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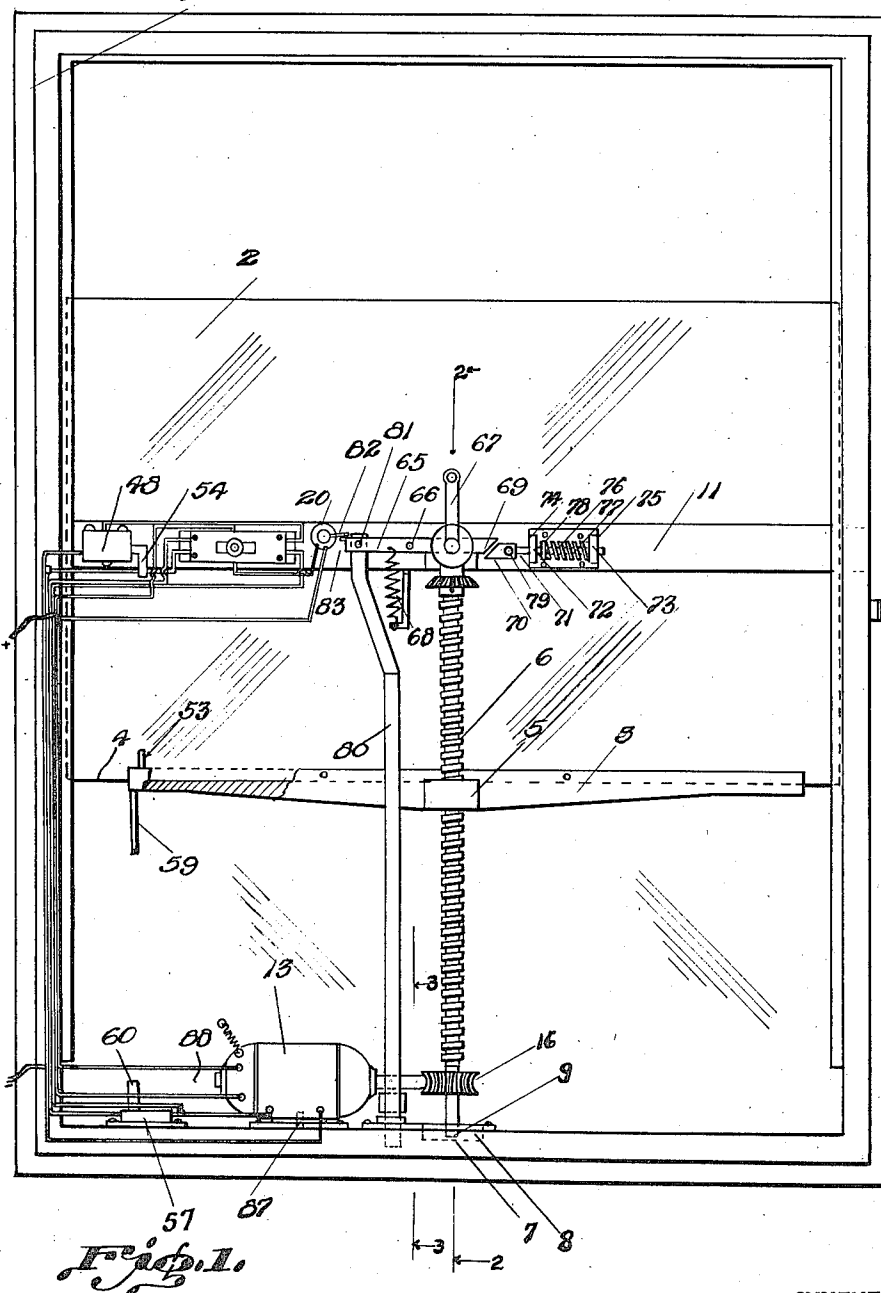
N. L. LARSEN

1,636,519

MOTOR OPERATED WINDOW

Filed Dec. 10, 1924

2 Sheets-Sheet 1



INVENTOR.

NILES L. LARSEN.

BY

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ATTORNEYS.

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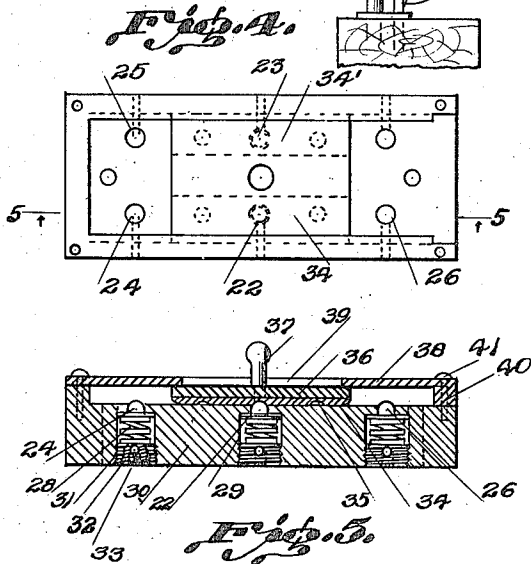
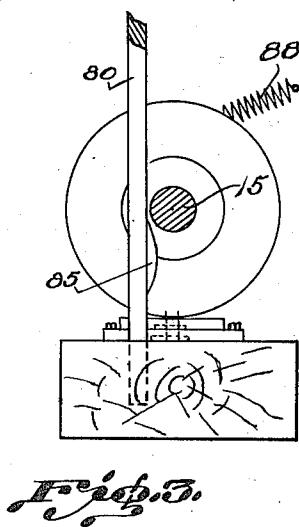
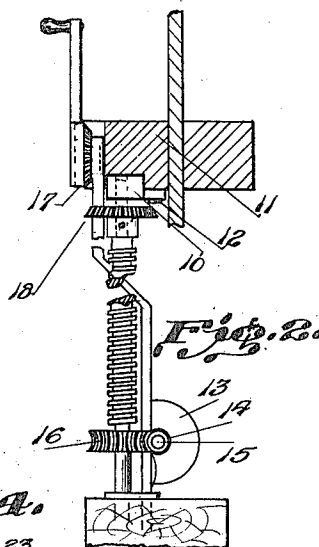
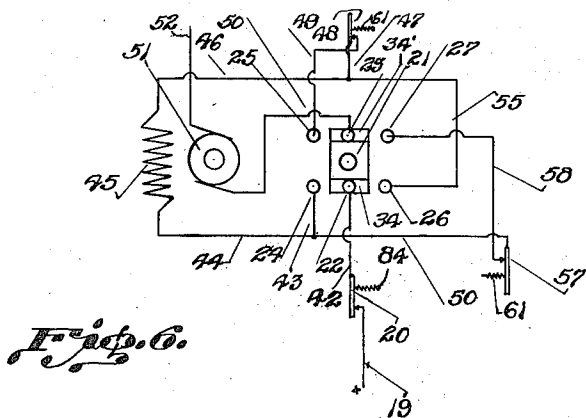
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NILES L. LARSEN

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UNITED STATES PATENT OFFICE.

NILES L. LARSEN, OF OAKLAND, CALIFORNIA.

MOTOR-OPERATED WINDOW.

Application filed December 10, 1924. Serial No. 755,070.

My invention is an improved arrangement for raising and lowering a window and is particularly adapted to operating windows of automobiles, and other vehicles as well as railway carriages. My invention is in the way of mounting and using an electric motor, the mechanism operated thereby and in the control of the motor: and in the manual manipulation of the lifting and lowering devices. My invention may be applied to any of the movable windows and in the specific illustration thereof is used to operate the windows in the doors of an automobile.

The usual type of automobile window is a sheet of plate glass which slides into a housing in the lower panel of the door and it is raised and lowered in some cases by a long screw upon which a nut travels, the screw being operated by a crank and the nut being connected to the sash. My invention comprehends mounting an electric motor in the bottom of the lower panel of the door, mounting a worm on its shaft, driving a worm wheel on the vertical screw and the various electrical and mechanical devices to control the operation.

My invention will be more readily understood from the following specification and drawings in which:—

Figure 1 is an elevation of a door or other frame showing a sliding sash and my electrical mechanism for raising and lowering the sash.

Figure 2 is a vertical section of Figure 1 on the line 2—2 in the direction of the arrows, showing the electrical and manual arrangement for operating the vertical screw, which lifts or lowers the sash.

Figure 3 is a vertical section of Figure 1 on the line 3—3 in the direction of the arrows, showing the cam for disconnecting the worm on the motor shaft from the vertical screw.

Figure 4 is a plan view of the sliding switch to reverse the motor, showing the top plate removed.

Figure 5 is a longitudinal section of the switch on the lines 5—5 Figure 4.

Figure 6 is a diagrammatic sketch of the electric circuits.

In the drawings, the door 1 is of the usual type of automobile door, with a sliding sash 2 illustrated as a sheet of glass. A grooved bracket 3 engages the lower edge 4 of the glass and has a nut formed in its central part 5 through which passes a long screw 6 to

raise and lower the sash. The screw 6 has a bearing 7 at its lower end, preferably formed of a plate 8 having a socket 9: and the upper end of the screw is mounted in a bearing 10 fastened to the cross bar 11 by screws or rivets 12.

The screw 6 is rotated by the electric motor 13, which has a worm 14 on its shaft 15 engaging a gear 16 keyed to the lower end of the screw. The screw may also be manually rotated by the bevel pinion 17 engaging the bevel gear 18 fastened to the upper end of the screw, in a manner hereafter described.

The electric circuit for the motor is as follows: referring to Figure 6:—The positive side of the circuit is indicated by the lead 19, connecting through the main switch 20 to the sliding switch 21, having central terminals 22 and 23, forward terminals 24 and 25 and reverse terminals 26 and 27. The "forward" rotation of the motor signifies an elevating motion of the window and a "reverse" rotation a lowering thereof.

Fuller details of the sliding switch are shown in Figures 5 and 6 in which:—The terminals, 22, 23, 24, 25, 26 and 27 are shown as plugs pressed upward by similar springs 28 in sockets 29 in an insulating base 30, in which is screwed a series of connectors 31 having apertures 32 for the various lead wires and screws 33 in the connectors to bind the wires. A sliding conducting plate 34 and opposite plate 34' are mounted on top of the base 30 and have a series of shallow depressions 35 to engage the various terminals. The plates are shown with an insulating top 36 and a handle 37 and are retained in position by the insulating cover 38, having a slot 39 for the handle, the cover being secured to the base 30 by the insulating rim 40 and screws 41.

The operation of the sliding switch is as follows:—

By means of the handle 37 the conducting plates 34 may be slid to the left or right, at the left making a connection through either plate to the center and left terminals 22 and 24 and 23 and 25 respectively, at the left the connection is through terminals 22 and 26 and 23 and 27 respectively.

Returning to the electric circuits of Figure 6:—

When the sliding switch 21 is moved to the left it puts the motor in "forward" operation to lift the window by circuit from

main switch 20, lead 42, terminal 22, plate 34, terminal 24, leads 43 and 44, field winding 45 leads 46 and 47, top automatic switch 48, lead 49, terminal 25, sliding plate 34', center terminal 23, lead 50 to the motor armature 51 and negative side of the circuit 52, thus causing the motor to turn "forward" and lift the window. When the sash reaches the top position finger 53 on the bracket 3 strikes the plunger 54 of the top automatic switch 48 and opens it, thereby breaking the circuit and stopping the motor. When it is desired to lower the sash the sliding switch 21 is moved to the right, which establishes a circuit from main switch 20, lead 42, terminal 22, sliding plate 34, terminal 26, lead 55, lead 46, through field windings 45 in the "reverse" direction, leads 44 and 56, bottom automatic switch 57, lead 58, terminal 27, sliding plate 34', center terminal 23, lead 50, motor armature 51 and to the negative side of the circuit 52. Thus causing the motor to turn "reverse" and lower the sash. When the sash reaches the bottom position finger 59 on the bracket 3 strikes the plunger 60 of the bottom automatic switch 57 and opens it thereby breaking the circuit and stopping the motor.

The top and bottom automatic switches 48 and 57 are of an ordinary type and remain open only when their plungers 54 and 60 are pressed in, the springs 61 otherwise closing the switches. The sash may be moved and retained in any desired position by placing the sliding switch 21 in neutral or midposition or by manually opening the main switch 20.

The sash may be raised and lowered by manual mechanism, if desired as follows:—

The bevel pinion 17 (see Figs. 1, 2 and 3) is journaled on a rocking bar 65, pivotally mounted by a pintle 66, secured to the cross bar 11 and has an operating crank 67. The bevel pinion is normally held in the upper position, by the spring 68, tensioned between the bar 65 and the door frame or housing of the sash. When the bar is depressed its bevel edge 69 bears against the bevel 70 of the sliding lock rod 71 and pushes this to the right in apertures 72 and 73 in the lugs 74 and 75 on bracket 76 secured to the cross bar 11, against the compression spring 77 between the lug 75 and a collar 78 on the rod 71. After the bevels have passed each other the rod 71 is forced to the left and holds the rock bar 65 depressed, until the handle 79 is moved to the right.

This action raises the cam rod 80, which is pivotally connected to one end 81 of the rock bar 65, and opens the main switch 20 by moving the switch lever 82 by the finger 83 on the bar against the spring 84 to open the switch. The cam 85 on the cam rod, which has sliding movement in the socket 86 at the bottom of the frame, contacts with the shaft

15 of the motor 13 and causes it to swivel on its base 87, in an ordinary way, and disengage the worm 14 from the worm gear 16 of the long screw 6. A spring 88 tensioned between the motor frame and the door frame 70 or sash housing normally retains the connecting worms in engagement. Turning the crank 67 will, when the above described adjustment is made, raise and lower the sash through the bevel pinion 17 and bevel gear 18 on the long screw 6 in the usual manner.

My invention may be considerably changed or modified to suit various kinds of windows without departing from the spirit thereof.

Having described my invention what I claim is:—

1. In a window having a frame, a sash slidable therein, a vertical screw having a screw threaded connection with the sash, gears on the top and bottom of the screw, means to support the screw in the frame, a motor in the frame having a gear engaging the said bottom gear, a manually operated gear to engage the said top gear and means to connect the top or the bottom set of gears.

2. In a motor operated window a frame, a sash slidable therein, a vertical screw operatively connected to the sash, gears on the top and bottom of the screw, a motor having a gear adapted to mesh with the bottom gear, a pivotal mounting for the motor in the frame, a rod slidable in the frame and a cam on the rod to swivel the motor, and a manually operated gear mounted in the frame to engage the top gear on the screw.

3. In a motor operated window a frame, a sash slidable therein, a vertical screw operatively connected to the sash supported in the frame, a motor pivoted in the base of the frame, gearing between the motor and the screw, a rock bar pivoted to the frame, a cam rod with a cam thereon connected to the rock bar, a gear on the top of the screw, a gear mounted on the rock bar and manually operated means to rock the rock bar, swing the motor on its pivot to disengage the gearing between the motor and the screw and to engage the gear on the top of the screw and the gear mounted on the rock bar.

4. In combination with a sliding window, a supporting bracket therefor, a screw for raising and lowering said bracket, an electric motor for operating said screw and means for disengaging said motor from said screw to permit the window to be operated manually.

5. In combination with a sliding window, a supporting bracket therefor, a vertical screw in threaded connection with said bracket, electric means to operate said screw, a crank for manually operating said screw and means operatively connected with said crank to disengage said electric means from said screw.

6. In combination with a sliding window, means for raising and lowering said window, a motor for actuating said window raising and lowering means, and manually controlled means for actuating said window raising and lowering means, said manually actuated means disengaging said motor from said window raising and lowering means.
7. A device of the type described comprising a sliding window, a screw operatively connected to said window for raising and lowering said window, a motor operatively connected to said screw for rotating said screw in either direction, a switch connecting said motor with a source of power for causing said motor to rotate in either direction, stop switches actuated by the moving window for disconnecting said motor from the source of power after the window has traveled between predetermined limits, manually controlled means for actuating said screw, and means connecting said manually controlled means with said motor for disconnecting said motor from said screw when said manually controlled means is operated.
- In testimony whereof I affix my signature.

NILES L. LARSEN.