Nov. 23, 1965 A. A. BURRIDGE 3,219,335

VEHICLE WINDOW REGULATING MECHANISMS

Filed Dec. 16, 1963 3 Sheets-Sheet 1

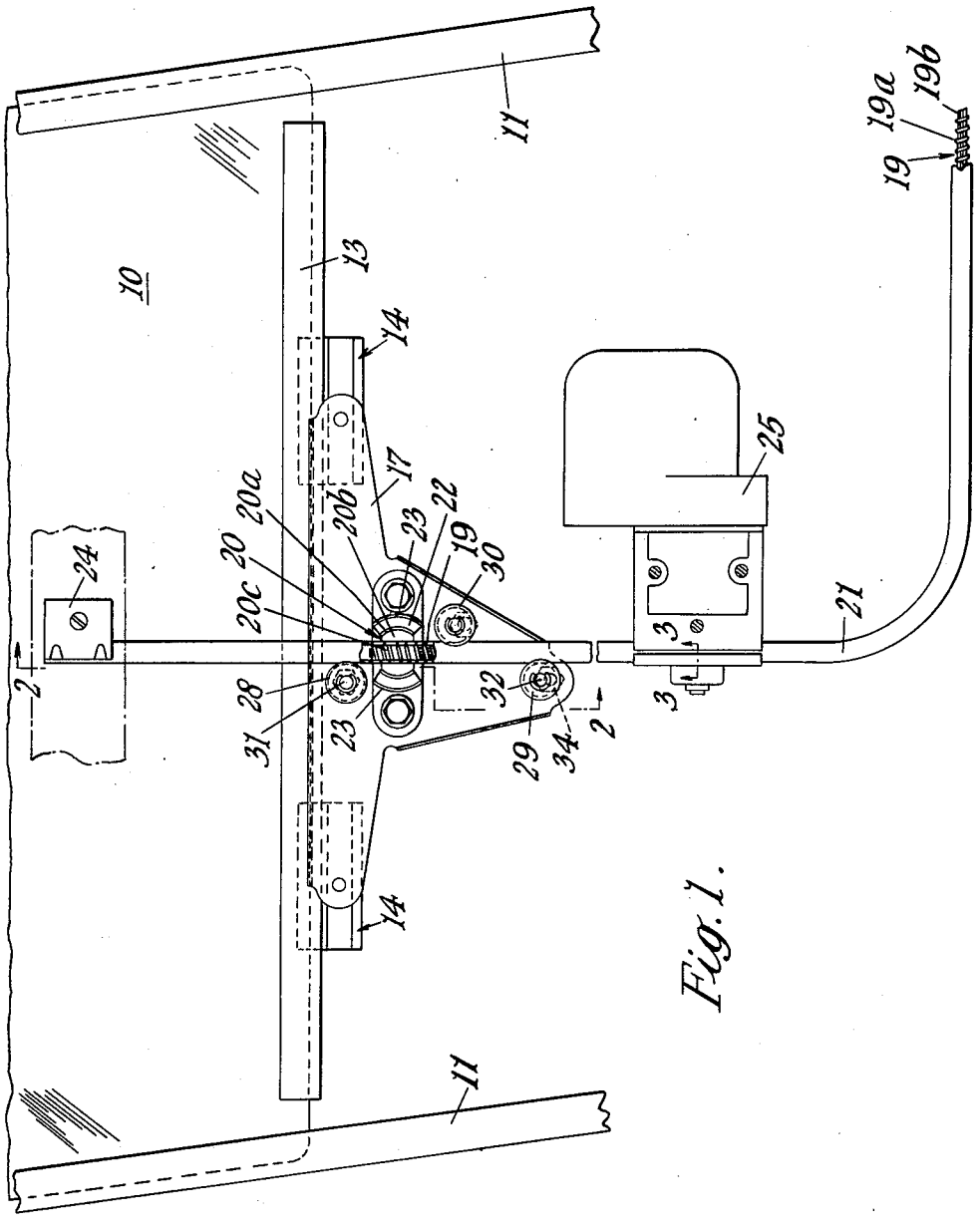

Fig. 1.

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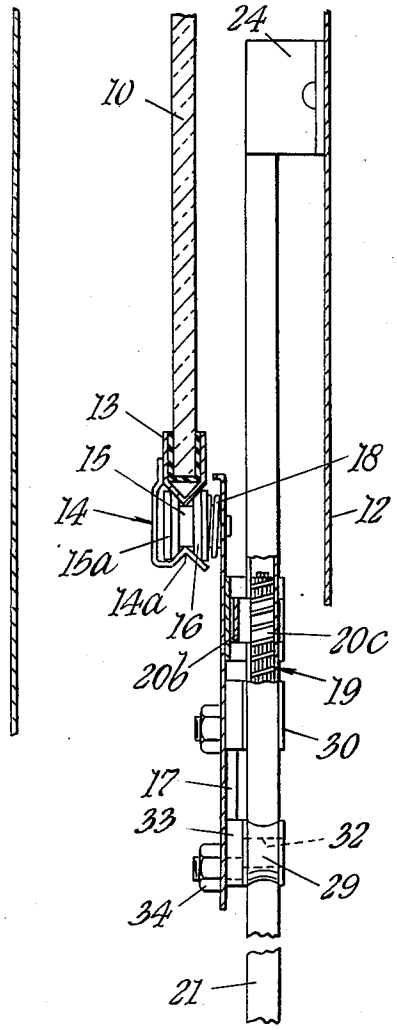

Fig. 2.

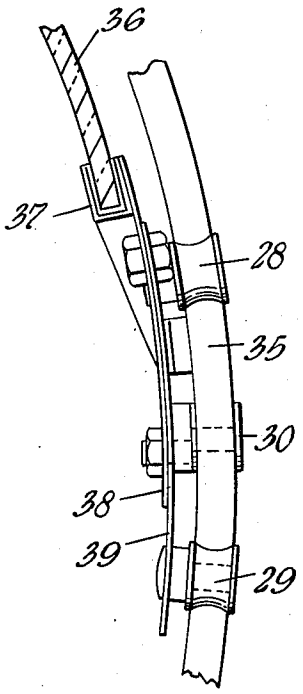

Fig. 5.

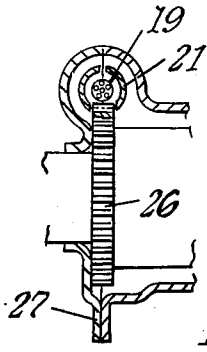

Fig. 3.

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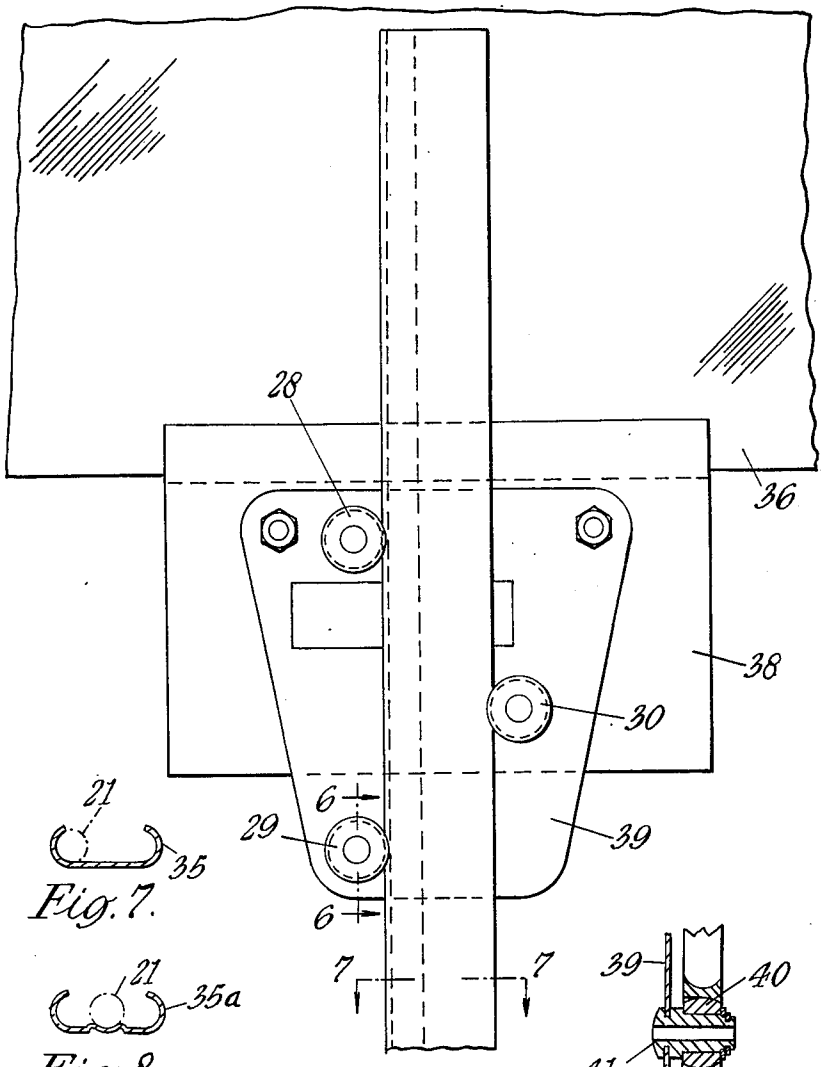

Fig. 4.

Fig. 7.

Fig. 8.

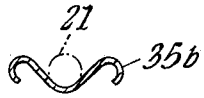

Fig. 9.

Fig. 6.

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3,219,335

VEHICLE WINDOW REGULATING MECHANISMS

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Claims priority, application Great Britain, Dec. 17, 1962, 47,445/62
1 Claim. (Cl. 268—124)

This invention relates to vehicle window regulating mechanisms of the kind including an elongated flexible driving element comprising a core and a helically coiled wire wound on the core, elongated tubular guide means for the driving element, a connecting piece secured to the driving element and projecting through a longitudinally extending slot in the guide means and actuating means including a rotatable pinion engaging the helically-wound wire on the driving element, the guide and actuating means being secured in use to a vehicle door and the connecting piece being connected to a window slidably mounted on said door so that operation of the actuating means effects movement of the window relative to the door.

When it is required to use such a regulating mechanism with a window which, by virtue of its shape, cannot be supported along its opposite lateral edges between a pair of guide channels, difficulty is encountered in preventing the window from pivoting about an axis transverse to the plane of the window.

Accordingly one object of this invention is to provide a window regulating mechanism of the kind specified wherein the above-mentioned difficulty can be avoided. Other objects and advantages will be made clear hereinafter.

In accordance with the invention in a window regulating mechanism of the kind specified the connecting piece is connected to a window supporting member adapted to support the in situ lower edge of the window, at least a pair of guiding elements are mounted on said window-supporting member so as to engage the tubular guide means on one side thereof at positions spaced along the length of the tubular guide means and at least one further guiding element is mounted on the window-supporting member so as to engage the tubular guide means on its opposite side, said further guiding element or elements being so positioned relative to the first-mentioned guiding elements as to prevent angular movement of the window-supporting member relative to the adjacent portion of the tubular guide means.

The guiding elements are preferably in the form of rollers rotatably mounted on the window-supporting member and where the minimum number of guiding elements are employed one of the first-mentioned guiding elements and the further guiding element are each conveniently adjustably mounted on the window-supporting member.

The invention will now be more particularly described with reference to the accompanying drawings wherein:

FIGURE 1 is a front elevation of one example of a window-regulating mechanism in accordance with the invention shown with parts of the mechanism broken away for clarity.

FIGURE 2 is a fragmentary sectional side elevation of the mechanism taken on a line 2—2 in FIGURE 1,

FIGURE 3 is a fragmentary section on the line 3—3 of FIGURE 1,

FIGURE 4 is a fragmentary front elevation of a modification of the example shown in FIGURE 1,

FIGURE 5 is a side elevation of the modification shown in FIGURE 4,

FIGURE 6 is a fragmentary section on the line 6—6 in FIGURE 4,

FIGURE 7 is a fragmentary section on the line 7—7 in FIGURE 4, and

FIGURES 8 and 9 show alternative configurations of the section shown in FIGURE 7.

Referring firstly to the example shown in FIGURES 1 to 3 it is required to regulate a window 10 which is slidably mounted in guide channels 11 located between the inner and outer panels of a vehicle door 12. The guide channels 11 are, as a result of the shape of the window 10, inclined to the vertical, so that there is a tendency for the panel 10 to skew about an axis perpendicular to its plane and stick in the guide channels 11.

As shown in FIGURE 2, the lower edge of the window 10 is supported in a channel member 13 to which a pair of horizontal guide members 14 are secured. Each of these guide members 14 depends from the channel member 13 and has at its lower edge an upwardly projecting V-shaped flange 14*a*. The web of the channel member 13 is similarly formed to a downwardly projecting V-shaped form. These two V-shaped parts project into a groove formed between head 15*a* of a stud 15 and a frusto-conical washer 16 mounted on the shank of the stud 15. The stud 15 is secured to a window supporting member in the form of a T-shaped plate 17 and a spring 18 is located on the stud shank and the plate 17 to urge the washer 16 towards the head 15*a*.

The plate 17 is connected to a flexible driving element 19 through the intermediary of a connecting piece 20 and a resilient coupling. The driving element 19 consists of a core 19*a* in the form of a bundle of wires and a helically coiled wire 19*b* wound on the core and is disposed within tubular guide means in the form of an open-seamed sheet metal tube 21. The connecting piece 20 is formed as a sheet metal pressing and has a pair of part cylindrical portions 20*a*, a web portion 20*b* and a portion 20*c* which is wrapped around the driving element 19 and which has a plurality of slots into which the wire 19*b* projects. The connecting piece 20 projects through the open seam in the tube 21 and its part-cylindrical portions 20*a* are bonded to a pair of rubber pads 22. These rubber pads 22 engage a pair of brackets 23 secured to the plate 17 so that there is a resilient coupling between the connecting piece 20 and the plate 17.

The tube 21 is adapted to be secured to the structure in which the window 10 is slidably mounted and for this purpose a bracket 24 is secured to the upper end of tube 21. As will be seen from FIGURE 1 the tube 21 is bent to an L-shaped form of which one limb extends vertically and the other horizontally. This configuration enables the mechanism to be housed within the limited space available within the vehicle door. Mounted on the door adjacent the bend in the tube 21 is actuating means in the form of an electric motor 25. Connected to the shaft of the motor through known reduction gearing and a slipping clutch brake arrangement is a pinion 26 (shown in FIGURE 3) which projects through a hole in tube 21 and engages the helically coiled wire 19*b*. The tube 21 is clamped in a housing 27 secured to the motor 25 and the tube 21 is thus secured to the door structure at the top and bottom of its vertical limb. The tube 21 is therefore capable of acting as a guide for the plate 17.

Mounted on the plate 17 are a pair of spaced guide elements in the form of rollers 28, 29 arranged to engage the tube 21 on one side. A further guide element in the form of a roller 30 is mounted on the plate 17 on the other side of the tube 21 and is arranged to engage the tube 21 between the rollers 28, 29. The roller 28 is rotatable on an axis fixed with respect to the plate 17 and is, in fact supported on the shank of a bolt 31 secured to the plate 17. Each of the rollers 29 and 30 is mounted on an eccentric support (as shown in FIGURE 2) comprising a

spindle **32**, a circular pad **33** and an eccentric bolt **34** by means of which the pad **33** can be secured in any desired position to the plate **17**.

In assembling the mechanism described above to a vehicle door, the motor **25** and guide tube **21** are first secured to the door structure. The brackets **23** are then secured to the plate **17** already engaged with the horizontal guide members **14**. The position of the plate **17** is then adjusted so that the roller **28** engages the tube and the rollers **29** and **30** are then adjusted and the associated pads secured in position. It will now be realized that the plate **17** cannot be rocked about an axis perpendicular to the plane of the window panel **10** owing to the interaction between the guide tube **21** and the rollers **28, 29** and **30**. Thus, owing to the manner in which the window **10** is connected to the plate **17**, the window **10** will not skew and become stuck in its guide channels **11**. It will also be noted that there is transverse movement between the plate **17** because the tube **21** is vertical whereas the guide channels **11** are inclined, and the panel as the window **10** is raised and lowered, such movement being permitted by the horizontal guide members **14**.

In the modification shown in FIGURES 4 to 9, the tubular guide means for the flexible drive element **19** includes a reinforcing web **35** the cross-sectional form of one example of which is shown in FIGURE 7. Two further examples **35***a* and **35***b* are shown in FIGURES 8 and 9. As will be seen from FIGURE 4, where the tubular guide means includes such a web in addition to the tube **21** it may not be necessary to anchor the tube at its upper end.

The example shown depicts the use of the mechanism for a part cylindrical window **36** which is movable in a generally vertical direction. It should be noted that the curvature shown in FIGURE 5 has been exaggerated considerably for the purpose of illustration.

Window **36** is rigidly mounted in a channel **37** welded to a pressed metal plate **38**. To the plate **38** a window supporting member **39** (corresponding to the plate **17** of FIGURE 1) is bolted. On member **39** the rollers **28, 29** and **30** are disposed as before. In this case, however, only the roller **30** is adjustable on an eccentric mounting. As shown in FIGURE 6 each of the rollers **28, 29** and **30** is mounted on a part spherical bearing piece **40**. In the case of the rollers **28** and **29** the piece **40** is mounted on a stepped tubular member **41** riveted to the plate **39**. The use of the spherical bearing enables the rollers to align themselves with the reinforcing web **35** with which they are engaged.

In the modification, the direction of movement of the window **36** and the guide tube **21** are both vertical, so that there is no relative movement between the window **36** and the supporting member **39**. The web **35**, prevents skewing of the window about an axis parallel to the axis of the tube **21** as well as reinforcing the tube.

It will be appreciated that the tubular guide means for the flexible driving element also provides a rigid guide for the window and can guide the window completely independently of any sliding guides that are provided. In cases where sliding guides cannot be provided, the example when a trapezoidal panel is employed; the guide tube and co-acting rollers provides the sole means of guiding the window.

In alternative forms the actuating means may be manually operable.

Having thus described my invention what I claim as new and desire to secure by Letters Patent is:

A vehicle window regulating mechanism including an elongated flexible driving element comprising a core and a helically coiled wire wound on the core, elongated tubular guide means for the driving element, said guide means being provided with a longitudinally extending slot, a connecting piece secured to the driving element and projecting through the longitudinally extending slot in the guide means, actuating means including a rotatable pinion engaging the helically wound wire of the driving element, a window supporting member connected to the connecting piece and adapted to support the in situ lower edge of a window, at least a pair of guiding elements mounted on said window supporting member for engaging the tubular guide means on one side thereof at positions spaced along the length of the tubular guide means, a pad rotatably mounted on the window supporting member, and a further guiding element mounted eccentrically on said pad for engaging the tubular guide means on its opposite side at a position intermediate said first mentioned guiding elements.

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