

- [54] WINDOW REGULATOR FOR MOTOR VEHICLE
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- [58] Field of Search ..... 49/351, 348, 349, 227,  
49/360, 350

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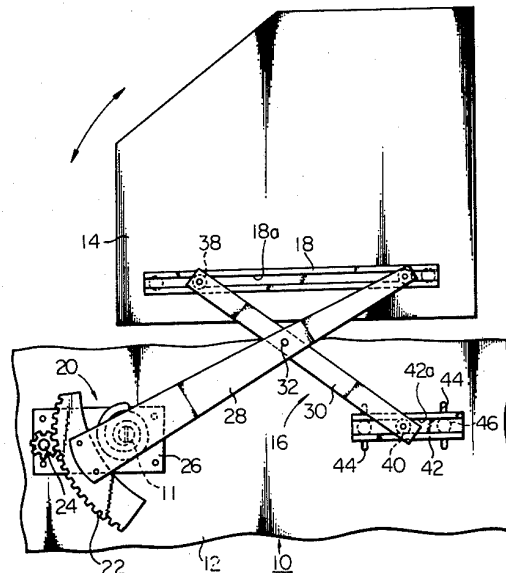
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Primary Examiner—J. Karl Bell

[57] ABSTRACT

A window regulator mechanism for raising and lowering a window pane of a motor vehicle having a door inner panel, which window regulator mechanism has an operating mechanism including first and second regulator arms pivotally connected to each other, the first regulator arm having one end connected to the window pane and the other end connected to actuating means, the second regulator arm having one end connected to the window pane and the other end carrying thereon a roller, and a guide rail for receiving the roller carried on the other end of the second regulator arm. The guide rail is integrally incorporated with the door inner panel and has formed at both ends thereof enlarged portions to receive the roller of the second regulator arm.

5 Claims, 4 Drawing Figures



UUSI, LLC  
Exhibit 2009

WEBASTO ROOF  
SYSTEMS, INC.  
Petitioner  
v.  
UUSI, LLC  
Patent Owner

Case:  
IPR2014-00650  
Patent: 7,579,802

Fig. 1  
PRIOR ART

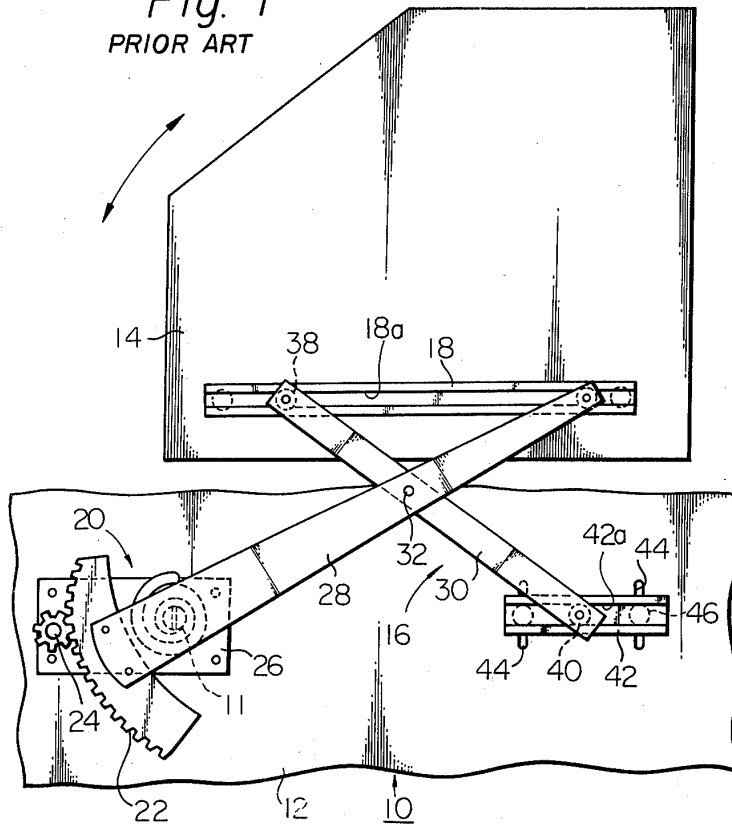


Fig. 2  
PRIOR ART

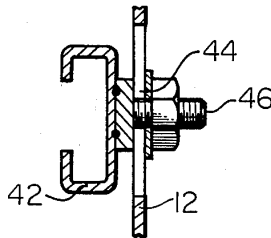


Fig. 3

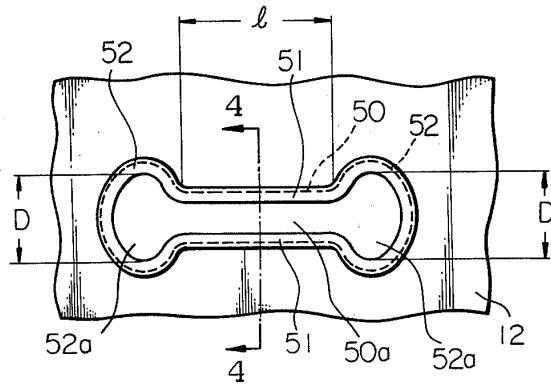
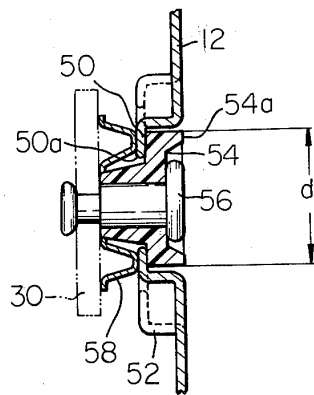


Fig. 4



## WINDOW REGULATOR FOR MOTOR VEHICLE

This invention relates in general to window regulators and, more particularly, to a window regulator mechanism for use in a motor vehicle.

It is an object of the present invention to provide a window regulator mechanism which is relatively simple in construction, comprises relatively few parts and is therefore inexpensive to manufacture, install and service.

Other objects and advantages of the present invention will be made more apparent as this description proceeds, particularly when considered in connection with the accompanying drawings, in which:

FIG. 1 is a schematic view of a prior art window regulator of a motor vehicle;

FIG. 2 is a sectional enlarged view of a part of the window regulator shown in FIG. 1;

FIG. 3 is a fragmentary sectional view of an improved guide means according to the present invention; and

FIG. 4 is a sectional view taken through a line 4—4 of FIG. 3 and additionally shows a roller in engagement with the guide means shown in FIG. 3.

Referring now to FIGS. 1 and 2, there is shown a prior art window regulator mechanism for use in a motor vehicle. The motor vehicle is shown as including a vehicle door body 10 having a door inner panel 12. A window pane 14 is disposed within the vehicle door body 10 and is moved upwards or downwards by means of a window regulator mechanism 16 within the vehicle door body 10.

The window regulator mechanism 16 includes a guide rail 18 to which the window pane 14 is secured. This guide rail 18 extends horizontally and is utilized in raising and lowering the window pane 14. This movement is effected by an operating mechanism 20.

The operating mechanism 20, for raising and lowering the window pane 14, includes a gear segment 22 which is driven by a pinion gear 24 operated by a crank handle or other suitable means not shown. As shown, the pinion gear 24 is rotatably mounted on a base plate member 26 which is attached to the door inner panel 12. A pair of regulator arms 28 and 30 are provided. The regulator arm 28 is secured at its one end to the gear segment 22 and rotatable therewith about the center of curvature of the gear segment 22 by means of a pin 11. The regulator arm 28 is pivotally connected to the regulator arm 30 by a pin 32 at a point spaced from the gear segment 22. The opposite end of the regulator arm 28 carries a roller 34 which is rollably received in a slot 18a in the guide rail 18. A helical spring 36 is fixed to the base plate member 26 and biases the regulator arm 28 counterclockwise.

One end (no numeral) of the regulator arm 30 carries thereon a roller 38 which is rollably received in the slot 18a of the guide rail 18 attached on the window pane 14. A roller 40 carried on the other end of the regulator arm 30 is rollably received in a slot 42a formed in a guide track 42, which is retained and positioned in the door body 10. Indicated as 44 are elongated slots into which mountings 46 are received which fixedly connect the guide track 42 to the door body 10. The elongated slots 44, which are formed in the door inner panel 12, permit adjustable positioning of the track 42 in the door body 10 to any position within the upper and lower limits of the elongated slots 44.

It will be noted that a window glass pane must be carefully manipulated by a suitable guiding and regulating mechanism to pass readily through an opening in a vehicle door body of minimum width. Thus, the window regulator mechanism must be precisely disposed and mounted within the vehicle door body, requiring highly skilled experience during assembly of the window regulator.

The present invention contemplates to integrally incorporate the guide track 42 with the door inner panel 12 to simplify assembly of the window regulator mechanism and to reduce the manufacturing cost of the same.

As shown in FIGS. 3 and 4, the present invention proposes to provide a guide rail 50 formed integrally with the door inner panel 12. The guide rail 50 is shown as having at both ends thereof enlarged portions 52 to receive an enlarged portion 54a of a roller 54 (see FIG. 4) but may have only one enlarged portion at one end of the guide rail. The guide rail 50 includes a pair of opposing stepped portions 51 which merge with enlarged portions 52. The stepped portions 51 preferably have L-shaped sections respectively as best seen in FIG. 4. The length *l* of the stepped portion 51 is determined to allow the roller 54 to move from one extreme position to another extreme position thereof during raising and lowering of the window pane 14. The enlarged portions 52 have openings 52a which merge with a guide slot 50a defined within the guide rail 50. The enlarged portions 52 are sized to allow ready insertion of the enlarged portion 54a of the roller 54. More specifically, the greatest dimension *D* of the enlarged portions 52 of the guide rail 50 is selected to be greater than the greatest dimension *d* of enlarged portion 54a of the roller 54.

It should be noted that the guide rail 50, enlarged portions 52, openings 52a and guide slot 50a are integrally formed with the door inner panel 12 by a stamping process during manufacture of the door inner panel 12.

As best seen in FIG. 4, the roller 54 is rotatably mounted on the regulator arm 30 by means of a pin 56 fixed thereto. Indicated as 58 is a corrugated spring washer which is disposed in a space between the regulator arm 30 and the guide rail 50 for maintaining the roller 54 in positions in which the enlarged portion 54a of the roller 54 rollably engages within the stepped portions 51 having L-shaped sections in the guide rail 40.

With the arrangement described hereinabove, assembly of the window regulator mechanism is simplified in that the roller 54 can be positioned in an operating condition merely by initially inserting the enlarged portion 54a of the roller 54 into either of the openings 52a in the guide rail 50, and thereafter moving the roller 54 in a right or left hand direction into the guide slot 50a so that the enlarged portion 54a of the roller 54 engages in the guide rail 50. Since, moreover, the guide rail is incorporated in the door inner panel, the manufacturing process is simplified because there is no need for assembling an independent guide rail onto the door inner panel. Another advantage of the present invention resides in the fact that since the guide rail is integrally formed with the door inner panel, a minimum number of independent component parts are required thereby reducing the manufacturing cost of the window regulator mechanism.

It will be apparent from FIG. 4 that the enlarged portion 54a of the roller 54 has an annular cylindrical sur-

face thereon while the stepped portions 51 of the guide rail 50 have opposite parallel extending plane surfaces thereof for rollably securely receiving therebetween the annular cylindrical surface of the enlarged portion 54a of the roller 54. With this arrangement, wear between the roller 54 and the guide rail 50 is reduced to a minimum since weight applied to the roller 54 is distributed over the plane surfaces of the guide rail 50 through the annular cylindrical surface of the roller 54.

The inclination of the window glass pane 14 has heretofore been adjusted by rotating the window pane 14 as shown by an arrow in FIG. 1 during assembly of the window regulator mechanism. This has been accomplished by adjusting the position of the guide track 42 through the use of the elongated slots 44 formed in the door inner panel 12. In the window regulator mechanism of the present invention, inclination of the window pane 14 can be accomplished by adjusting the position of the base plate member 26 or the guide rail 18.

What is claimed is:

1. A window regulator mechanism for raising and lowering a window pane in a motor vehicle door body having an inner panel, comprising a first arm secured at its one end to a gear segment meshing with a pinion gear mounted on said door inner panel and connected at its other end to said window pane, a second regulator arm pivotally connected to said first regulator arm by a pin at a point spaced apart from said gear segment

and connected at its one end to said window pane, said second regulator arm being provided with a roller having an annular enlarged portion thereof at the other end of said regulator arm, said enlarged portion having an annular cylindrical surface thereon, and a guide rail being formed integrally with said door inner panel and including a pair of opposing stepped portions, said stepped portions having opposite parallel extending plane surfaces thereof for rollably securely receiving therebetween the annular cylindrical surface of the enlarged portion of said roller to guide the other end of said second regulator arm.

2. A window regulator mechanism as claimed in claim 1, wherein said guide rail has formed at one end an enlarged portion.

3. A window regulator mechanism as claimed in claim 1, wherein said guide rail has formed at both ends enlarged portions.

4. A window regulator mechanism as claimed in claim 1, wherein the length of said stepped portions is determined to allow said roller to move from one extreme position to another extreme position thereof during raising and lowering of the window pane.

5. A window regulator mechanism as claimed in claim 2, wherein said enlarged portion is sized to allow ready insertion of an enlarged portion of a roller mounted at the other end of said second regulator arm.

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