapted to be mounted on the opposite end of the bottom of the window panel movably engaging the other guide, said guide members and devices lying sub-

stantially in a common longitudinal plane, and each device cooperating with a guide member to hold the window panel against displacement transverse to the up and down path of travel of the panel.

13. A guide structure according to claim 12 in which the spring pressure exerted by said devices on the two guides is substantially or approximately equalized.

14. A guide structure according to claim 12 in which said guide members comprise channel members facing each other and said compression devices slidably engage parallel edges of the channel members at points spaced from the bottoms thereof.

15. A guide structure according to claim 12 in which each of said upright guide members has substantially parallel guiding edges and said compression devices travel along said edges.

16. A structure according to claim 12 comprising a glass retainer channel adapted to be secured to the bottom of the window panel and a depending bracket secured to one end thereof carrying said vertically spaced devices, said bracket having a longitudinal slot closed at both ends, and a swinging window regulator arm adapted to be connected at its outer end in said slot.

17. In a window structure for a vehicle body having a window frame with a window opening and a well therebelow, a window panel adapted to be raised and lowered in said window opening and well, and fixed upright channel guides mounted in the window well adjacent opposite ends of the panel; a metal channel adapted to embrace the lower edge of the panel, a longitudinally yieldable spring pressed compression device mounted on one end of the bottom of said channel and adapted to travel along spaced parallel edges of one of said guides, a depending bracket secured to the bottom of said channel at the opposite end thereof and having means for attachment thereto of a depending extension of a metal guide post secured to the adjacent upright edge of the panel, a longitudinally yieldable spring pressed compression device secured to the lower end of the bracket below the end of the post and extending longitudinally beyond the same for travel along spaced parallel edges of the adjacent guide, and guide means between the bracket and said last named guide extending in a locality above said last named guide device.

18. In a window structure for a vehicle body having a window frame with a window opening and a well therebelow, a window panel adapted to be raised and lowered in said window opening and well, and fixed upright channel guides mounted in the window well adjacent opposite ends of the panel; a metal channel adapted to embrace the lower edge of the panel, a longitudinally yieldable spring pressed compression device

mounted on one end of the bottom of said channel and adapted to travel along spaced parallel edges of one of said guides, a depending bracket secured to the bottom of said channel at the opposite end thereof and having means for attachment thereto of a depending extension of a metal guide post secured to the adjacent upright edge of the panel, and a longitudinally yieldable spring pressed compression device secured to the lower end of the bracket below the end of the post and extending longitudinally beyond the same for travel along spaced parallel edges of the adjacent guide, the spring pressure of said first named compression device being greater than the spring pressure of said second named device.

19. In a window structure for a vehicle body having a window frame with a window opening and a well therebelow, a window panel adapted to be raised and lowered in said window opening and well, and fixed upright channel guides mounted in the window well adjacent opposite ends of the panel; a metal channel adapted to embrace the lower edge of the panel, a longitudinally yieldable spring pressed compression device mounted on one end of the bottom of said channel and adapted to travel along spaced parallel edges of one of said guides, a depending bracket secured to the bottom of said channel at the opposite end thereof and having means for attachment thereto of a depending extension of a metal guide post secured to the adjacent upright edge of the panel, and a longitudinally yieldable spring pressed compression device secured to the lower end of the bracket below the end of the post for travel along spaced parallel edges of the adjacent guide, said depending extension of the post being arranged for vertical travel exteriorly of said last named guide, and the spring pressure of said first named compression device being greater than the spring pressure of said second named device.

20. In a window structure for a vehicle body having a window frame with a window opening and a well therebelow, a window panel adapted to be raised and lowered in said window opening and well, and fixed upright channel guides mounted in the window well adjacent opposite ends of the panel; a metal channel adapted to embrace the lower edge of the panel, and a longitudinally yieldable spring pressed compression device mounted at each end of the bottom of said channel and adapted to travel along spaced parallel edges of one of said guides, each of said devices having means cooperable with the parallel edges of the guide for resisting displacement of the window panel in a direction transverse to the opening and closing movement thereof, the spring pressure of one of said devices being materially greater than the spring pressure of the other of said devices.

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