

July 22, 1941.

J. AMUNDSON

2,249,998

WINDOW OPERATING MECHANISM

Filed Jan. 25, 1939

5 Sheets-Sheet 1

Fig. 2.

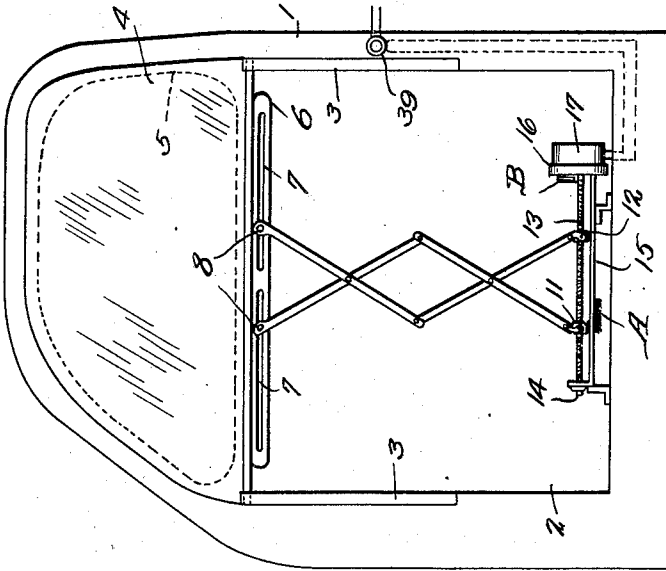
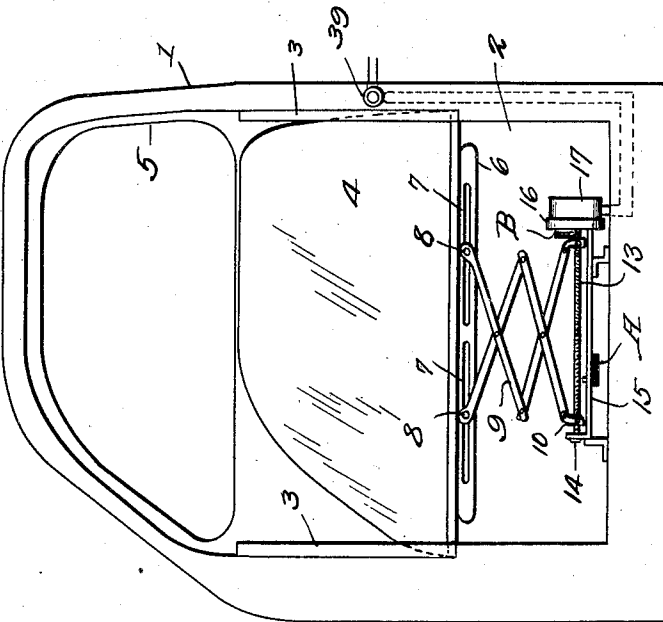


Fig. 1.



John Amundson

INVENTOR.

BY *Chas. Snow*

ATTORNEYS.

July 22, 1941.

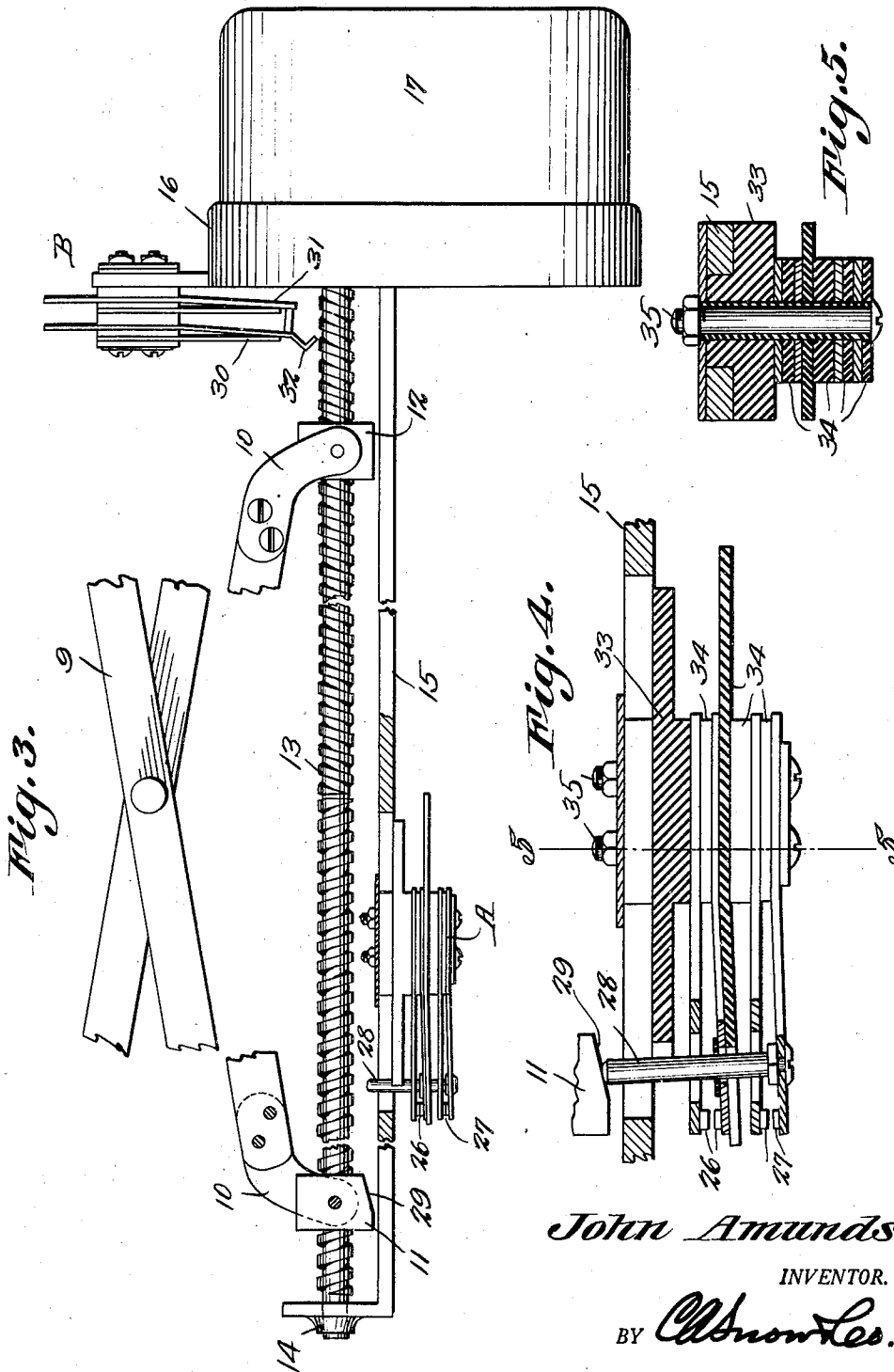
J. AMUNDSON

2,249,998

WINDOW OPERATING MECHANISM

Filed Jan. 25, 1939

5 Sheets-Sheet 2



John Amundson

INVENTOR.

BY *Chas. Snow & Co.*

ATTORNEYS.

July 22, 1941.

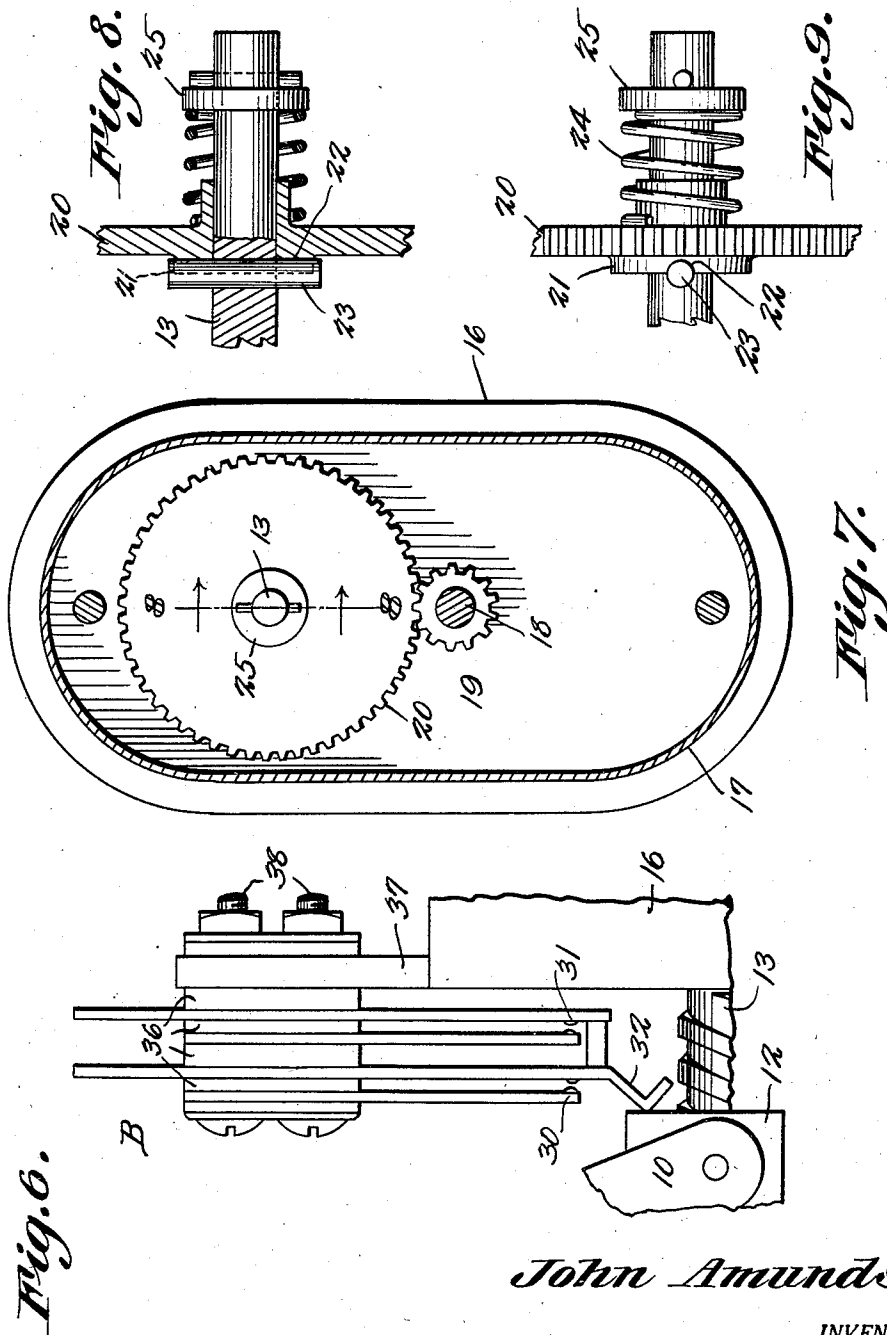
J. AMUNDSON

2,249,998

WINDOW OPERATING MECHANISM

Filed Jan. 25, 1939

5 Sheets-Sheet 3



John Amundson

INVENTOR.

BY *Chas. Snow & Co.*

ATTORNEYS.

July 22, 1941.

J. AMUNDSON

2,249,998

WINDOW OPERATING MECHANISM

Filed Jan. 25, 1939

5 Sheets-Sheet 4

Fig. 13.

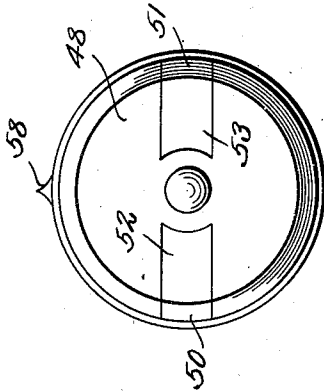


Fig. 12.

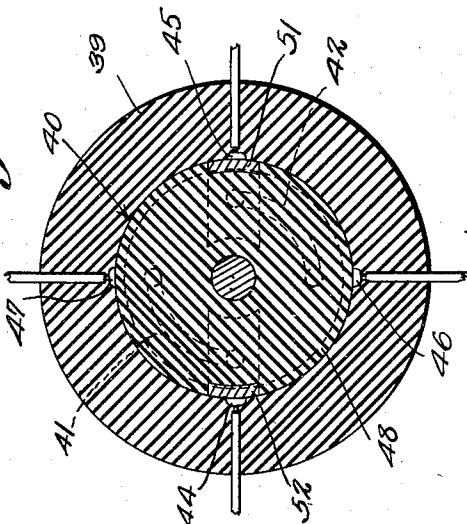


Fig. 10.

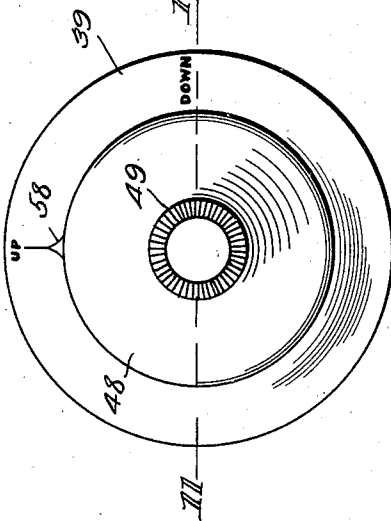


Fig. 14.

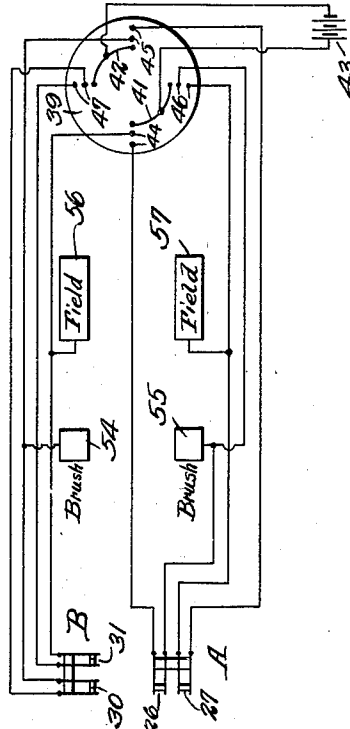
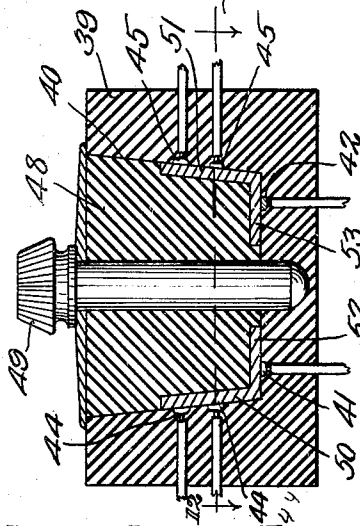


Fig. 11.



John Amundson
INVENTOR.

BY *Chas. H. Leo.*
ATTORNEYS.

July 22, 1941.

J. AMUNDSON

2,249,998

WINDOW OPERATING MECHANISM

Filed Jan. 25, 1939

5 Sheets-Sheet 5

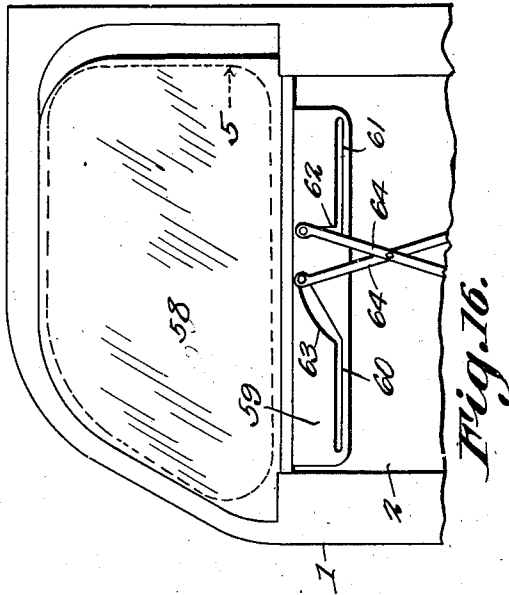


Fig. 15.

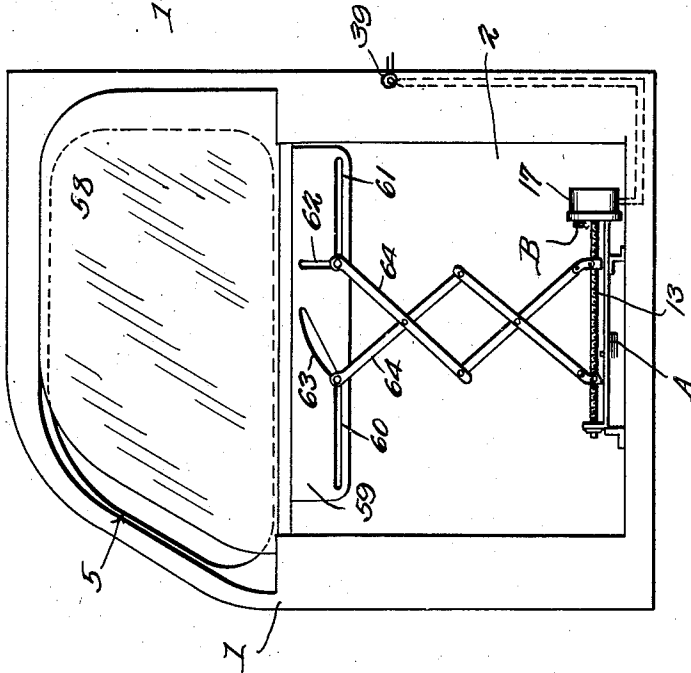


Fig. 16.

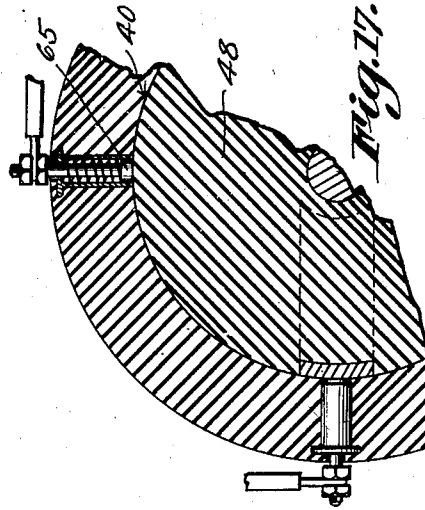


Fig. 17.

John Amundson

INVENTOR.

BY *CA Snow & Co.*

ATTORNEYS.

UNITED STATES PATENT OFFICE

2,249,998

WINDOW OPERATING MECHANISM

John Amundson, Faulkton, S. Dak.

Application January 25, 1939, Serial No. 252,823

1 Claim. (Cl. 268—124)

This invention relates to mechanism designed primarily for operating automobile windows although it is to be understood that it can be used also for operating windows in buildings and for opening and closing sliding doors.

An object of the present invention is to provide a motor-actuated feed screw having a lazy-tong connection with the member to be actuated, said motor being reversible whereby the window or other structure can be shifted in any desired direction.

A still further object is to provide an arrangement of switches whereby the operation of the motor will be stopped as soon as the window or other structure being shifted reaches either limit of its movement.

A still further object is to provide a novel form of switch by which the operation of the motor can be controlled by the operator so as to bring the movement of the window to a stop before its limit of movement is reached.

A still further object is to provide relief means for preventing injury to the mechanism such as might result from continued operation of the motor after the window has ceased to move.

A still further object is to provide simple and compact operating mechanism which can be installed readily in a door or other part of a motor vehicle or within the wall of a building or other structure.

With the foregoing and other objects in view which will appear as the description proceeds, the invention consists of certain novel details of construction and combinations of parts herein-after more fully described and pointed out in the claim, it being understood that changes may be made in the construction and arrangement of parts without departing from the spirit of the invention as claimed.

In the accompanying drawings the preferred form of the invention has been shown.

In said drawings

Figure 1 is an elevation of the frame of an automobile door in which is shown the mechanism constituting the present invention, the window being shown open.

Figure 2 is a similar view showing the window closed.

Figure 3 is an enlarged view partly in elevation and partly in section of a portion of the window-operating mechanism.

Figure 4 is an enlarged vertical longitudinal section through the bottom switch used for reversing the motor.

Figure 5 is a section on line 5—5, Figure 4.

Figure 6 is a side elevation of the other motor reversing switch.

Figure 7 is a section through the gear case of the motor showing the means for transmitting motion from the motor shaft to the operating screw.

Figure 8 is a section on line 8—8, Figure 7.

Figure 9 is a plan view of the structure shown in Figure 8.

Figure 10 is an elevation of the controlling switch for use by the operator.

Figure 11 is a section on line 11—11, Figure 10.

Figure 12 is a section on line 12—12, Figure 11.

Figure 13 is an elevation of the inner or small end portion of the switch showing the opposed contacts thereon.

Figure 14 is a view showing in diagram the wiring of the switches and motor.

Figure 15 is an elevation of a modified arrangement of mechanism whereby a window can be given a sliding movement after being fully raised, the raised window being shown in position prior to said sliding movement.

Figure 16 is a view similar to Figure 15 showing the position of the window after it has been slid to closed position.

Figure 17 is an enlarged section through a portion of the switch showing some of the contacts, said contacts being of slightly modified construction.

Referring to the figures by characters of reference 1 designates a window frame which, in the present instance, comprises a portion of an automobile door having a recess 2 provided with opposed guides 3 in which the window 4 is slidably mounted. This window is adapted to be concealed within recess 2 when the window is open but to move from said recess and across the window opening 5.

To the lower edge of the window 4 is attached a strip 6 provided with longitudinal slots 7 and movably mounted in the respective slots are studs 8 projecting from the upper ends of a lazy-tongs 9 also housed in recess 2. The lower ends of the lazy-tongs, as shown particularly in Figure 3, are provided with downwardly extended forks 10 which straddle and are pivotally connected to nuts 11 and 12 respectively. These nuts are mounted on a feed screw 13 one end of which is journaled in a bearing 14 at one end of a base strip 15 while the other end of the screw extends into and bears within a gear case 16 provided at one end of a motor housing 17. The shaft 18 of the motor in the housing has a gear 19 which is in constant mesh with a large gear

20. This large gear has a hub 21 formed with a diametrical groove 22. A pin 23 extends diametrically through the adjacent portion of screw 13 and a spring 24, which is mounted on the screw thrusts at one end against gear 20 and at its other end against a collar 25 fastened on the screw. Thus gear 20 normally is pressed against pin 23 so that said pin will be seated in groove 22. Consequently, under ordinary working conditions, gear 19, while rotating, will rotate gear 20 which, in turn, will drive the screw 13. However should the screw meet with excessive resistance to its rotation, the hub 21 would be pushed away from pin 23 against the action of spring 24 so that gear 20 thus could rotate independently of the screw.

Screw 13 is provided with a left-hand thread extending from one end to the center thereof and a right-hand thread extending from the center to the other end thereof. One thread is engaged by the nut 11 while the other thread is engaged by the nut 12. Obviously, therefore, when the screw is rotated in one direction, the two nuts will be fed toward each other and will cause the lazy-tongs to operate so as to thrust the window 4 into position to close the opening 5. When the screw is rotated in the opposite direction, however, the nuts will be moved apart, thereby contracting the lazy-tongs and withdrawing the window from the opening 5.

A double switch having separate pairs of contacts 26 and 27 is secured to the base strip 15 and has a pin 28 extending into the path of nut 11, said nut being preferably beveled, as at 29, so that at the instant the window 5 is closed by the operation of the lazy-tongs, nut 11 will shift pin 28 so as to break the electrical connection at both contacts 26 and 27.

Arranged within the path of the nut 12 where it will be operated when said nut is moved its maximum distance away from nut 11, is another double switch including separate pairs of contacts 30 and 31 having a pressure receiving member 32 adapted to be engaged by nut 12 so as to break the electrical connections at both pairs of contacts 30 and 31. Normally, however, when the nut 12 is out of said extreme position, the contacts are closed together as shown so that circuits can be completed therethrough.

As has been shown in the drawings the respective switches are insulated from the supporting structure. For example the double switch A which includes the contacts 26 and 27 can be mounted on a block 33 of insulating material and the several contacts and the interposed insulation strips which have been indicated at 34, can all be held together and to the base strips 15 by a bolt 35 insulated from all of the parts as shown in Figure 5. These bolts and pin 28 are adjustable in slots for proper placing of the switch. A somewhat similar arrangement is provided for the other double switch indicated at B where suitable insulating portions 36 are interposed between the metal parts of the switch, all parts of the switch being jointed to a supporting bracket 37 by bolts 38 which can be insulated from the metal parts in the same manner as has been shown in Figure 5.

In Figures 10 to 13 there has been illustrated in detail a special form of switch to be operated by hand whereby the circuit to the motor can be broken and the window can be moved either upwardly or downwardly at the will of the operator. This special switch includes a socket member 39 having a tapered recess 40. In the end

wall of this recess are stationary contacts 41 and 42 in the form of opposed arcuate plates concentric with the center of the recess and these plates are electrically connected to the respective terminals of battery 43.

Located on the wall of recess 40 are opposed pairs of contacts 44 and 45 and located between these contacts and equidistant therefrom are opposed pairs of contacts 46 and 47. The contacts of each pair are located one above the other.

A movable switch member in the form of a plug 48 is rotatably mounted within recess 40 and is provided with a knob 49 whereby it can be rotated readily in the recess. This rotatable member has opposed contact strips 50 and 51 embedded therein at diametrically opposed points and provided with extensions 52 and 53 which project partly across the end of the plug or movable member 48 so that they can engage the respective contacts 41 and 42. The strips 50 and 51 are so positioned that they can be used to electrically connect the contacts of either of the pairs 44 and 45 or 46 and 47.

The motor used in connection with this apparatus can be of any desired type but it is preferred to use a series-wound motor because of its starting torque properties and because its brushes are all properly centered so that the armature can be started in either direction for reversal of the tongs. However the type of motor used and the size thereof will be dependent upon the conditions present. In Figure 14 the respective brushes of the motor have been indicated at 54 and 55 while the fields have been indicated at 56 and 57. The several parts can be electrically connected as indicated in Figure 14 and the operation will be as follows:

When it is desired to raise the window, the operator turns knob 49 until an index or pointer 58 carried thereby is brought to a predetermined position which, for example, can be designated by the word "up." At this time the circuit will be closed through the contacts 47 and 46 and the motor caused to rotate in one direction so as to move the nuts 11 and 12 toward each other and cause the lazy-tongs to be extended as in Figure 2. The extension of the tongs will be gradual and the window will be gradually moved to position across opening 5. Should it be desired to stop the movement of the window before it is entirely closed, all that is necessary is for the operator to return the movable member of the switch to its initial position so as to break the circuit to the motor. However should the switch be left in the "up" position, the window 4 would continue to move until it reaches full closed position at which time the beveled face 29 of nut 11 would contact with pin 28 and break the circuit to the motor by moving apart the contacts 26 and the contacts 27.

Thereafter should it be desired to open the window, the operator turns the movable member 48 of the switch until brought to the "down" position whereupon electrical connections will be made by the strips 50 and 51 at the contacts 44 and 45. This will result in the rotation of the motor in the opposite direction and, consequently, the lazy-tongs 9 will be retracted so as to move the window 4 away from full closed position. At any time during this movement the circuit to the motor can be broken by the operator turning the member 48 to its intermediate or neutral position. However should the member 48 be retained in "down" position, the movement of the window to full open position would continue until nut

12 has contacted with brush member 32. This would cause the electrical connections between the contacts 30 and the contacts 31 to be broken so that the motor would be stopped.

As before stated, the mechanism herein described is especially suited for use in operating the windows of automobiles. It will be obvious, however, that it can be used also for operating windows of buildings and also for opening and closing doors. It is also to be understood that the connections between the nuts on the screw 12 and the windows or doors of buildings or other structures, can be varied to meet the requirements.

Some types of automobiles and the like have sliding windows which, after being raised, are thrust transversely of the frame. This is true for example of "Ford" and "Plymouth" automobiles. For the purpose of obtaining this compound movement, it is intended to provide a structure such as shown for example in Figures 15 and 16. By referring to said figures it will be noted that the window 58 has its bottom flange 59 provided with spaced alining slots 60 and 61. That end of slot 61 nearest the center of the flange is formed with a vertical extension 62 while that end of slot 60 is provided at its inner end with an inclined extension 63. The upper arms of the lazy-tongs 64 are in sliding engagement with the slotted portion of the flange and operate as heretofore stated to raise the window to closed position. In the modified construction shown in Figures 15 and 16, however, the lazy-tongs, after bringing the window 58 to its fully raised position, can continue to fold so that the upper end of one arm 64, while moving upwardly within the vertical extension 62 will exert a thrust longitudinally of flange 59, thereby causing the window 58 to slide into fully closed position from the location shown in Figure 15 to the one shown

in Figure 16. During this movement the upper end of the other arm 64 of the lazy-tongs will work freely within the inclined extension 63 of slot 60. When the lazy-tongs are retracted, the foregoing operation is reversed, the window 58 being pulled out of the position shown in Figure 16 to the position shown in Figure 15 after which it is drawn downwardly as heretofore explained.

Another modification of the invention has been illustrated in Figure 17 wherein the contacts 65 have been shown spring-pressed so as to maintain intimate engagement at all times with the adjacent surface of the rotatable member of the switch. These contacts can be used in lieu of the contacts 41, 42, 44, 45, 46 and 47.

What is claimed is:

In a vehicle construction, a panel having a recess therein and also having an opening there-through, a window slidable in said recess and across said opening, said window having a flange secured thereto at its bottom edge and said flange having slots therein, an electric motor positioned in said recess adjacent the lower portion thereof, a reversely threaded shaft extending outwardly from said motor and along the lower portion of said recess, a support for said shaft and motor comprising an elongated bar extending beneath said shaft and having an end of said shaft journaled therein, said bar having legs spacing it above the bottom of said recess, lazy tongs threadedly connected with said reversely threaded shaft and also being connected with the slots in said bottom window flange, a control switch for said motor located on said bar and extending downwardly therefrom between said bar and the bottom of said recess, means on said lazy tongs for operating said switch, and a manual control switch positioned exteriorly of said recess panel.

JOHN AMUNDSON.