United States Patent [19]

Ladd et al.

[11] **3,890,742**

[45] **June 24, 1975**

[54] **WINDOW REGULATOR MECHANISM**

[75] Inventors: **Floyd N. Ladd**, Warren; **Donald G. Stacy**, Plymouth, both of Mich.

[73] Assignee: **Ford Motor Company**, Dearborn, Mich.

[22] Filed: **Apr. 3, 1974**

[21] Appl. No.: **457,534**

[52] **U.S. Cl.** **49/350**; 49/353; 49/374

[51] **Int. Cl.**[2] **E05F 11/44**

[58] **Field of Search** 49/350, 348, 136, 144, 49/168, 103, 374, 375, 353

[56] **References Cited**

UNITED STATES PATENTS

1,800,001	4/1931	Ackerman	49/350
1,960,601	5/1934	Sullivan	49/374 X

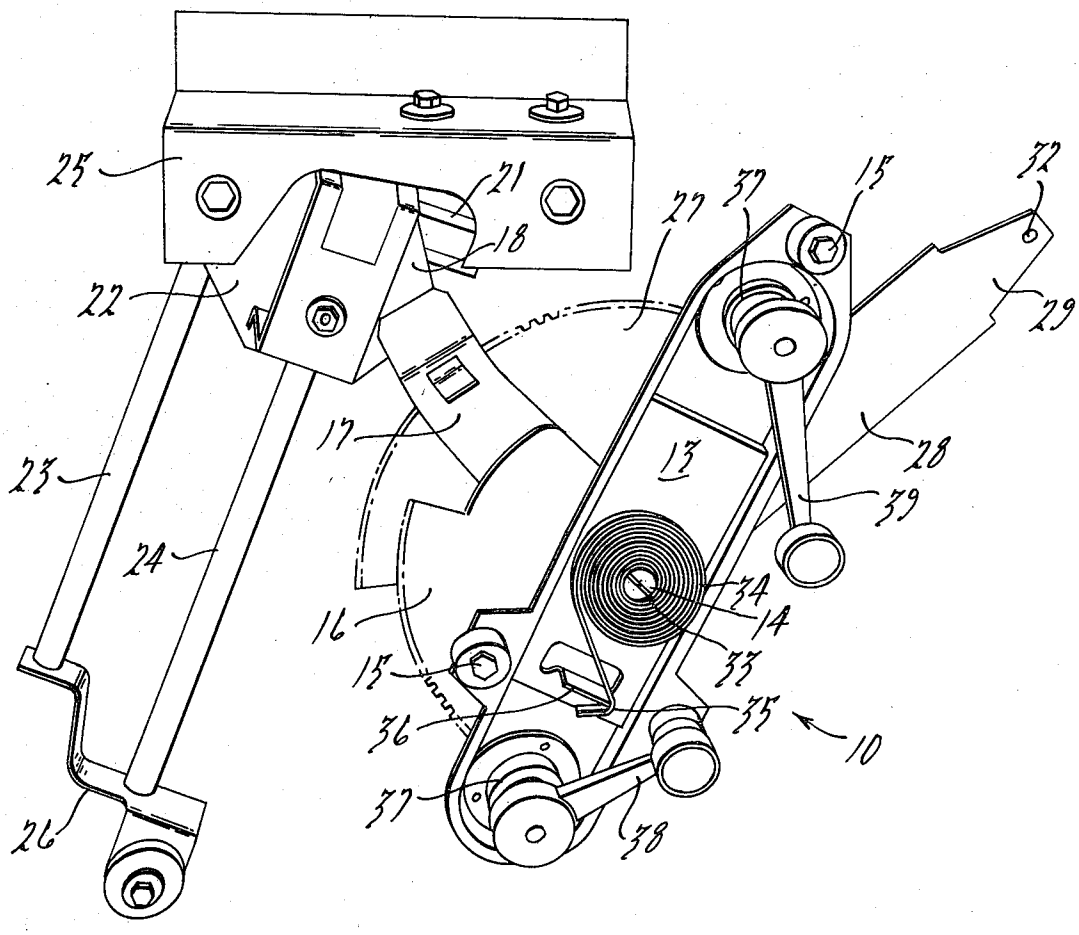
Primary Examiner—Kenneth Downey

Attorney, Agent, or Firm—John J. Roethel; Keith L. Zerschling

[57] **ABSTRACT**

A window regulator mechanism to lower or raise a window panel, the window panel being divided into separately movable ventilation and visibility sections. The window regulator mechanism comprises a mounting plate and a first and a second gear sector rotatably mounted in superimposed relationship on a common pivot shaft journalled in the mounting plate intermediate the ends of the latter. A first regulator arm is fixed to the first gear sector and the second regulator arm is fixed to the second gear sector, each regulator arm being swingable about the axis of the pivot shaft and being coupled to a respective one of the panel sections for raising and lowering the latter in response to independent rotation of the gear sectors.

7 Claims, 2 Drawing Figures



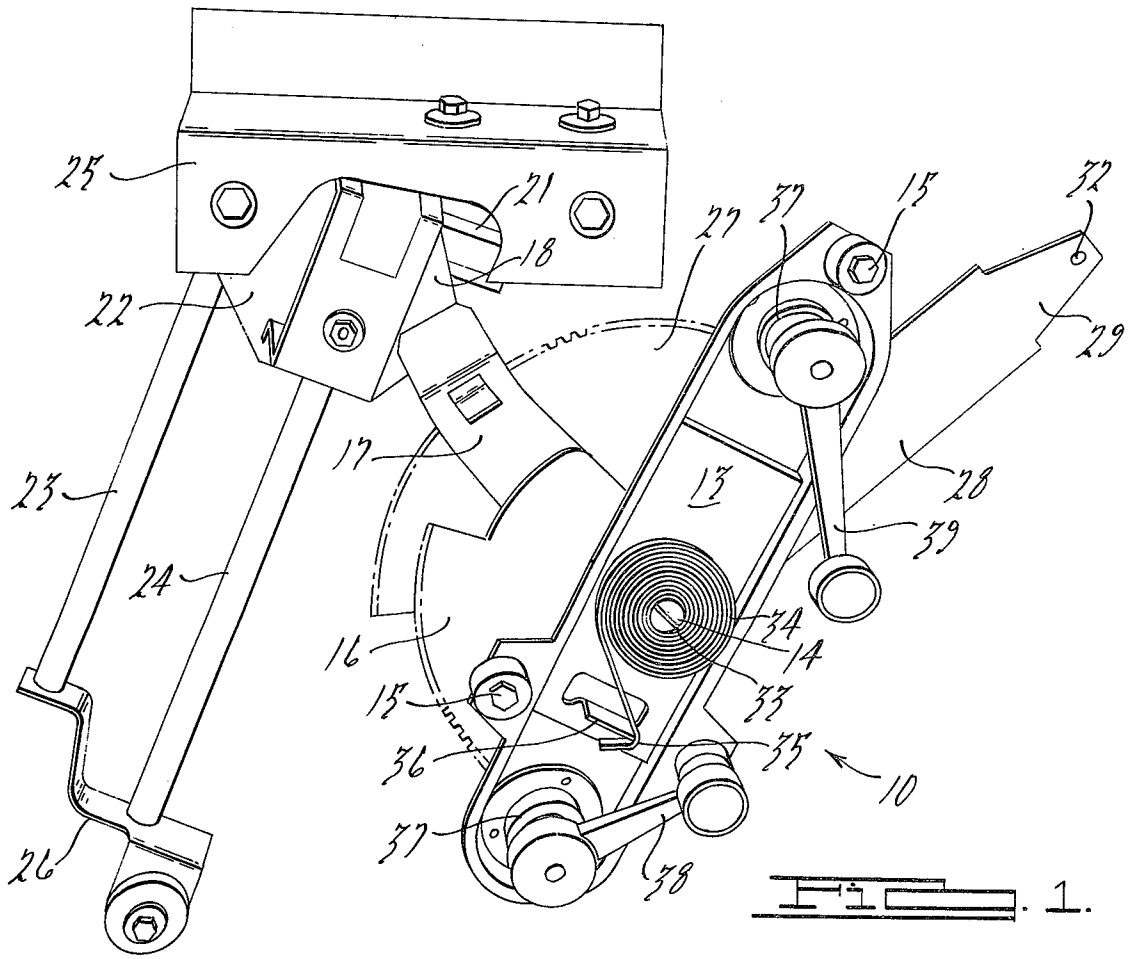

25
21
18
22
27
37
15
32
29
17
23
24
13
28
39
16
34
14
15
33
36
35
10
37
38
26

Fig. 1.

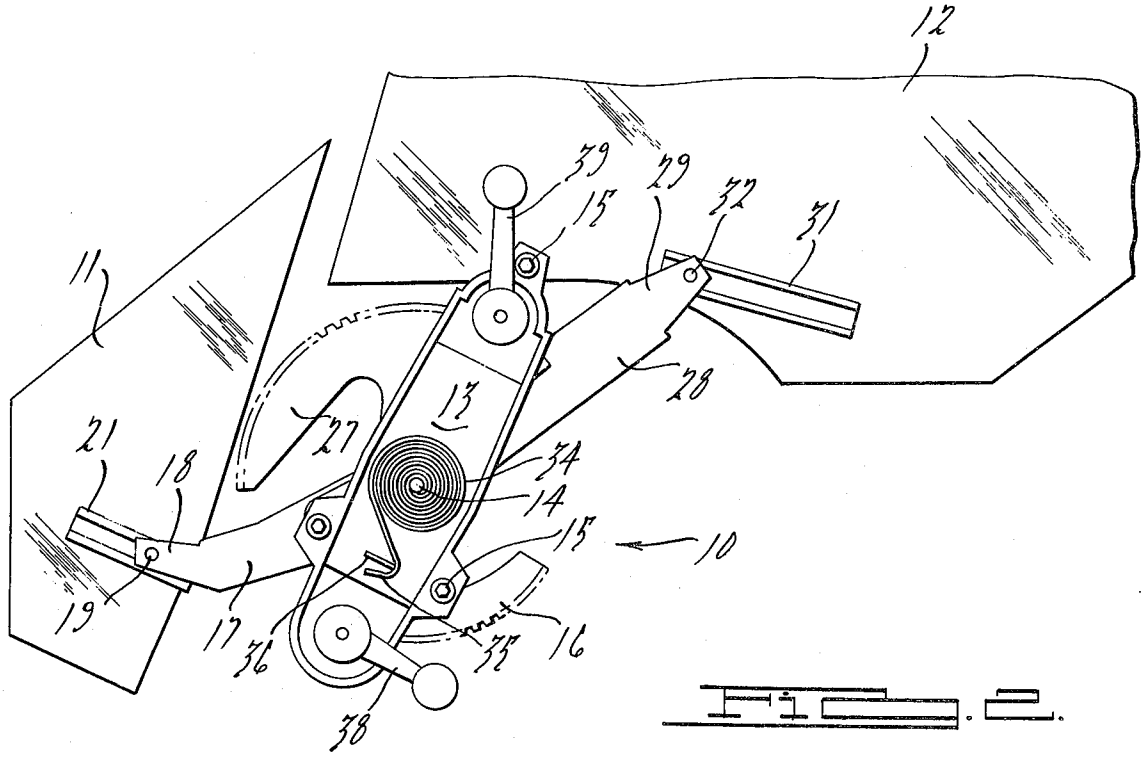

12
39
29
15
32
31
11
28
13
27
21
18
34
14
15
10
19
17
36
35
16
38

Fig. 2.

WINDOW REGULATOR MECHANISM

BACKGROUND OF THE INVENTION

U.S. Pat. No. 1,770,747 issued July 15, 1930 to William D. Crowell disclosed a vehicle ventilation system in which the front door window panels were divided into independently movable sections so that the forward and somewhat smaller section could be lowered to provide a desired amount of ventilation or exhaust opening. In the Crowell disclosure, each window panel section is operable by an independent window regulator mechanism and each panel section is guided within fixed guide bars including a fixed division bar between the two panel sections.

U. S. Pat. No. 3,659,381 issued May 2, 1972 to S. M. Frey et al. represents an updated version of the Crowell system. In the Frey et al system a single window regulator mechanism is utilized to lower or raise the two window panel sections. Movement of the two sections from a fully raised to a fully lowered position or vice-versa is always sequential. That is, from a fully raised position the ventilation or exhaust section must be first fully lowered before the main or large panel section may be lowered. Conversely, from the fully lowered position the large panel must be fully raised before upward movement of the ventilation or exhaust system can occur. On occasion, the sequential movement system may be objectionable. At times it may be desired to lower the main panel section without lowering the ventilation section or without having to wait for the ventilation section to complete its downward movement.

Accordingly, it is an object of the present invention to provide a dual function window regulator mechanism constructed and arranged to be operable to move either section of the window panel in raised or lowered direction independently of the other section. This is the principal of operation of the Crowell disclosure, but it is an object of the present invention to accomplish this without having to utilize two separate and wholly independent regulator mechanisms.

SUMMARY OF THE INVENTION

The present invention relates to a window regulator mechanism adapted to lower or raise a window panel into or out of a window well, the window panel being vertically divided into separately movable ventilation and visibility sections. The window regulator mechanism comprises an elongated mounting plate, a first gear sector freely rotatably mounted on a pivot shaft journalled in the mounting plate intermediate the ends of the latter and a first regulator arm fixed to the first gear sector and coupled to the ventilation section for raising and lowering the latter in response to rotation of the first gear sector. A second gear sector is mounted on the pivot shaft and is coupled to the latter for rotation therewith. A second regulator arm is fixed to the second gear sector and coupled to the visibility section for raising and lowering the latter in response to rotation of the second gear sector. Independent first and second drive means are located at opposite ends of the mounting plate and are coupled to the first and second gear sectors, respectively, for rotating the latter to independently lower and raise the window panel sections.

The respective gear sectors are rotatable in opposed directions to counter-swing the regulator arms in respective window panel section lowering or raising directions in response to independent rotation of the first and second drive means in a common direction of rotation.

DESCRIPTION OF THE DRAWING

Other objects, advantages and features of the present invention will become more apparent as the description proceeds, reference being had to the accompanying drawing wherein:

FIG. **1** is a perspective view of the window regulator mechanism embodying the present invention shown coupled to the guide means for guiding lowering and raising movement of a section of a vehicle door window panel; and

FIG. **2** is a semi-diagrammatic view of the window regulator mechanism in relationship to the divided sections of a vehicle door window panel.

DETAILED DESCRIPTION OF THE INVENTION

Referring now to the drawing, there is illustrated a window regulator mechanism, generally designated **10.** The window regulator mechanism is adapted to lower or raise a window panel into or out of a window well of a vehicle door. Reference may be made to the aforementioned U.S. Pat. No. 3,659,381, see FIG. **1,** for an exemplification of the relationship of the window panel to the vehicle door.

In FIG. **2** of the present application, the window panel is shown divided into a small forward ventilation or exhaust section **11** and a larger main or visibility section **12.** The window regulator **10** comprises an elongated mounting plate **13** carrying a pivot shaft **14** journalled in a conventional manner in the mounting plate intermediate the ends of the latter. The mounting plate **13** is adapted to be bolted to an inner door panel (not shown) by mounting bolts **15.** The mounting plate **13** is positioned beneath the panel section **12** adjacent the division between the two panel sections **11-12** with its longitudinal axis extending generally in the same direction as the division line between the panel sections.

A first gear sector **16** is freely rotatably mounted on the pivot shaft **14.** A first regulator arm **17** is fixed to the gear sector **16** and is coupled at its free end **18** to the ventilation section **11.** The free end **18** of the arm **17** carries a slide member (not visible) secured to the arm on a pivot stud **19.** The slide member is slidable in a channel **21** secured to the panel section **11.** The channel **21** is coupled to a bracket **22** slidable on spaced guide rods **23-24** adapted to be secured to the inner door panel by suitable mounting brackets **25-26,** respectively.

A second gear sector **27** somewhat larger than the gear sector **16** is mounted on the pivot shaft **14** in superimposed relation to the first gear sector **16** and the end of the regulator arm **17** fixed to the gear sector **16.** A second regulator arm **28** is fixed to the second gear sector **27.** The free end **29** of the arm **28** is coupled by a slide (not visible) slidable in a channel **31** secured to the panel section **12,** the slide being secured to the arm on a pivot stud **32.**

The pivot shaft **14** is coupled to the inner end **33** of a spiral regulator spring **34,** the free end **35** of the spring being hooked on a lug **36** turned out of the mounting plate **13.** The spring **34** functions to counterbalance the weight of the main panel section **12.**

Each gear sector **16-27** is driven in window lowering and raising direction by an independent conventional window regulator pinion and clutch assembly **37** having

a manual crank handle connected to the pinion shaft. The crank handle **38** for driving the gear sector **16** is somewhat shorter than the crank handle **39** for driving the gear sector **27**, the length of each handle being proportional to the size of the panel section to be lowered or raised, as are the gear sectors **16** and **27**.

As viewed in the drawings the respective gear sectors **16-27** are rotatable in opposed directions to counter-swing the regulator arms **17** and **28** in respective window panel section lowering or raising directions in response to independent rotation of the crank handles **38** and **39** in a common direction of rotation. That is, upon rotation of the crank handle **38** in a clockwise direction as viewed in FIG. **1**, the gear sector **16** is freely rotated about the pivot shaft **14** in a counterclockwise direction causing the arm **17** to be swung in a counterclockwise direction about the pivot shaft axis **14**. This causes the ventilation section **11** to be moved downwardly along the guide rods **23-24**. Movement of the ventilation section is independent of any movement of the main panel section **12**. If it is desired to lower the main panel section **12**, it is only necessary to rotate the crank handle **39** in a counterclockwise direction thereby driving the gear sector **27** in a clockwise direction about the pivot shaft **14** and causing the regulator arm **32** to be swung in a clockwise direction to lower the panel **12**. Since the regulator arm **32** is coupled to the pivot shaft **14** and the pivot shaft is coupled to the clock spring **34**, the spring **34** is wound up as the regulator arm **32** swings from a substantially upright position to a downwardly extending position. The increased energy stored in the spring **34** as a result of it being wound up assists in raising the panel **12** to a closed position upon rotation of the crank handle **39** in a counterclockwise direction.

As described, the window regulator mechanism **10** provides a dual function window regulator mechanism constructed and arranged to be operable to move either section of the window panel in raised or lowered direction independently of the other section.

It is to be understood that this invention is not limited to the exact construction illustrated and described above, but that various changes and modifications may be made without departing from the spirit and scope of the invention as defined in the appended claims.

We claim:

1. A window regulator mechanism adapted to lower or raise a window panel into or out of a window well,
- the window panel being vertically divided into separately movable ventilation and visibility sections,
- the window regulator mechanism comprising:
- an elongated mounting plate,
- a first gear sector freely rotatably mounted on a pivot shaft journalled in the mounting plate intermediate the ends of the latter,
- a first regulator arm fixed to the first gear sector and coupled to the ventilation section for lowering and raising the latter in response to rotation of the first gear sector,
- a second gear sector mounted on the pivot shaft and coupled to the latter for rotation therewith,
- a second regulator arm fixed to the second gear sector and coupled to the visibility section for raising and lowering the latter in response to rotation of the second gear sector,
- and independent first and second drive means located at opposite ends of the mounting plate and coupled to the first and second gear sectors, respectively, for rotating the latter to independently lower and raise the window panel sections.

2. A window regulator mechanism according to claim **1**, in which:
- the respective gear sectors are rotatable in opposed directions to counter-swing the regulator arms in respective window panel section lowering or raising directions in response to independent rotation of the first and second drive means in a common direction of rotation.

3. In combination, a window panel divided substantially vertically into a small ventilation section and a large visibility section,
- and a window regulator mechanism for lowering and raising the window panel sections into and out of a window opening,
- the window regulator mechanism comprising an elongated mounting plate positioned beneath the larger of the two panel sections adjacent the division therebetween with its longitudinal axis extending generally in the same direction as the division line between the panel sections,
- a first and a second gear sector in superimposed relationship on a pivot shaft journalled in the mounting plate intermediate the ends of the latter,
- a first regulator arm fixed to the first gear sector and a second regulator arm fixed to the second gear sector,
- each regulator arm being swingable about the axis of the pivot shaft and being coupled to a respective one of the panel sections for lowering and raising the latter in response to rotation of the gear sector to which it is fixed,
- and independent first and second drive means located at opposite ends of the mounting plate and coupled to the first and second gear sectors, respectively, for rotating the latter to independently lower and raise the window panel sections.

4. A vehicle body structure according to claim **3**, in which:
- the first gear sector is freely rotatable about the pivot shaft and the second gear sector is coupled to the shaft for rotation therewith,
- and a counterbalance spring is coupled to the shaft to counterbalance the weight of the visibility section coupled to the second regulator arm.

5. A vehicle body structure according to claim **3**, in which:
- the respective gear sectors are rotated in opposite directions about the pivot shaft axis to oppositely swing the regulator arms in respective window panel section lowering or raising directions in response to independent rotation of the first and second drive means in common directions of rotation.

6. A vehicle body structure according to claim **5**, in which:
- the first gear sector is freely rotatable about the pivot shaft and the second gear sector is coupled to the shaft for rotation therewith,
- and the counterbalance spring is coupled to the shaft to counterbalance the weight of the window panel section coupled to the second regulator arm.

7. A vehicle body structure according to claim **6**, in which:
- the second gear sector is somewhat larger than the first gear sector, the sizes of the gear sectors being proportional to the sizes of the respective visibility and ventilation sections of the window panel.

* * * * *

Notice of Adverse Decision in Interference

In Interference No. 99,303, involving Patent No. 3,890,742, F. N. Ladd and D. G. Stacy, WINDOW REGULATOR MECHANISM, final judgment adverse to the patentees was rendered Mar. 9, 1978, as to claims 3 and 5.

[*Official Gazette August 8, 1978.*]