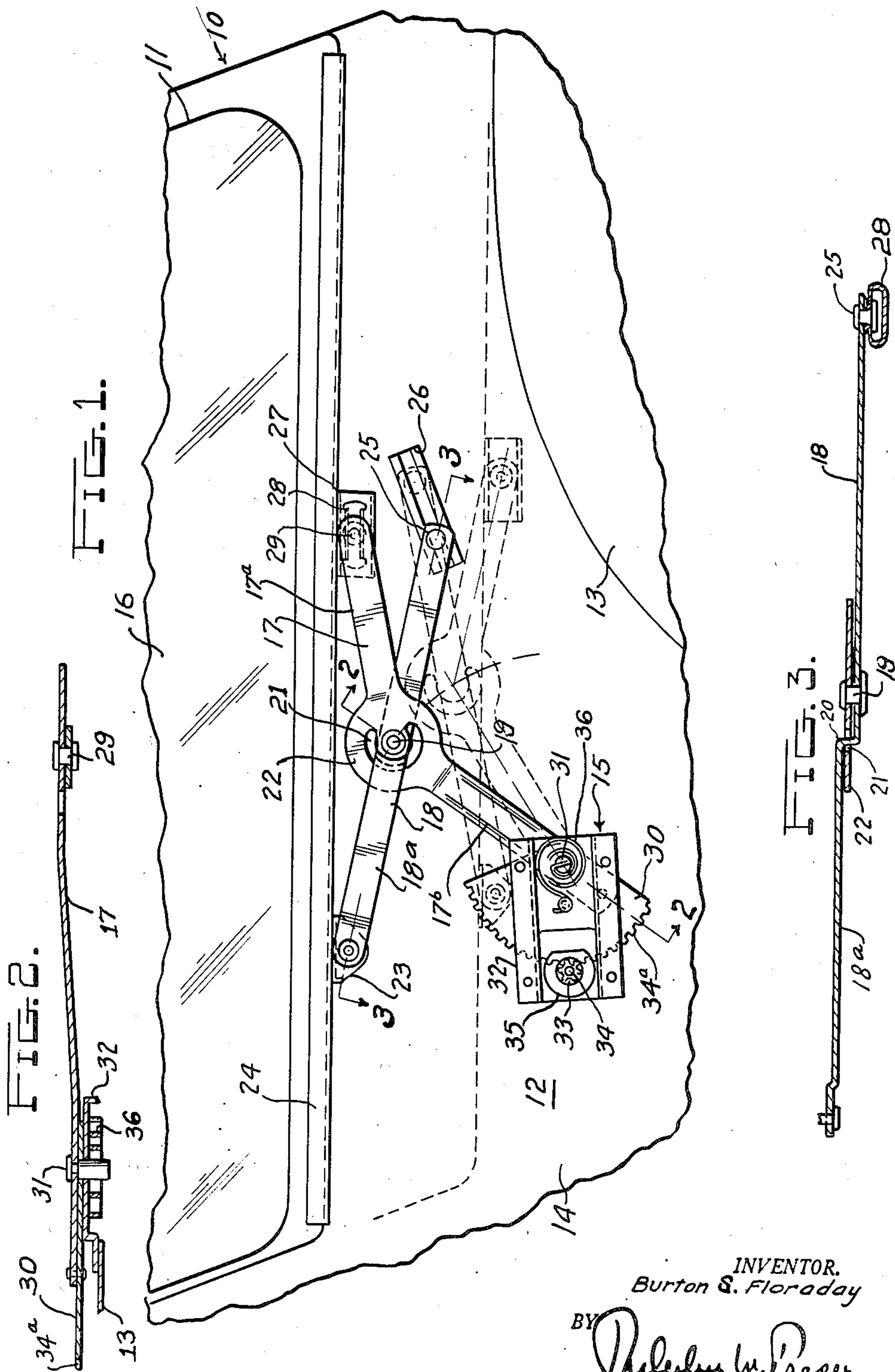


March 6, 1951

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WINDOW REGULATOR MECHANISM

2,544,451

Filed Sept. 13, 1947



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UNITED STATES PATENT OFFICE

2,544,451

WINDOW REGULATOR MECHANISM

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Application September 13, 1947 Serial No. 773,781

1 Claim. (Cl. 268—126)

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This invention relates to window regulators and more particularly to cross arm regulators for use in connection with vehicle window panels.

An object of this invention is to produce a simple and efficient regulator mechanism for imparting inclined movement to a window panel when traveling between the open and closed positions, and more particularly for imparting sidewise movement during actuation thereof vertically between its open and closed positions.

Another object is to produce a regulator mechanism of the above type which is compact and enables the operating unit to be arranged in close proximity therewith for disposition of the entire assembly within a limited space.

Other objects and advantages of this invention will become obvious from the ensuing description, and for purposes of illustration but not of limitation, an embodiment of the invention is shown in the accompanying drawings, in which

Figure 1 is a fragmentary elevational view of an automobile door with one wall panel partially removed for illustrating a window regulator mechanism embodying the present invention;

Figure 2 is a sectional view taken along the line 2—2 of Figure 1, and

Figure 3 is a sectional view taken substantially along the line 3—3 of Figure 1.

Due to the streamline construction of automobile styles now being produced, the means for rendering the desired movements of a window panel in an automobile body are made more difficult for it is often necessary that the window panel be made to travel in some angular relation during opening and closing movements and, in addition, a great deal of space cannot ordinarily be made available in the window well for receiving the window panel and also house the regulator mechanism in position for most effective use. The present invention embraces, in particular, a regulator mechanism for effectively and efficiently imparting the desired opening and closing movement of a window panel operatively mounted in an automobile body.

Referring now to the embodiment of the invention shown in the accompanying drawings, the vehicle body 10 of streamline construction, and to which the present invention may be applied, comprises a window opening 11 arranged above a window well section 12 that is enclosed by inner and outer panel walls 13 and 14 respectively. The well section, co-extensive with the lower end of the window opening, houses the window regulator mechanism, indicated generally at 15, and receives the window panel 16 when lowered by the

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mechanism to an open position, as illustrated by the broken lines in Figure 1.

A vehicle window frame of streamline construction generally departs from the usual rectangular shape and, in many instances, the frame slopes in one direction or another to appear substantially as a parallelogram. To carry out the streamline effect, and in some instances, even, where no inclination is present in the frame, the window panel 16 is arranged to have inclined side edges and the window opening 11 and well 12, as a result, are correspondingly shaped. In specific application, it is desirable that the window panel travel in an inclined direction, such for example as in the direction corresponding to the inclination of the window edge and that the window regulator mechanism be housed within the limited space available within the window well portion so as to be hidden from view.

In order efficiently to accomplish window movement in an inclined direction, or in other words, to impart lateral displacement of the window concomitant with its up and down movement between the open and closed positions of adjustment, I provide a cross arm regulator 15 consisting of a driving arm 17 in the shape of a bell crank lever and an elongate rectilinear guide or balance arm 18. These arms 17 and 18 are pivoted together intermediate their ends, as at 19, the extent of pivotal movement being controlled by an offset portion 20 in the guide arm 18, which offset portion is operative within an arcuate slot 21 in the angular portion 22 of the bell crank lever.

One end portion 18a of the guide arm 18 is pivotally connected on a support 23 depending from the usual channel bar 24 fixed to the lower edge of the window panel. The other end of the guide arm has a stud or roller 25 that is adapted to slide within a channel bracket 26 stationarily fixed in an inclined position to the inner panel wall 13.

A horizontally disposed channel or retainer bracket 27 depending from the channel bar 24 in spaced apart relation with the support 23, is provided with a horizontally disposed slot 28 adapted slidably to receive a stud or roller 29 carried on one end of the bell crank lever. The other end of the bell crank is engaged by a stud 31 which, in combination with rivet or bolt means, fixes the bell crank rigid with a gear sector 30 that forms a part of the drive mechanism.

The driving mechanism generally is a unitary structure of conventional design, including the gear sector 30 with the stud 31 fixed to its base,

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the stud being pivotally mounted on a mounting plate 32 secured, as by rivets, to the inner panel wall. The drive mechanism also includes a driving pinion 33 meshing with the teeth 34^a on the periphery of the gear sector, the driving pinion being mounted on a driving shaft 34 supported within a conventional friction clutch device 35 that is also secured to the mounting plate. In the mounted position, a portion of the driving shaft extends outwardly of the inner panel wall and is adapted to be engaged for turning movement by a conventional crank handle (not shown) thereby to manipulate the regulator.

The gear 30 with its attached bell crank lever is constantly urged for swinging movement in the direction for raising the window panel by a counterbalancing spring 36 having one end anchored to the stud 31 while the other end is fixed to the mounting plate. In this position, the counterbalancing forces assist in overcoming the gravitational forces urging the window to its lowered position of adjustment.

In accordance with this invention, correct movement is imparted to the window panel by arranging the ends of the regulator arms 17 and 18, operatively engaging the window channel, to swing through equal arcs, that is through corresponding angles of equal radii about their common pivot 19. Otherwise the window panel will not travel in parallelism and will bind within its guides. If the window panel has a lower sloping edge, link means, associated with the ends of the arms, can be used to enable the ends to work through equal arcs. One such link means is illustrated in my co-pending patent application entitled "Vehicle Window Regulator," filed on December 4, 1944, and bearing the Serial Number 566,522.

The above assures movement of the window panel in parallel relation. Movement of the window panel in the direction of inclination of the window edge is effected by an arrangement whereby a straight line through the center of the guide 26 and the pivot stud 31 is at right angles to the up and down movement of the window panel 16, such for example as may be determined by the guides engaging the side edge of the panel, and a straight line passing through the center of the pivotal mounting for the arm 18^a and the pivot stud 31 is parallel to a line inclined in the direction of window movement. By employing a bell crank lever 17 as one of the regulator arms, the desired relationship is maintained throughout the effective operating range of the regulator and the parts are compacted into an area that readily fits within the limited space of the window well.

From the description, it will become evident that I have produced a simple and economically

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manufactured window regulator mechanism that is adapted positively to impart inclined travel to a window panel, as for example, in the direction of inclination of the window edge during the movement thereof between the open and closed position. The described mechanism may be pre-assembled apart from the window panel and the body thereby to enable separate assembly and installation on an assembly line basis of the type ordinarily employed in the automobile industry.

It is to be understood that numerous changes in the details of construction, arrangement and operation may be made without departing from the spirit of the invention, especially as defined in the following claims.

What I claim is:

A window regulator mechanism adapted to be mounted in a window well for lowering or raising the window panel into and out of said well in a direction oblique to the vertical, said regulator comprising a pair of unitary levers interpivotated intermediate their ends, one of said levers comprising a bell crank having a pair of rigidly connected arms extending from the pivotal connection at an oblique angle to each other, and the other lever being rectilinear and extending in a straight line across the pivot point, guide means slidably and pivotably connecting one arm of the bell crank lever to the lever edge of the window panel, fixed pivotal means for mounting the other end of the bell crank lever in the window well, means pivotably connecting one arm of the rectilinear lever to the lower edge of the window panel and guide means slidably and pivotably mounting the other end of the rectilinear lever comprising a straight guide slot extending in a line inclined with reference to the lower edge of the window which line passes through the fixed pivotal mounting of one arm of the bell crank lever, and the slidable connection between the bell crank lever and the window edge being parallel to the window edge.

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