United States Patent [19]

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[11] **3,897,652**

[45] **Aug. 5, 1975**

[54] **LIFTING MECHANISM FOR A LARGE WINDOW**

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[22] Filed: **Mar. 25, 1974**

[21] Appl. No.: **454,603**

[30] **Foreign Application Priority Data**

Apr. 26, 1973 Germany 2321185

[52] **U.S. Cl.** **49/351;** 403/164; 403/364

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

[58] **Field of Search** 49/227, 348–351, 49/374, 375; 403/364, 382, 403, 393, 388, 164

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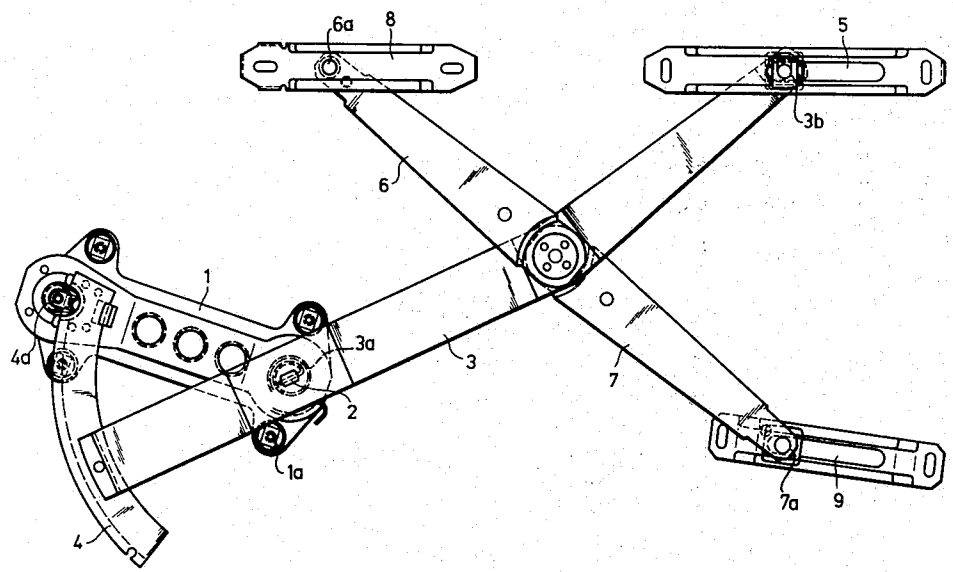
[57] **ABSTRACT**

The lifting lever of a mechanism for lifting a large window of an automotive vehicle is provided with two fixedly connected arms pivoted on the lever. The lever is turned by a segment gear on one end, and its other end engages the window to be lifted. One of the arms also engages the window and the other is guided on the body of the vehicle on which the lifting lever is mounted. The arms are stampings of flat bar stock having at their inner ends circular shoulders rotatably received in a circular opening of the lever which they enter from opposite sides. They are connected in the opening of the lever by a rivet and interengaged projections and recesses.

8 Claims, 4 Drawing Figures



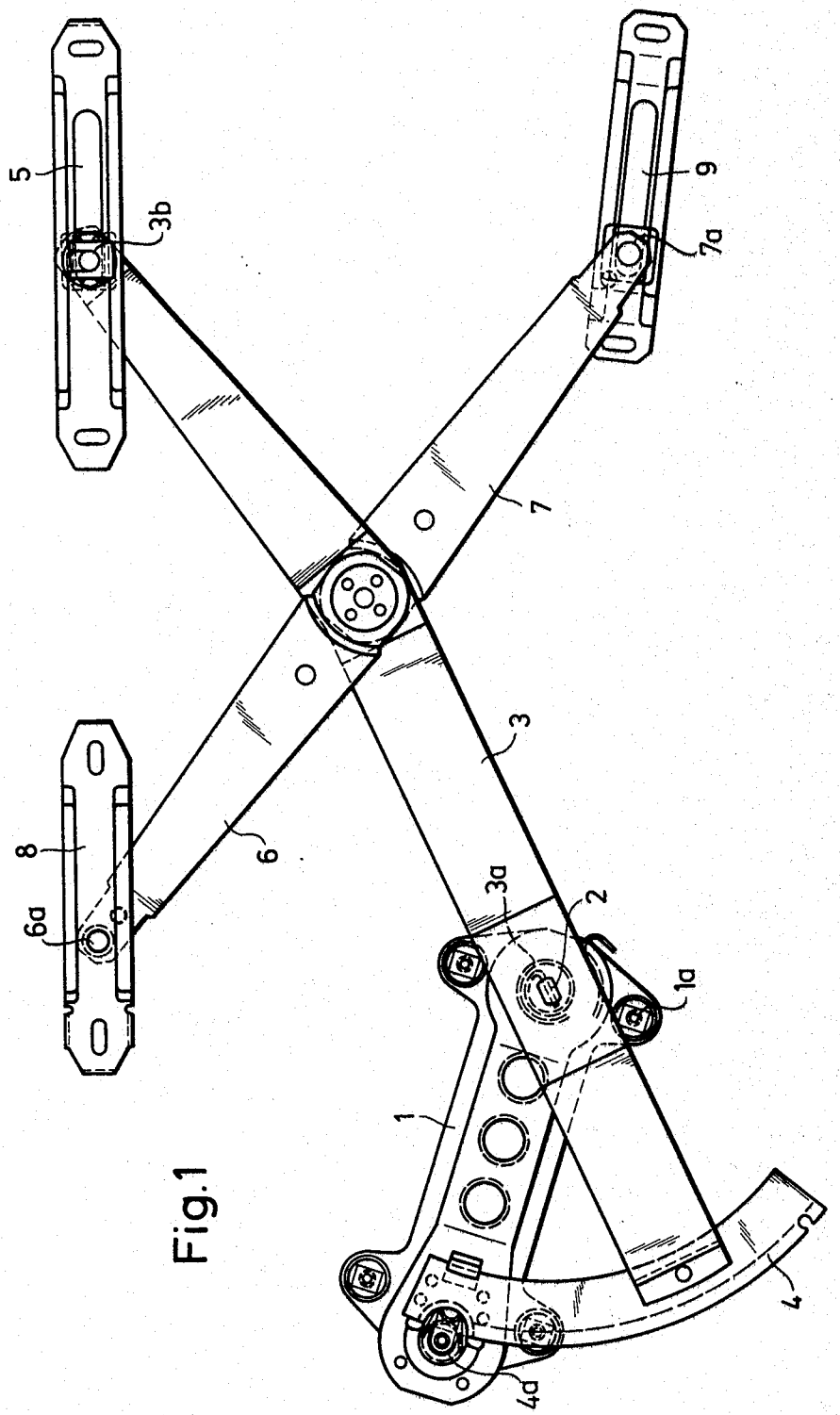


Fig.1

Fig.2

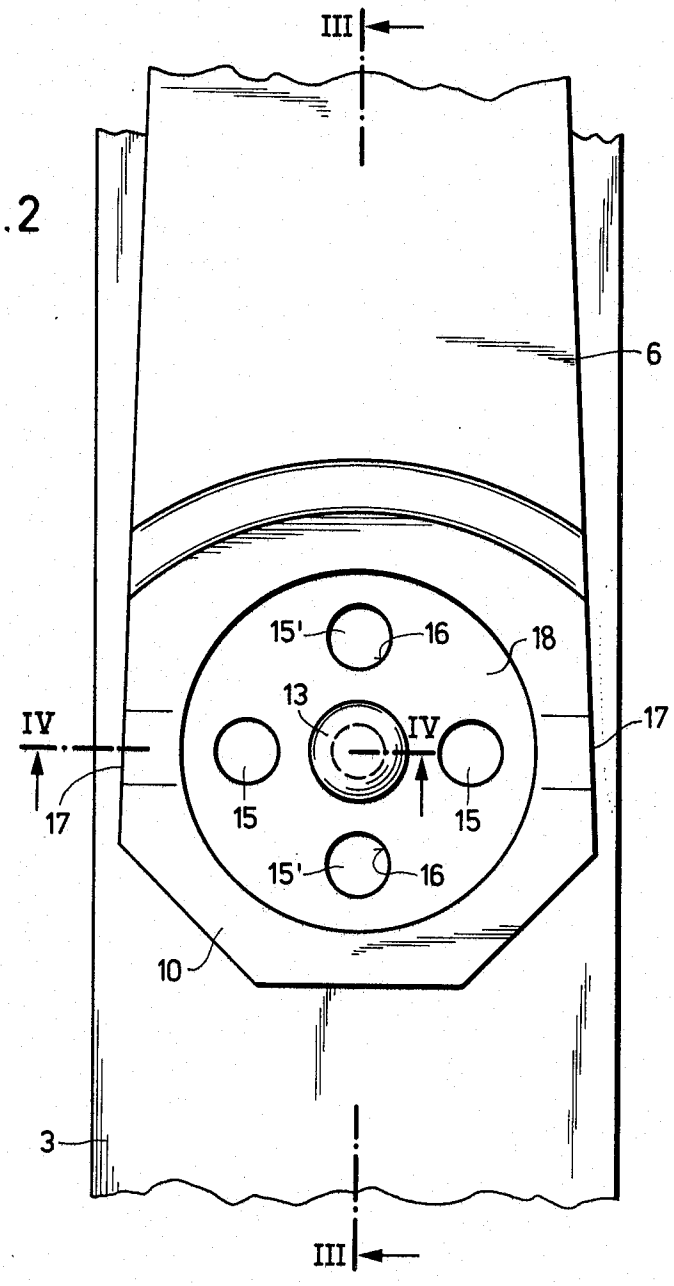


Fig.3

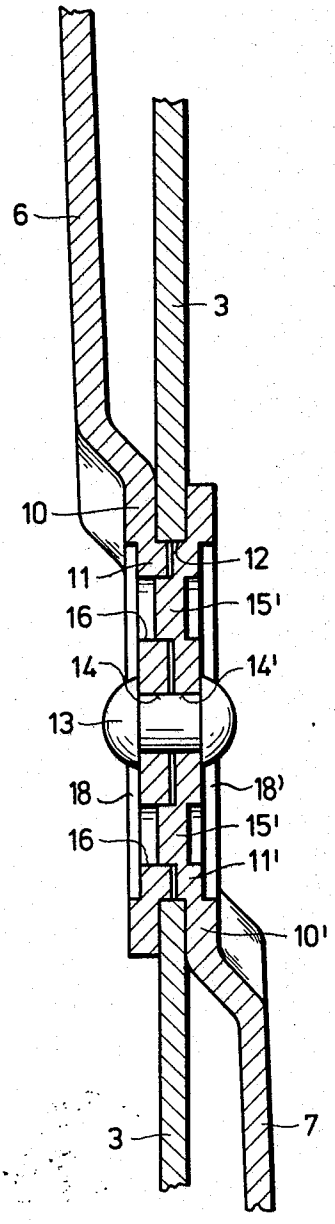
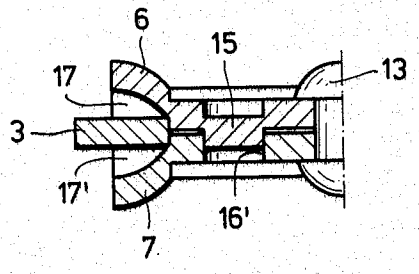


Fig. 4



LIFTING MECHANISM FOR A LARGE WINDOW

This invention relates to lifting mechanism of the type employed for windows in the doors and other body parts of automotive vehicles, and particularly to an improved lifting mechanism for windows of great horizontal width, such as the tail gate windows of station wagons.

It is common practice to provide very wide motorcar windows with a lifting lever pivoted on the car body, as on the tail gate, and turned by a manual or electrical device. Two elongated guide arms have first longitudinally terminal portions fixedly fastened to each other and pivotally connected to the lifting lever. A free end of the lever and a free end of a first one of the arms carry engaging elements secured to the window to be lifted while a corresponding engaging element is guided on the vehicle body in such a manner as to keep the lower edge of the lifted window horizontal during its vertical movement.

The pivot arrangement which fixedly connects the guide arms to each other in known window lifting mechanisms of the type described while permitting joint pivoting movement of the arms relative to the levers is relatively complex, requires precise adjustment for proper functioning, and is thus relatively costly.

An object of the invention is an improvement in the known window lifting mechanism which reduces the cost of the mechanism and reduces the number of parts required.

According to the invention, each of the first, longitudinally terminal portions of the guide arms has a projecting shoulder which defines a circle about the pivot axis of the arms on the lifting lever. The lever is formed with an opening therethrough which receives the shoulders of the guide arms in conforming engagement for rotation about the pivot axis. The two guide arms are offset from each other in the direction of the pivot axis and enter the opening in the lifting lever from opposite axial directions. The terminal portions of the arms are fixedly fastened to each other by fastening elements which extend axially in the opening of the lifting lever.

Other features, additional objects, and many of the attendant advantages of this invention will readily be appreciated from the following detailed description of a preferred embodiment when considered in connection with the appended drawing in which:

FIG. 1 shows a window lifting mechanism of the invention for a tail gate window in rear elevation;

FIG. 2 illustrates a portion of the apparatus of FIG. 1 on a larger scale in a different operating position; and

FIGS. 3 and 4 show the device of FIG. 2 in respective sections on the lines III—III and IV—IV.

The window lifting mechanism shown in FIG. 1 is normally mounted on a portion of an automobile body, such as a door or a tail gate, by means of a mounting plate 1 and four bolts 1*a*. A pivot pin 2 secures a two-armed window lifting lever 3 of flat bar stock to the mounting plate 1, and a torsion spring 3*a* tends to pivot the lever 3 about a first pivot axis counterclockwise, as viewed in FIG. 1. The short arm of the lever near the plate 1 carries a segment gear 4 which meshes with a pinion 4*a*, the pinion being normally driven by a manually operated crank or an electric motor, as is known in itself and not directly relevant to this invention. A slide 3*b* on the free end of the long arm of the lever 3 is slidably engaged in a guide channel 5, normally mounted on the bottom edge of the window to be lifted.

Two guide arms 6, 7 of flat bar stock have first longitudinally terminal portions fixedly fastened to each other and mounted on the long arm of the lever 3 approximately half-way between the pivot pin 2 and the engaged slide 3*b* for angular movement about a second pivot axis, as will presently be described in more detail. Slides 6*a*, 7*a* on the free, second, longitudinally terminal end portions of the arms 6, 7 are engaged in respective guide channels 8, 9, the channel 8 being normally fastened to the lower window edge, and the channel 9 to a part of the car body, such as the tail gate. The structure described so far is basically known, and the improvement contributed by this invention is best seen in FIGS. 2 to 4 and relates to the connection between the guide arms 6, 7 to each other and to the lever 3.

The two arms 6, 7 are stampings of flat bar stock and of approximately uniform thickness between their two wide longitudinal faces. The inner or first longitudinally terminal portion 10, 10′ of each arm 6, 7 is transversely offset from the flat remainder of the arm, and one of its wide faces is formed with a shallow circular depression 18, 18′ so that the end portions 10, 10′ each have the shape of a very shallow dish. Corresponding to the outer circumference of the depression 18, 18′, the bottom of the dish forms a circular shoulder 11, 11′ in the other wide face.

The lever 3 has a circular opening 12 whose short cylindrical wall has a diameter only slightly greater than the diameter of the two identical shoulders 11, 11′. The height of each shoulder 11, 11′ is slighly smaller than one half the axial height of the wall about the opening 12. The two shoulders 11, 11′ enter the opening 12 from opposite axial directions so that the two end portions 10, 10′ are axially offset from each other, and the remainders of the arms 6, 7 are even farther spaced in the direction of the axis of rotation of the end portions 10, 10′ in the opening 12, referred to hereinabove as the second pivot axis.

Central openings 14, 14′ in the bottom walls of the depressions 18, 18′ are aligned and receive a rivet 13 which thus axially secures the arms 6, 7 in the opening 12 and to some extent impedes their relative angular displacement about the pivot axis of the device seen in FIGS. 2 and 3. Such angular displacement is prevented by integral, axial projections 15 of the terminal portion 10 spaced from the second pivot axis and engaging mating bores 16′ in the terminal portion 10′, and by corresponding projections 15′ of the terminal portion 10′ received in bores 16 of the portion 10, all elements connecting the two arms 6, 7 being located in the opening 12.

As is best seen in FIG. 4, but also partly evident from FIG. 2, receptacles 17, 17′ are formed in the arms 6, 7 and are contiguously adjacent the cylindrical wall of the lever 3 bounding the opening 12. The receptacles are normally filled with grease and provide lubrication for the bearing provided in the lever 3 for the shoulders 11, 11′.

The several parts of each arm 6, 7 are shaped in a single stamping operation. The stampings may then be galvanized, and the galvanized arms 6, 7 assembled with the lever 3 by means of a single rivet 13, all necessary clearances being automatically established by the initial dimensions of the stampings. The improved pivot assembly of the invention has been found to be much less costly to build than the conventional assemblies, yet to operate smoothly for extended periods without

requiring servicing, being at least equivalent in this respect to the more complex pivot arrangements of earlier window lifting devices.

It should be understood, of course, that the foregoing disclosure relates only to a preferred embodiment of the invention, and that it is intended to cover all changes and modifications of the example of the invention herein chosen for the purpose of the disclosure which do not constitute departures from the spirit and scope of the invention set forth in the appended claims.

What is claimed is:

1. In a lifting mechanism for a window in the body of an automotive vehicle, the mechanism including a mounting member adapted to be mounted on said body, a lifting lever, first pivot means securing said lever to said member for pivoting movement about a first axis, first and second elongated arms, second pivot means securing respective first longitudinally terminal portions of said arms to said lever for joint pivotal movement of said arms relative to said lever about a second pivot axis spaced from said first axis, engaging means on respective second longitudinally terminal portions of said arms remote from said second axis and on a terminal portion of said lever spaced from said second axis in a direction away from said first axis, and a plurality of guide means respectively associated with said engaging means for movably securing the engaging means on said lever and on said first arm to said window, and for movably securing the engaging means on said second arm to said body, the improvement in said second pivot means which comprises:

a. a projecting shoulder defining a circle on the first terminal portion of each of said arms about said second axis,

1. said lever being formed with an opening therethrough receiving said shoulders in conforming engagement for rotation of said first terminal portions about said second axis,

2. said arms being offset from each other in the direction of said second axis and said shoulders entering said opening from opposite axial directions; and

b. fastening means axially extending in said opening and fixedly connecting said first terminal portions, said fastening means including an axial projection on one first terminal portion remote from said second axis and engaging an opening in the other first terminal portion.

2. In a mechanism as set forth in claim **1,** the axial height of each of said shoulders being greater than one half the thickness of said lever in said opening thereof.

3. In a mechanism as set forth in claim **1,** said fastening means further including a rivet centered in said shoulders and axially passing through said first terminal portions.

4. In a mechanism as set forth in claim **1,** the first and second longitudinal portions of each arm and said shoulder on the first longitudinal portion thereof constituting a unitary body, and said axial projection being an integral part of the unitary body of said one first terminal portion.

5. In a mechanism as set forth in claim **4,** said lever having an inner circumferential wall in said opening thereof, said wall slidingly engaging said shoulders during rotation of said arms relative to said lever about said second axis, each arm being formed with a receptacle for a lubricant contiguously adjacent said wall, said receptacle being offset from the shoulder of said arm in a direction radially away from said second axis.

6. In a mechanism as set forth in claim **1,** each arm consisting of flat bar stock of approximately uniform thickness in the direction of said second axis and formed with a substantially circular depression in one wide longitudinal face of said first terminal portion so that said first terminal portion is approximataly dish-shaped, the bottom of said dish shape in the other wide face of said first terminal portion being bounded circumferentially by said shoulder.

7. In a mechanism as set forth in claim **6,** said second terminal portions of said arms being offset from the corresponding first terminal portions in opposite axial directions, said first and second axes being substantially parallel.

8. In a mechanism as set forth in claim **6,** the bottom of the dish shape of each first terminal portion being spaced axially from the bottom of the dish shape of the other first terminal portion.

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