June 24, 1947. L. S. GREENMUN 2,422,830

GEAR DRIVE FOR WINDOW REGULATORS AND THE LIKE

Filed Sept. 9, 1944 2 Sheets-Sheet 1

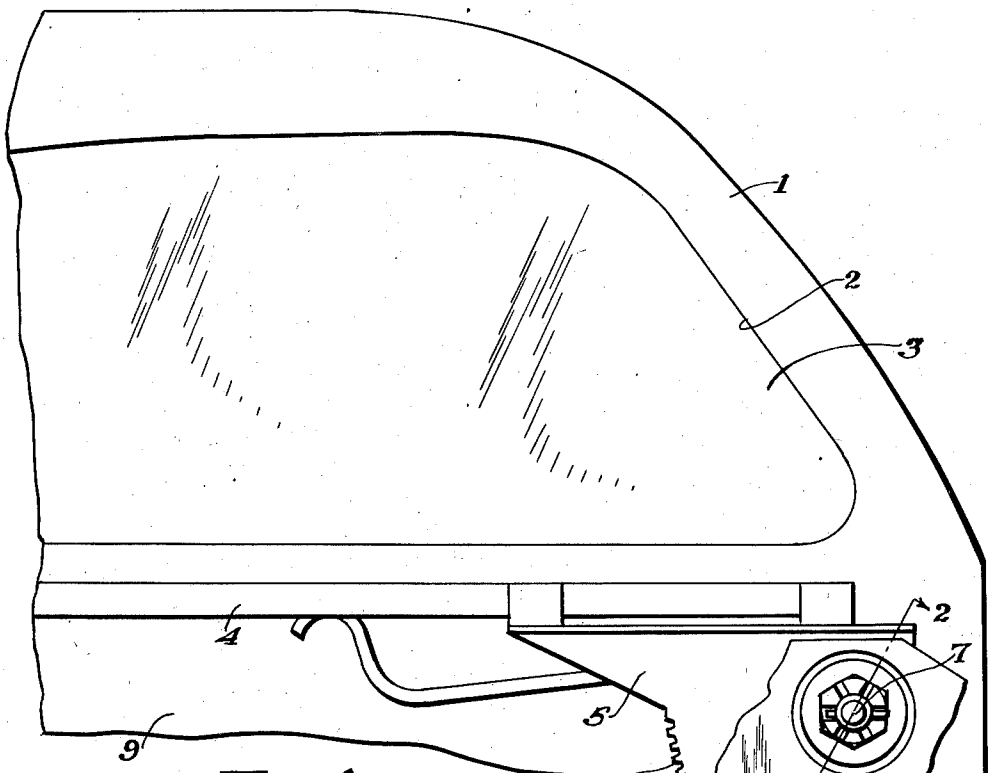


Fig. 1

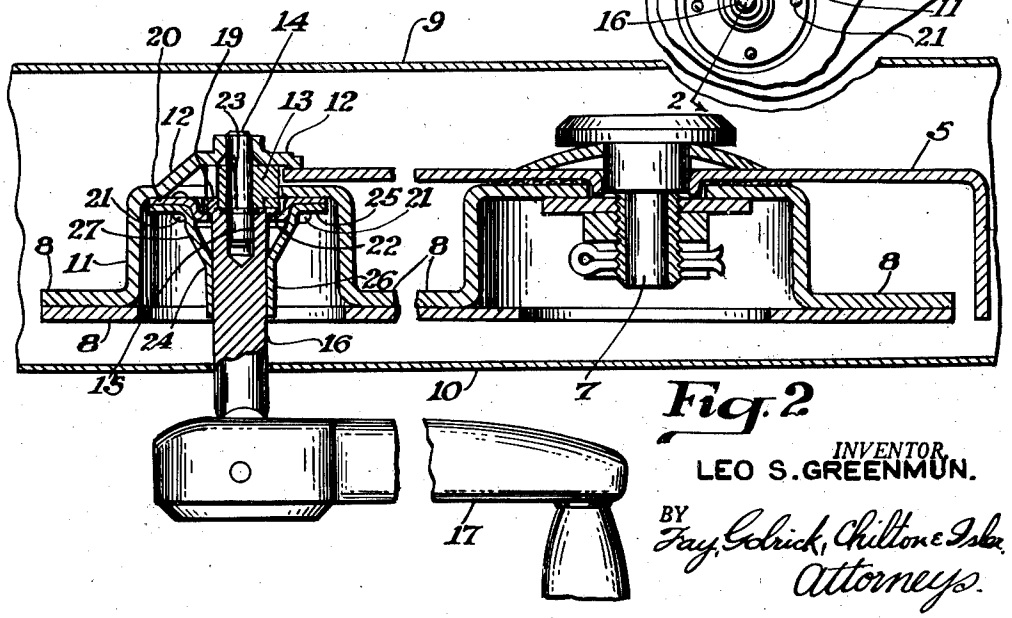


Fig. 2

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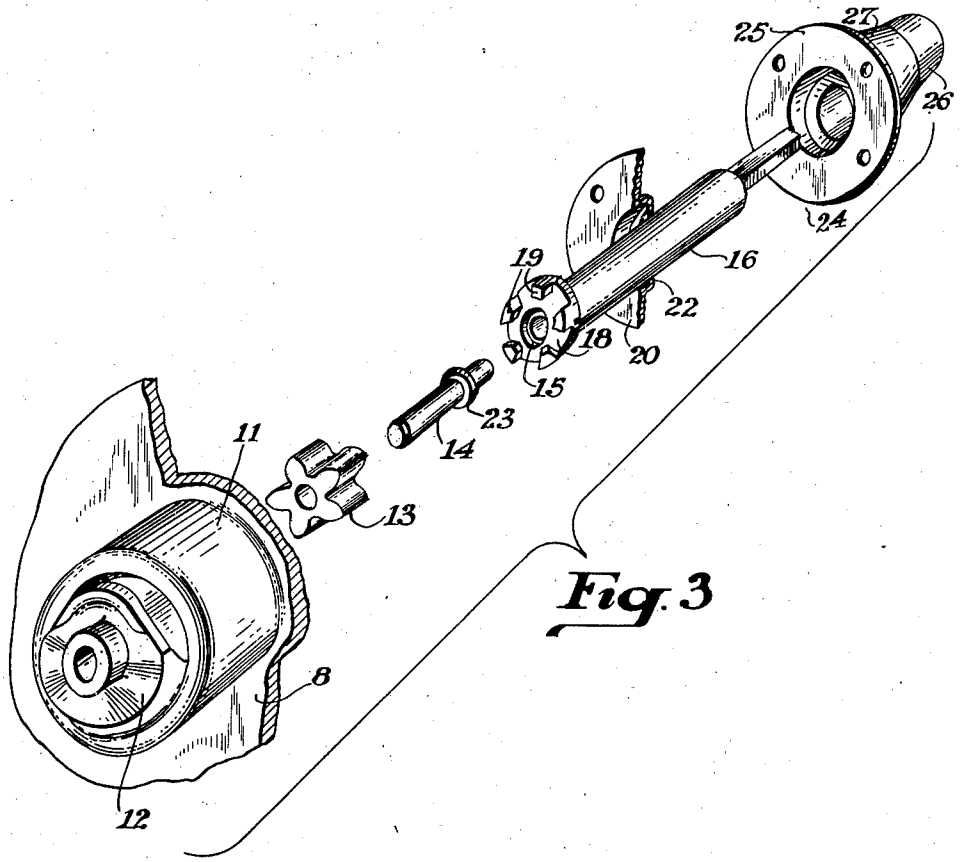
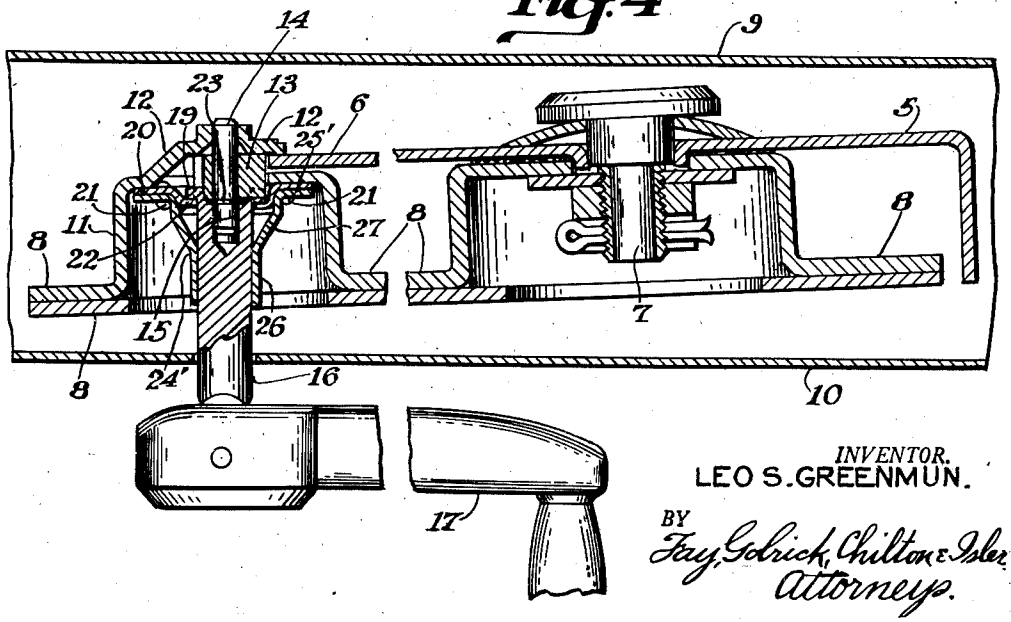


Fig. 3

Fig. 4



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GEAR DRIVE FOR WINDOW REGULATORS AND THE LIKE

Leo S. Greenmun, Johnson City, N. Y.

Application September 9, 1944, Serial No. 553,390

9 Claims. (Cl. 74—414)

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This invention relates, as indicated, to a gear drive, but has reference more particularly to a gear drive especially adapted for window regulators of automobiles and the like.

It is customary to provide, for the raising and lowering of windows in automobiles and the like, a device commonly known as a window regulator, and consisting usually of a crank handle, which is accessible to an occupant of the car, a crank shaft to which the crank handle is pinned, a pinion or small gear at one end of the shaft, and a larger gear sector or segment, which is in mesh with the pinion and upon which the window is supported, the window being raised or lowered by rotation of the crank handle, which, in turn, rotates the gear sector. Such a window regulator is shown in my co-pending application, Serial No. 551,406.

In the usual case, the pinion is rigidly secured to the shaft and in axial alignment with the shaft, so that in order that the shaft will extend at right angles to the door or body panel of the car, it is necessary that the bracket or plate upon which the shaft and gear sector are usually mounted be mounted on the door frame substantially parallel with the inner surface of the door or panel. In some cases, due to various considerations from a manufacturing standpoint, it is not possible or feasible to mount the plate or bracket in such a position, the plate or bracket being then mounted on the door or body panel in non-parallel relationship to the inner surface of the door or panel. This, in the usual case, would result in the crankshaft extending into the car at an angle other than a right angle to the inner surface of the door, rendering it difficult to operate a crank handle attached to such crankshaft.

The present invention has as its primary object the provision of a window regulator of the aforesaid type which is so constructed as to render it possible to have the crankshaft extend at right angles to the inner surface of the door or body panel, even if the plate or bracket in which the crankshaft is mounted, is in non-parallel relation to the door or body panel.

Another object of the invention is to provide a flexible gear drive for window regulators and the like, which is so constructed as to permit the pinion to be driven with the shaft disposed at an angle to the axis of the pinion.

A further object of the invention is to provide a flexible gear drive of the character described which consists of a minimum number of easily manufactured and readily assembled parts, and which is inexpensive to manufacture.

Other objects and advantages of the invention will be apparent during the course of the following description.

In the accompanying drawings, forming a part

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of this specification, and in which like numerals are employed to designate like parts throughout the same,

Fig. 1 is a fragmentary view of an automobile door, with portions thereof broken away to more clearly show the window regulator of the present invention;

Fig. 2 is a cross-sectional view, taken on the line 2—2 of Fig. 1;

Fig. 3 is an exploded view of the gear drive shown in Fig. 2; and

Fig. 4 is a view similar to Fig. 2, but modified to show a non-parallel arrangement of the window regulator to the inner surface of the door.

Referring more particularly to Figs. 1 to 3 inclusive of the drawings, there is illustrated a car door 1 of more or less conventional form, and having a window opening 2. The door is provided with a window 3 which has its bottom edge enclosed in a channel strip 4, to one end of which is secured a stamping 5, a portion 6 of which is in the form of a segment or sector of a gear.

The stamping 5 is mounted for rotation or pivotal movement about a stubshaft or pin 7, which is secured to a plate or bracket 8. The plate or bracket 8 is rigidly mounted on the door frame and is substantially parallel with the outer and inner surfaces of the door, which are represented by reference numerals 9 and 10, respectively.

The plate or bracket 8 is in the form of a stamping having a circular embossment 11, a portion of which is struck out to form a housing 12 for a small gear or pinion 13, which is in mesh with the gear segment 6. The pinion 13 is journalled on a shaft or pin 14 which is loosely mounted in the housing 12 and extends through the embossment 11 and into a recess 15 in one end of a crank shaft 16, to the other end of which the crank handle 17 for raising and lowering the window 3 is secured.

The shaft 16 is similar to the crank shaft to which reference has previously been made, but in this case, one end of the shaft is upset to form a flange 18 from which a plurality of circumferentially spaced teeth 19 extend in an axial direction, such teeth being normally disposed between the teeth of the pinion 13. The pinion 13, as well as the flange 18, are retained in position by means of a disc 20 which is secured, by rivets 21 to the embossment 11, said disc having a flange 22 spaced axially from the plane of the disc and so disposed as to restrain excessive movement of the flange 18 from the pinion 13.

The pin 14 has a radial flange 23 which is in abutment with the inner radial face of the pinion 13, thereby restraining the pin 14 from being axially displaced downwardly, as viewed in Fig. 2.

The shaft 16 is journalled in a collar or bearing 24, having a radial flange 25 which is secured to the embossment 11 by the same rivets which

secure the disc 20 to such embossment. This collar or bearing has an annular portion 26, within which the flange 22 of the disc 20 is nested, and a conical or tapered portion 27.

It is thus seen that I have provided a gear drive for window regulators and the like which is of extremely simple and rugged construction, and which consists of a minimum number of easily manufactured parts.

As previously stated, it is sometimes necessary to mount the regulator at a slight angle to the inner surface 10 of the door, as shown in Fig. 4. In order to so mount the regulator, but still have the crank shaft 16 extend at right angles to said inner surface of the door, some of the parts which have been described are loosely assembled in order to permit the shaft 16 to be secured to the regulator at an angle of slightly less than 90 degrees to the general plane of the regulator. In order to provide for this, I provide a clearance of several thousandths of an inch between the pin 14 and the cylindrical wall of the recess 15 in the shaft 16. A similar clearance is also provided between the outer radial wall of the flange 18 and the inner radial wall of the pinion 13. This permits the parts to be assembled, as shown in Fig. 4, and in order to complete the assembly, a modified form of bearing 24' is used for the shaft 16, which is identical in all respects to the bearing 24, but having the flange 25' thereof disposed at an angle other than a right angle to the axis of the collar. This angle is substantially the same as the angle between the plate 8 and the axis of the shaft 16.

It is thus seen that I have provided a window regulator which is so constructed as to render it possible to have the crank shaft extend at right angles to the inner surface of the door or body panel, even if the plate or bracket in which the crank shaft is mounted is in non-parallel relation to the door or body panel.

It will also be seen that I have provided a flexible gear drive for window regulators and the like, which is so constructed as to permit the pinion to be driven with the shaft disposed at an angle to the axis of the pinion.

It is to be understood that the form of my invention, herewith shown and described, is to be taken as a preferred example of the same, and that various changes in the shape, size and arrangement of parts may be resorted to, without departing from the spirit of the invention, or the scope of the subjoined claims.

Having thus described my invention, I claim:

1. In a gear drive for window regulators and the like, a plate having a body portion and a portion struck from said body portion to form a housing, a restraining disc opposite said struck portion of said plate, a pinion disposed in said housing, and a shaft having a toothed driving head formed integrally therewith and in driving engagement with said pinion, said driving head disposed between said pinion and said disc, and said disc functioning to restrain excessive movement of said driving head from said pinion.

2. In a gear drive for window regulators and the like, a plate having a body portion and a portion struck from said body portion to provide a housing, a pin mounted in said housing, a restraining disc, a pinion journalled on said pin and disposed in said housing, and a shaft having a recess in one end thereof and a driving head having teeth in mesh with the teeth of said pinion, said head disposed between said pinion and said disc, and said pin journalled in the recess of said shaft.

3. A gear drive as defined in claim 2, in which said pin has a radial flange interposed between said pinion and said driving head and adapted to restrain said pin against axial displacement.

4. A gear drive as defined in claim 2, in which clearance is provided between said pin and the wall of said recess, whereby to permit said pinion to be driven by said shaft with the axis of said shaft at an angle to the axis of said pinion.

5. A gear drive as defined in claim 2, in which clearance is provided between said pin and the wall of said recess, and between the opposed radial faces of said driving head and pinion, whereby to permit said pinion to be driven by said shaft with the axis of said shaft disposed at an angle to the axis of said pinion.

6. In a gear drive for window regulators and the like, a plate having a portion formed to provide a gear housing, a gear disposed in said housing, a bearing member secured opposite said housing, and a shaft having a driving head formed integrally therewith and in mesh with said gear, said shaft journalled in said bearing member at an angle to the axis of said gear.

7. In a gear drive for window regulators and the like, a plate having a portion formed to provide a gear housing, a gear disposed in said housing, a restraining disc having a radial portion spaced from one end of said gear, a bearing member secured adjacent said restraining disc, and a shaft having a driving head formed integrally therewith and in mesh with said gear, said shaft journalled in said bearing member, and said spaced radial portion of said disc nested in said bearing member.

8. In a gear drive for window regulators and the like, a member having a portion formed to provide a gear housing, a pin having one end mounted in said housing, a retaining washer disposed opposite said housing, a pinion journalled on said pin and disposed in said housing, and a shaft having an axial recess and a driving head in mesh with the teeth of said pinion, said head disposed between said pinion and said washer, and said pin having its other end mounted in said axial recess of said shaft.

9. In a gear drive for window regulators and the like, a member having a portion formed to provide a gear housing, a pin having one end mounted in said housing, a retaining washer disposed opposite side housing, a bearing member having a portion in which a portion of said washer is nested, a pinion journalled on said pin and disposed in said housing, and a shaft journalled in said bearing member and having an axial recess and a driving head in mesh with the teeth of said pinion, said head disposed between said pinion and said washer, and said pin having its other end mounted in said axial recess of said shaft.

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