# United States Patent [19]

**Herrmann**

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[54] **WINDOW ACTUATING APPARATUS WITH AUXILIARY MANUAL OPERATION**


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[58] **Field of Search** ..... 74/625, 424.6, 425, 74/424.5



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[57] **ABSTRACT**

In an electrically operated window actuating device in which power is normally transmitted from a motor to an operating cable through a reducing gear system, a manual emergency drive is provided in which a normally idling gear of the drive is mounted coaxially on the same shaft as the intermediate gear of the reducing gear system. Resilient means normally urge the driving gear of the emergency drive out of engagement with the idling gear. When the manual drive is put into operation, its driving gear actuates the idling gear and the intermediate gear of the reducing gear system thereby causing displacement of the operating cable. The housing for the apparatus is made up of symmetrical parts which can be reversed so as to fit both right and left hand side windows.


**5 Claims, 2 Drawing Figures**

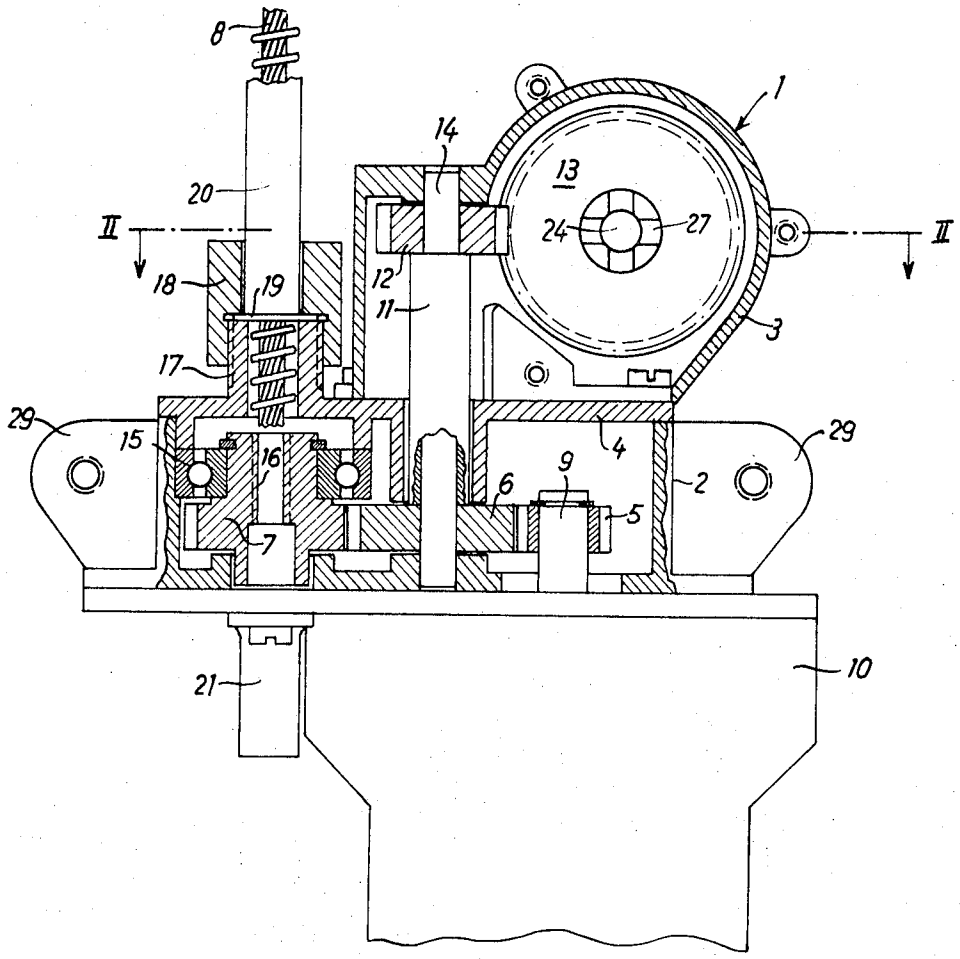
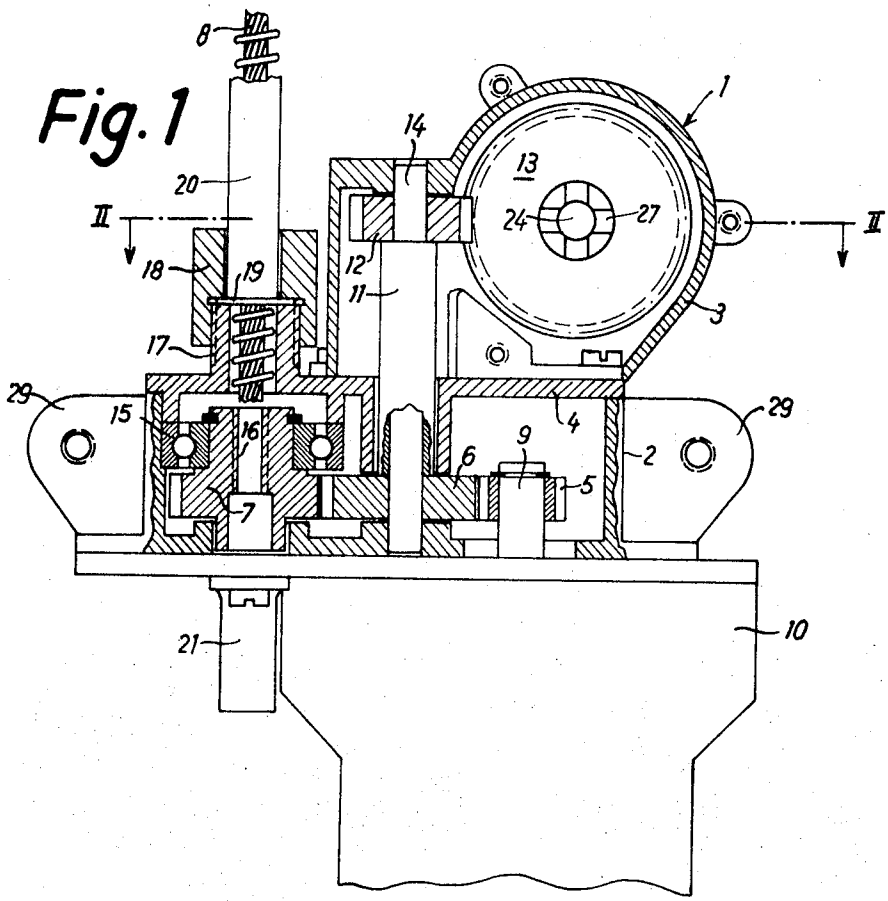


Fig. 1



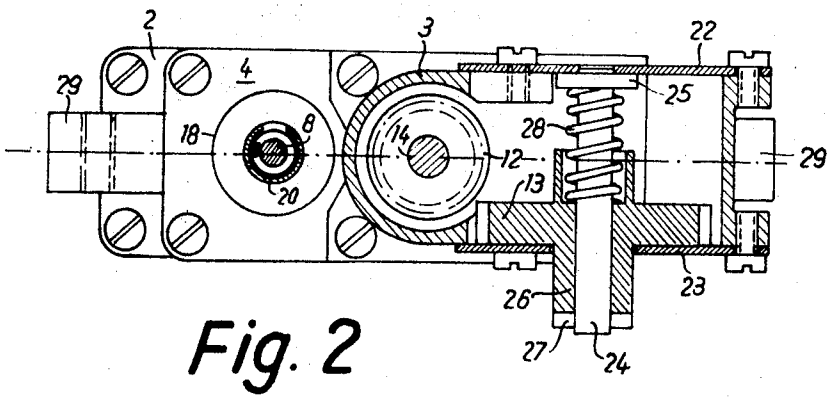




Fig. 2

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# WINDOW ACTUATING APPARATUS WITH AUXILIARY MANUAL OPERATION

## BACKGROUND OF THE INVENTION

This invention resides in the field of window actuating devices, and more specifically is directed to apparatus used for electrically actuating windows.

## DESCRIPTION OF THE PRIOR ART

Most electrically driven window actuating devices for motor vehicles consist of a motor connected to a reducing gear system operating a stiff threaded cable which moves the window up and down and of a manual or crank drive placed in the device and intended to be operated in case of power or other failure. This drive is usually in the form of a miter gearing including a normally idling gear wheel. In prior art devices the miter gearing acts directly on the motor shaft, the normally idling miter gear being fixed non-rotationally on this shaft. When the motor fails to operate, the threaded cable is moved by the miter gear acting directly on the reducing gear. Because of the high rotational speed of the motor the miter gearing has a considerable reducing ratio and accordingly manual operation requires about 200 crank revolutions for the complete raising or lowering of a typical automobile window.

In addition to the above-described operating problem encountered in prior art devices, many of them are of a size which does not allow for their installation in all, or at least many, makes of vehicles.

## SUMMARY OF THE INVENTION

The present invention provides electric window actuating means having a manual crank-operated drive means which make it possible to open or close a window with a relatively small numberof crank revolutions. The assembly of the invention is flat and of reduced dimension so as fits easily into the window wells of most motor vehicle bodies.

The invention is comprised of a device wherein the normally idling gear of the crank-operated emergency drive is mounted coaxially with the intermediate gear of the cable drive's reducing gearing.

As the intermediate gear has more teeth than has the driven gear, the emergency drive engages the cable drive with a small reducing ratio such that only about 50 crank revolutions are required to raise or lower a vehicle window completely.

The emergency drive can include miter gearing with helical gear wheels or bevel gear pairs.

The objects and attendant advantages, features, and uses of the present invention will become more readily apparent upon from a consideration of the following detailed description thereof when taken in conjunction with the accompanying figures.

## BRIEF DESCRIPTION OF THE DRAWING

FIG. 1 is an elevational view, partly in section, of a window actuating device constructed in accordancewith the present inventive teaching; and

FIG. 2 is a cross sectional view of the device of FIG. 1 taken along line II—II thereof.

## DESCRIPTION OF THE PREFERRED EMBODIMENT

In both figures of the drawings, like reference numerals identify like elements or parts.



Referring to FIG. 1, a gear case 1 consists of a lower part 2, an upper part 3 and an intermediate cover 4 secured together by screws. In lower part 2 is housed a reducing spur gear system consisting of a driven gear 5, an intermediate gear 6 having more teeth than the driven gear and driving gear 7 which actuates a threaded window cable 8. As seen on the right hand side of FIG. 1, driven gear 5 is mounted on a motor shaft 9 of a flat electric motor 10 which is flanged directly to the lower part 2. Motor 10 is a permanently energized reversible direct current motor of conventional design.

As shown, intermediate gear 6 is connected nonrotationally by sleeve 11 with a driven gear 12 forming a part of the miter gear assembly ofthemanual drive. The intermediate gear 6 and the driven gear 12 are mounted on a shaft 14 in gear case 1. The miter gear assembly is a helical gear couple formed of driven gear 12 and a driving gear 13 with the driven gear 12 being considerably smaller than the driving gear 13.

Intermediate gear 6 meshes with the driving gear 7 of the reducing gear system and the driving gear is mounted rotatably over ball bearing 15 in lower part 2. Driving gear 7 has an axially extending threaded opening in which the threaded cable 8 is engaged in the manner of a spindle nut assembly

With the above described arrangement, it is seen that while driving gear 7 does not move axially, rotation thereof will lead to axial displacement of the cable 8 and, in turn, depending on the direction of this rotation, to either upward or downward movement of the window (not shown) to which it is operatively associated in known manner.

Mounted coaxially with driving gear 7 and cable 8 on the intermediate cover 4 is an externally threaded guide attachment 17 with a screw cap threaded on its outer end securing the flange end 19 of stiffening tube 20 about the cable 8 for preventing it from bending or twisting. A similar arrangement can be provided on the opposite side on the lower member 2 or at the flange of electric motor 10. However, in FIG. 1 only a sleeve 21 is provided for receiving the free end of cable 8.

Referring to FIG. 2, it is seen that the upper part 3 which follows the configuration of driving gear 13 is open on both sides and the openings are closed by covers 22 and 23. Driving gear 13 is mounted on a shaft 24 which is supported at its flanged end 25 in cover 22. Gear 13 which is mounted rotatably and axially movable on shaft 24, has a bearing shoulder 26 which passes through an opening in cover 23. Shoulder 26 terminates in a cross-shaped slot 27 adapted to receive an actuating element (not shown), such as a hand crank. A helical expansion spring 28 surrounds shaft 24 between flange 25 and an annular recess in one side of gear 13. This spring 28 normally holds the miter gear pair 12,13 out of meshed engagment so that driven gear 12 can idle freely as motor 10 rotates.

The dash-dot line in FIG. 2 denotes the axis of symmetry of the apparatus which can be mounted for right hand, or left hand positioning by simply reversing covers 22, 23, driving gear 13, shaft 14 and spring 28. With this arrangement maintaining stock is greatly simplified. These parts are interchangeable therefore for all vehicle windows. The lower part 2 of the gear case 1 has attachment shoulders 29 by which the gearing attachment with the motor attached can be secured to a vehicle body.

Referring again to FIG. 1, it is seen that the gear 6 has a much larger diameter than driven gear 5 and has a correspondingly greater number of teeth. The manual emergency drive provided by the helical gears 12, 13 is in direct engagement with the cable 8 through sleeve 11, intermediate gear 6 and driving gear 7. In this manner the reducing gear ratio which necessarily exists between driven gear 5 and driving wheel 7 because of high motor speeds of 4,000 to 4,500 rpm, does not come into play when the manual drive is operated. With the arrangement shown, only about one-fourth the normal number of crank revolutions are needed to raise or lower a vehicle window. The number of teeth on the intermediate gear 6 may correspond exactly or approximately to the number of teeth on driving wheel 7. Similarly, by interposing the manual drive as shown, a very flat, space-saving unit can be manufactured so as to fit in the door wells of most vehicles.

While only a particular embodiment of the invention has been shown and described, it will be apparent to those skilledin the art that various changes and modifications may be made therein without departing from the invention in its broader aspects. Therefore, the aim in the appended claims is to cover all such changes and modifications as may fall within the true spirit and scope of the invention.

What is claimed is:

1. A window actuating apparatus for motor vehicles and the like comprising an electric motor, reducing gearing including a driven gear connected to said motor, an intermediate gear and a driving gear, said intermediate gear having a greater number of teeth than said driven gear, a threaded cable in movable engagement with said driving gear and arranged for raising and lowering a vehicle window, a manual emergency drive arranged to rotate said intermediate gear and driving gear, said manual emergency drive being selectively engaged with said reducing gearing and said manual emergency drive comprising a driving gear and a driven gear, said driving gear being coaxial with said intermediate gear and secured thereto for rotation therewith, said driving gear and driven gear of said manual drive being mounted on respective shafts disposed at right angles to one another and forming a helical gear couple, said driven gear of said manual drive being disengagable from said driving gear of said manual emergency drive so that said driven gear idles when said electric motor drives said reducing gearing.

2. Apparatus according to claim 1, wherein said driving gear of said manual drive is considerably larger than said driven gear of said manual drive, said manual drive comprising a shaft, said driving gear mounted on and axially displaceable along said shaft, and spring means engaged to bias said driving gear axially along said shaft for maintaining it out of engagement with said driven gear.

3. Apparatus according to claim 2, wherein a case being arranged to enclose said reducing gearing and said helical gear couple, an intermediate gear shaft extending through and secured at its ends to said casing, a sleeve mounted on said intermediate gear shaft, said intermediate gear of said reducing gearing and said driven gear of helical couple each attached to an opposite end of said sleeve.

4. Apparatus according to claim 3, wherein said case being symmetrically constructed about an axis of symmetry extending through the axial centers of said driven gear, intermediate gear and driving gear of said reducing gearing.

5. Apparatus according to claim 1, wherein a sleeve member coaxial with said driving gear of said reducing gearing is provided around said cable to prevent bending of said cable.

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