United States Patent [19]

Chikaraishi

[11] **3,888,047**

[45] **June 10, 1975**

[54] **WINDOW REGULATOR FOR MOTOR VEHICLE**

[75] Inventor: **Takayo Chikaraishi,** Tokyo, Japan

[73] Assignee: **Nissan Motor Company Limited,** Yokohama, Japan

[22] Filed: **May 22, 1973**

[21] Appl. No.: **362,844**

[30] **Foreign Application Priority Data**

May 23, 1972 Japan 47-60183

[52] **U.S. Cl.** **49/351**

[51] **Int. Cl.** **E05f 11/44**

[58] **Field of Search** 49/351, 348, 349, 227, 49/360, 350

[56] **References Cited**

UNITED STATES PATENTS

2,122,605	7/1938	Chandler	49/351 X
2,409,068	10/1946	Roethel	49/351 X
2,850,333	9/1958	Hamman	49/351 X

FOREIGN PATENTS OR APPLICATIONS

111,236	8/1940	Australia	49/351

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

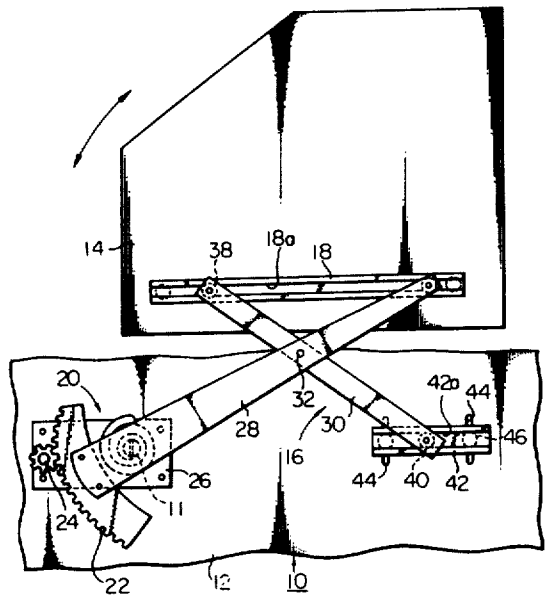


Fig. 1
PRIOR ART

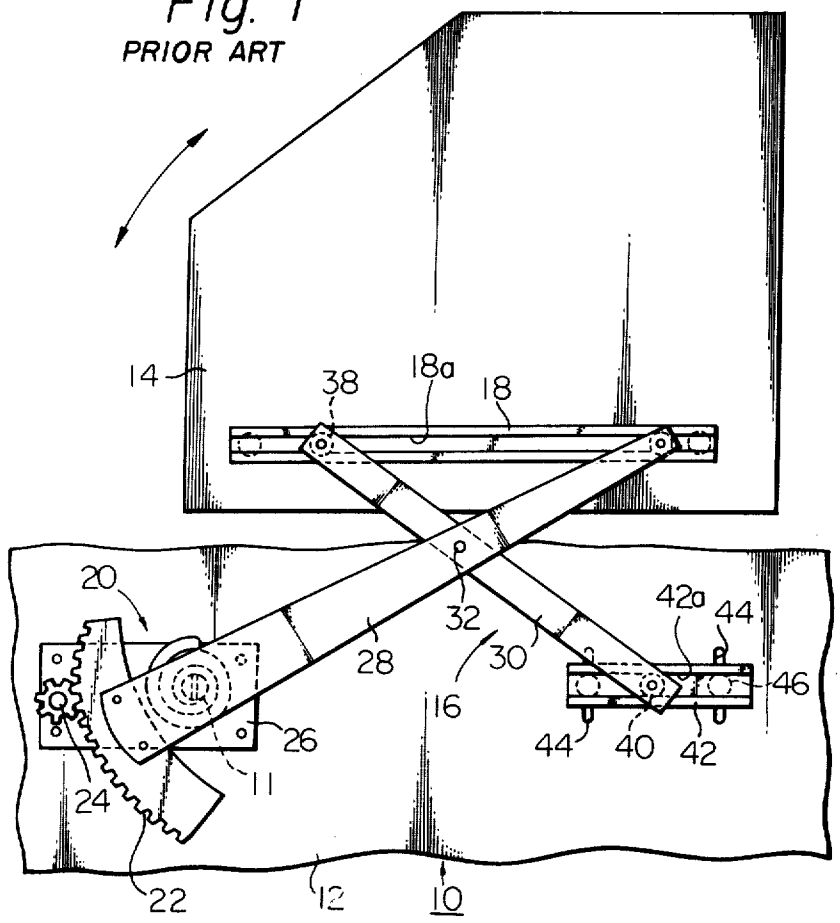


Fig. 2
PRIOR ART

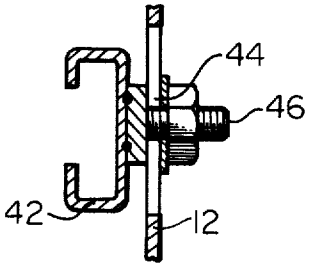


Fig. 3

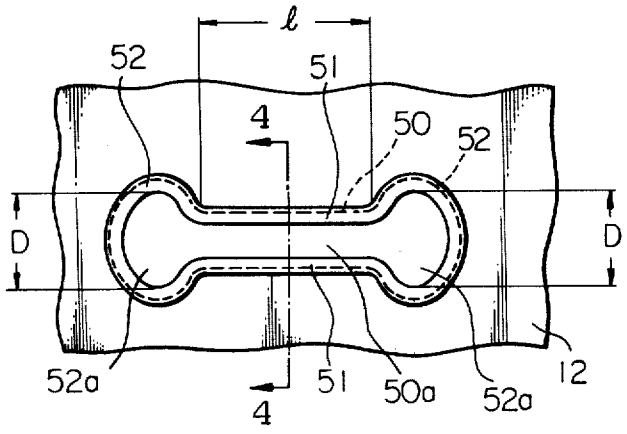
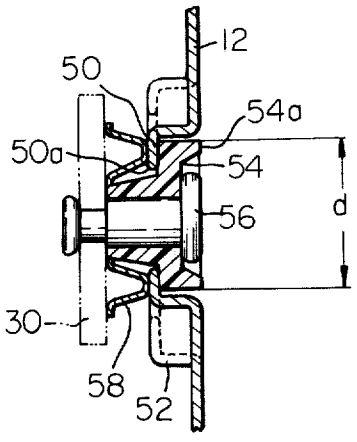


Fig. 4



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 in 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 **18***a* 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 **18***a* 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 **42***a* 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 **54***a* of a roller **54** (see FIG. **4**) but way 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 **52***a* which merge with a guide slot **50***a* defined within the guide rail **50**. The enlarged portions **52** are sized to allow ready insertion of the enlarged portion **54***a* 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 **54***a* of the roller **54**.

It should be noted that the guide rail **50**, enlarged portions **52**, openings **52***a* and guide slot **50***a* 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 **54***a* 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 **54***a* of the roller **54** into either of the openings **52***a* in the guide rail **50**, and thereafter moving the roller **54** in a right or left hand direction into the guide slot **50***a* so that the enlarged portion **54***a* 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 **54***a* of the roller **54** has an annular cylindrical sur-

face thereon while the stepped portions **51** of the guide rail **50** have opposite parallelly extending plane surfaces thereof for rollably securely receiving therebetween the annular cylindrical surface of the enlarged portion **54***a* 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 parallelly 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.

* * * * *