Nov. 21, 1933. P. W. WINKELMANN 1,935,968

WINDOW OPERATING DEVICE

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Fig. 3.

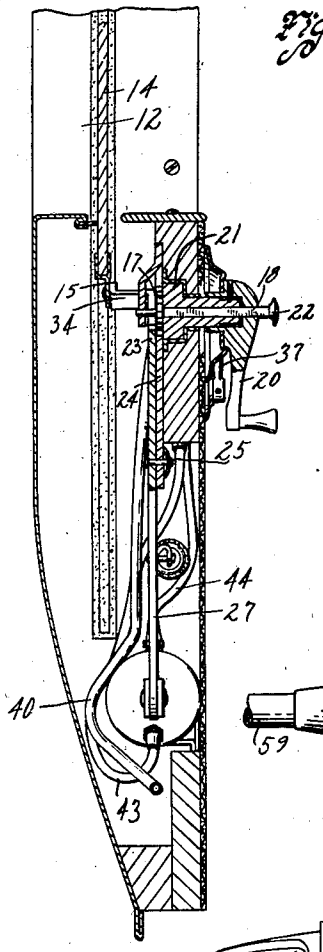


Fig. 1.

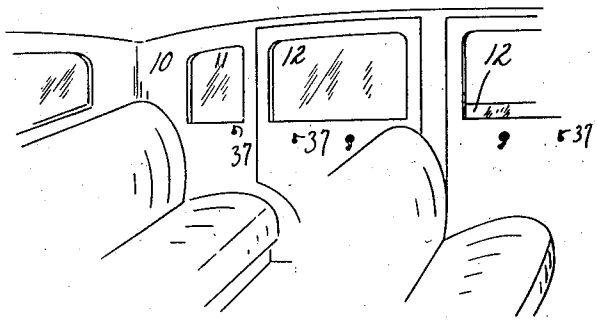


Fig. 4a.



Fig. 4.

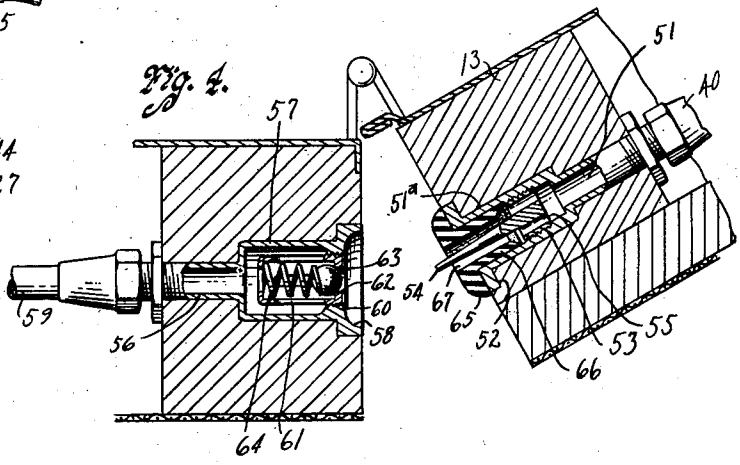


Fig. 8.

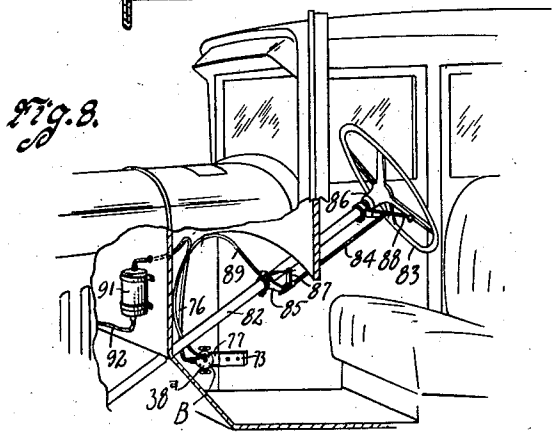
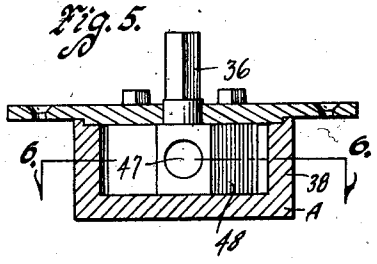


Fig. 5.



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WINDOW OPERATING DEVICE

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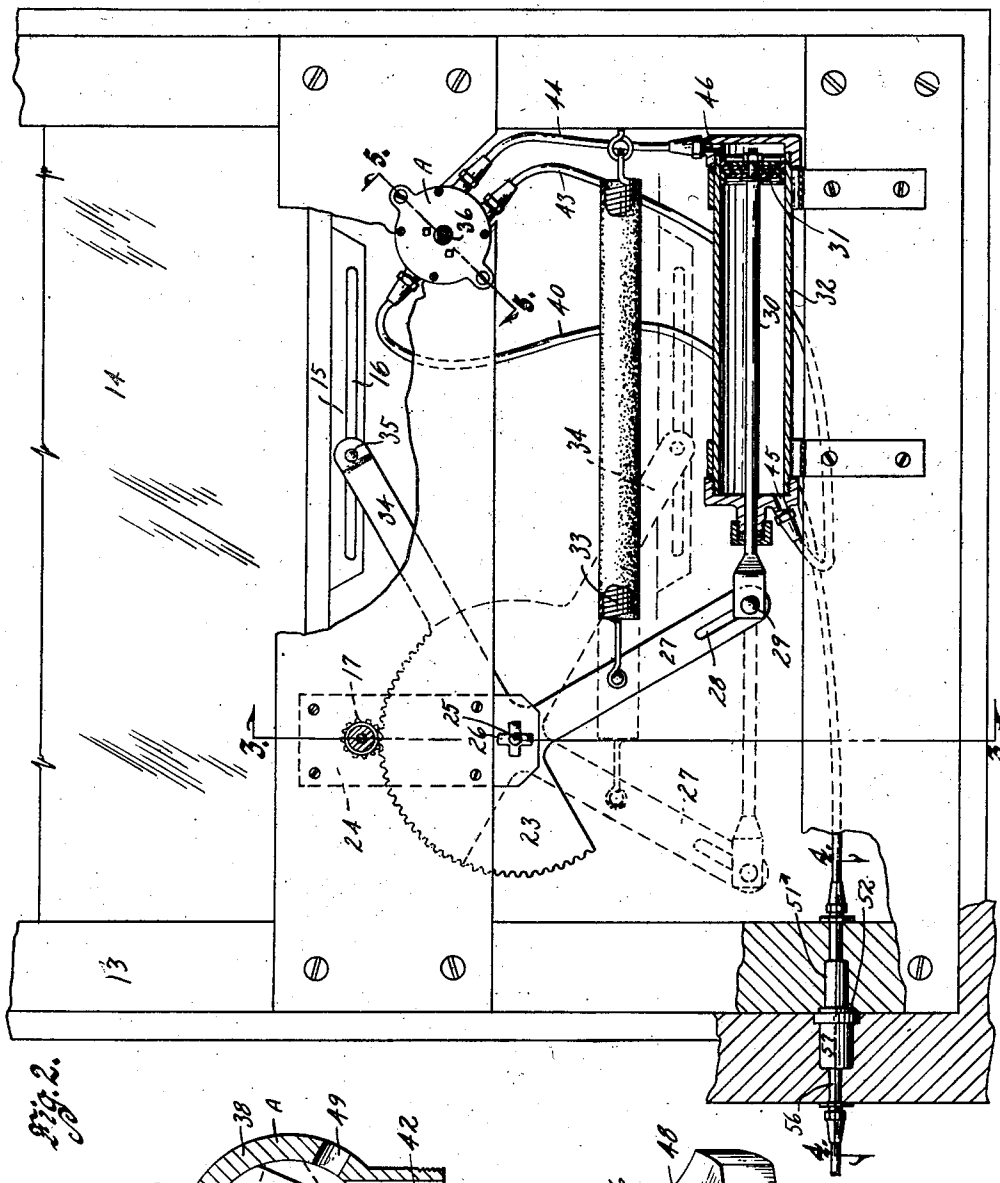


Fig. 2.

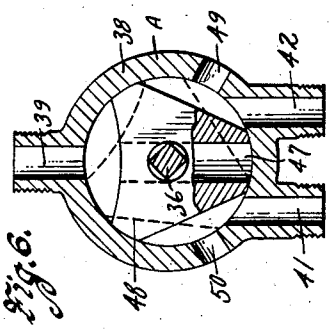


Fig. 6.

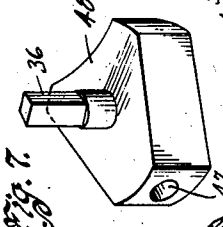


Fig. 7.

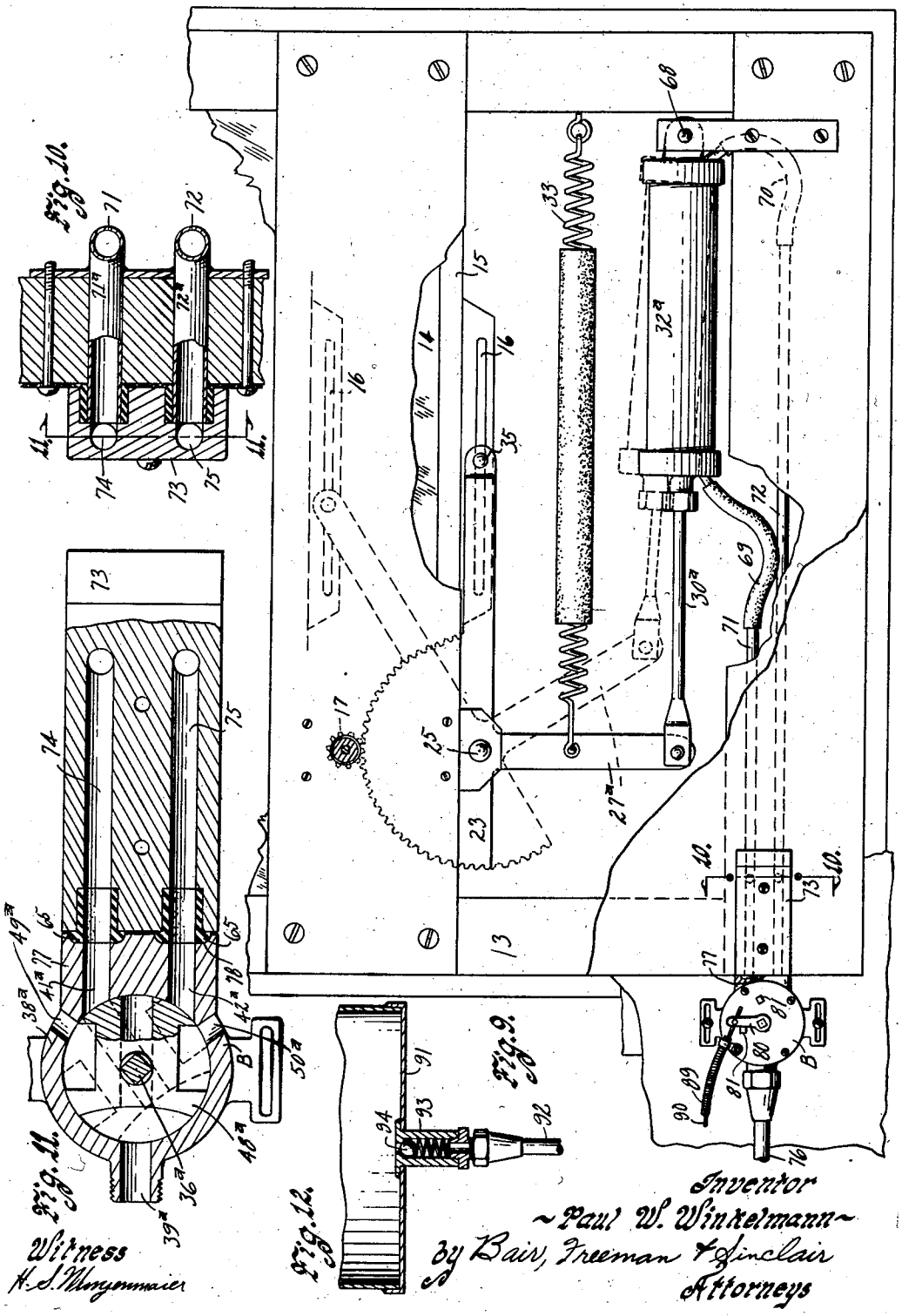
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WINDOW OPERATING DEVICE

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Patented Nov. 21, 1933 1,935,968

UNITED STATES PATENT OFFICE

1,935,968

WINDOW OPERATING DEVICE

Paul W. Winkelmann, Milford, Iowa

Application September 28, 1931
Serial No. 565,482

2 Claims. (Cl. 268—125)

The object of my invention is to provide a simple and effective window operating device adaptable for use wherever vacuum or air pressure is available for practical use.

More particularly, it is my purpose to provide a window operating mechanism particularly adapted for use in raising and lowering the windows of automobiles.

In this connection, it is my purpose to provide an apparatus which may be connected with some vacuum creating mechanism of the car and used for raising and lowering windows.

Another particular object of the invention is to provide means for operating the apparatus on a swinging door.

With these and other objects in view, my invention consists in the construction, arrangement and combination of the various parts of my window operating device, whereby the objects contemplated are attained, as hereinafter more fully set forth, pointed out in my claims, and illustrated in the accompanying drawings, in which:

Figure 1 is a perspective view of part of the interior of an automobile.

Figure 2 is an elevation of a part of the interior of an automobile door, parts being broken away and parts being shown in section.

Figure 3 is a vertical, detail, sectional view taken on the line 3—3 of Figure 2.

Figure 4 is a detailed, sectional view taken on the line 4—4 of Figure 2 but showing the door ajar.

Figure 4A is a perspective view of the check valve operating element for the hinge line construction.

Figure 5 is a sectional view taken on the line 5—5 of Figure 2.

Figure 6 is a sectional view taken on the line 6—6 of Figure 5.

Figure 7 is a perspective view of the valve member.

Figure 8 is a perspective view of the interior of a car, parts being broken away and parts being shown in section for illustrating the manner in which the device may be mounted upon the automobile.

Figure 9 is an elevation of a portion of the inside of the car having installed thereon a slightly modified form of my device.

Figure 10 is a sectional view taken on the line 10—10 of Figure 9.

Figure 11 is a sectional view taken on the line 11—11 of Figure 10; and

Figure 12 is a horizontal, sectional view of the bottom of the vacuum reserve tank.

My invention is illustrated herein as applied to an automobile.

In the drawings, I have shown in Figure 1 a perspective view of a part of the interior of an automobile 10 having the vertically sliding windows 11 and 12. The windows 12 are in the doors of the automobile.

My invention involves apparatus for operating these windows by vacuum or pressure. It is illustrated here as operating from the engine as a vacuum creating means.

In Figure 2, I have shown the inside of the automobile door 13, having the vertically sliding pane of glass 14. This glass has connected with its lower edge a guide element 15, having the horizontally elongated slot 16. There is a substantially standard structure provided for operating such a window. It consists of a suitably mounted toothed pinion 17, journaled on the plate 24 of the door and operated by means of a shaft 18, on which is a handle 20 inside the door. A sleeve 21 non-slidably but rotatably mounted supports the shaft 18, which is angular in outline. The shaft 18 has threaded on its outer end the head 22. This shaft is slidable lengthwise. This shaft is slidable for the purpose of throwing the pinion 17 into and out of gear with the toothed sector 23. This means for throwing the pinion in and out of gear is peculiar to my structure.

The toothed sector 23 is journaled on the supporting plate 24 by means of a shaft 25. I provide a spring washer 26 for holding the sector 23 in any position of its movement. The sector 23 has a projecting arm 27, which in the form of the device shown in Figure 2 has an elongated slot 28, pivoted as at 29 to a plunger stem 30. The stem 30 is connected with a plunger 31 in a fixed cylinder 32.

There is provided the spring 33 connected with the arm 27 and with the frame of the door for balancing the window.

The sector 23 has another arm 34 from which a pin 35 projects into the elongated slot 16.

Thus by operating the sector 23, the window may be raised or lowered. By pushing the shaft 18 inwardly until the pinion 17 meshes with the sector 23, the window may be raised or lowered by hand.

I will now describe the means for operating the plunger for operating the window by power.

Power operating mechanism

The power operating mechanism includes the arm 27, the plunger 31, and the means for connecting them together with the cylinder 32 and the parts now to be described.

A controlling valve is mounted at some suitable location. In Figures 1 and 2, I have shown the controlling valve mounted on the inside of the door. The valve is indicated generally at A and has a stem 36 projecting inwardly and carrying an operating handle 37 (see Figures 1 and 2).

The details of the valve structure are illustrated in Figures 5, 6 and 7.

The valve casing 38 has a passage 39 connected with the vacuum tube 40 and the spaced passages 41 and 42 connected with the tubes 43 and 44. The tube 43 communicates with the interior of the cylinder 32 at one end thereof through the passage 45, and the tube 44 communicates with the interior of the cylinder at its other end through the passage 46.

The tube 40 connects with some vacuum creating means.

It will be seen that the spring 33 normally tends to hold the window up even if there should be some leakage in the cylinder.

If it is desired then to lower the window, the operator grasps the handle 37 and moves it to position where the passage 47 in the valve proper 48 registers with the passage 39 and with the passage 41. This action connects the left-hand end of the cylinder 32 as shown in Figure 2 with the source of vacuum.

The casing 38 has a passage 49 open to atmosphere and when the valve 48 is in the last-mentioned position, the air coming in through the passage 49 can pass through the passage 42 and the tube 44 and the passage 46 to the right-hand end of the cylinder 32. The air pressure forces the piston 31 toward the left, for thus lowering the window 14.

The valve can be readily manipulated for lowering the window any degree desired. If the window is lowered to an intermediate position, it can be held there by turning the valve 48 to its neutral position shown in Figure 6. Thereupon the connection with the source of vacuum is shut off, the casing 38 has an opening 50 to atmosphere, and when the valve it thus turned to its neutral position, both sides of the plunger 31 are subject to equal atmospheric pressure.

If then it is desired to raise the window, the valve is turned to position where its passage 47 registers with the passages 39 and 42 for connecting the right-hand end of the cylinder with the vacuum creating means. Thereupon air enters the left-hand end of the cylinder and forces the plunger or piston to the right for raising the window.

If the window to which the apparatus is connected is in a door, the connection of the tube 40 with the vacuum creating means is a simple matter.

Where the operating mechanism is mounted on the inside of the door, it is necessary to have a suitable connection at the hinge line of the door. The form in which that connection may be embodied will now be described.

Hinge line connection

Referring to Figures 2 and 4, it will be seen that there is mounted in the frame of the door 13, a pipe or the like 51, to which the tube 40 is connected. The pipe 51 has an enlarged portion 51*a* terminating at the edge of the door in a peripheral flange 52 countersunk in the door frame. Screwed into the enlarged portion is a cylinder-like member 53 having the valve operating stem 54 projecting beyond the edge of the door. The member 53 has a number of air passages 55.

In the frame of the car is mounted a pipe or the like 56 having an enlarged portion 57 terminating at the edge of the frame adjacent to the door in an enlarged cup-like member 58. The tube 56 connects with a pipe 59 leading to any suitable source of vacuum. The enlarged portion 57 of the tube 56 has near the cup-like portion 58 an inwardly projecting threaded flange 60 into which is screwed a valve cage 61, having the seat 62 for cooperation with a ball check valve 63 held normally seated by a spring 64. For cooperating with the cup-like member 58, I provide a rubber gasket or the like 65, having the sleeve-like portion 66 projecting into the enlarged part 51*a* of the tube 51 as shown in Figure 4.

The gasket 65 and its sleeve 66 have a passage 67 extending through them for the flow of air.

In Figure 4, the parts are shown with the door slightly open, whereupon the spring 64 will cause the ball check valve 63 to be snugly seated. However, when the door is closed, the member 54 pushes the ball 63 off its seat, and thus leaves the tube 59 in free communication with the tube 40.

The structure shown provides a tight joint when the valve is unseated.

Modified form

In Figures 8 and 9, I have shown a form of my invention involving certain modifications.

The valve B is shown mounted on the frame of the car adjacent the hinge line joint. The construction thus employed is further illustrated in Figures 10 and 11.

In the construction just mentioned, there is provided the cylinder 32*a*, similar to the cylinder 32, but instead of mounting it rigidly on the inside of the door, I pivot it at one end as at 68. The plunger stem 30*a* is then pivoted to an arm 27*a* on the sector 23, which is similar to the arm 27, except that it does not have the elongated slot 28. The piston 32*a* in this form of the device rocks from its position for instance shown by full lines in Figure 9 to its position shown in dotted lines in that figure.

The piston 32*a* has passages at its ends through its wall communicating with tubes 69 and 70, which in turn are connected with pipes 71 and 72. These pipes have at their ends farthest from the cylinder 32*a* portions 71*a* and 72*a* turned at right angles and extended through the door and projected into the block 73 mounted on the inside of the door, extending to the hinge line thereof.

The ends of the tube portions 71*a* and 72*a* communicate with passages 74 and 75 extending through the block 73 and having at their ends farthest from the tube members the gaskets 65 similar to that already described.

The valve B is similar in construction to the valve A with exceptions that will be mentioned. Its casing 38*a* has in its wall a passage 39*a* similar to the passage 39 and connected with a tube 76, which in turn is connected with some vacuum creating means. The casing 38*a* has a short extension 77 through which extend passages 41*a* and 42*a*. The extension 77 is formed at the outer ends of the passages 41*a* and 42*a* with seats 78 for the gaskets 65.

The casing 38*a* has the air passages 49*a* and 50*a* similar to the passages 49 and 50 already described.

The valve 48*a* differs somewhat in shape from the valve 48 as shown best in Figure 11. The stem 36*a* of the valve 48*a* projects through the casing 38*a* and has an arm 80, the movement of which is limited by suitable stops 81. Either type of cylinder may be used with either type of valve.

I have provided means for operating the arm 80 from the steering post near the steering wheel

for mailmen or otherwise, for whom such arrangement might be convenient.

In Figure 8, I have shown a steering post 82 on which is a steering wheel 83. A rod 84 is journaled in brackets 85 and 86 and has the handle 88 near the steering post and the angular extending arm 87 at its lower end.

Suitably mounted is a flexible stiff wire tube 89 of well-known construction. Extending through this is a wire 90, which is connected to the arm 80 and to the arm 87, so that by manipulating the handle 88, the wire 90 may be moved lengthwise for operating the arm 80.

In Figure 8, I have also shown a reserve vacuum tank 91, mounted forwardly of the dash and connected by a tube 92 with the vacuum creating means. Seated in the bottom of the tank 91 (see Figures 8 and 12) and communicating with the interior of the tank is a valve cage 93 in which is a spring-pressed ball check valve 94. The valve cage connects with the tube 92.

It will thus be seen that I have provided a simple and effective apparatus for operating windows, which is particularly adapted for use in operating windows in hinged doors.

In Figure 1, I have shown an apparatus mounted on the inside of a door with the valve operating handle on the door. In the particular type of device shown here, the cylinder is fixed and play is allowed between the plunger stem and the operating arm for the sector 23. In this form of device, there is shown means illustrated in Figures 2 and 4 for making a proper joint provided with a check valve at the hinge line of the door.

I have shown as particularly illustrated in Figure 3 means for operating the window by means of a handle, which means include the pivotal pinion 17 that can be thrown out of gear when desired.

In Figure 9 is illustrated a slightly different form of the invention in which the cylinder has a slight pivotal movement.

I have also shown in Figures 8 and 9 a means for operating the valve from the steering column.

In Figures 8 and 12, I have shown an auxiliary vacuum tank, which may be employed in connection with my invention.

With a device of this kind, the operator simply turns the valve to the proper position and the window is raised or lowered. It may be stopped in any position of its adjustment and there held.

I preferably use the means for manually controlling the window with all forms of my device. Thus the window can be raised or lowered by hand when the engine is not running.

It will be seen that by very slight modifications, it would be possible to use compressed air or steam instead of vacuum for operating an apparatus of this kind.

Changes may be made in the details of the arrangement of the construction of the parts of my window controlling device, and it is my intention to cover by my claims any such changes in the use of any materials or arrangement of parts, which may be within the reasonable scope of my invention.

I claim as my invention:

1. In a window operating device, a pivotally mounted toothed sector, means for operatively connecting the sector with a window, a pinion mounted for movement to and from position for meshing with the sector, a handle for rotating the pinion, and a power device for actuating the sector, whereby the sector may be manually operated or power operated or simultaneously manually and power operated.

2. A suction operated elevating and lowering mechanism for a vertically movable window glass comprising a suction operated actuating element including a reciprocatory member, a window glass elevating and lowering lever including a pair of arms approximately at right angles, means for connecting the outer end of one of said arms to said member, means for slidably connecting the outer end of the other of said arms to the bottom of the window glass, and means for controlling the movement of said member including a manually operable valve for simultaneously establishing communication between said element and the atmosphere and a suction source.

PAUL W. WINKELMANN.