Jan. 5, 1932. W. LAPATOFF 1,839,232

DOOR OPENING MECHANISM

Filed Sept. 25, 1929 2 Sheets-Sheet 1

Fig. 1.

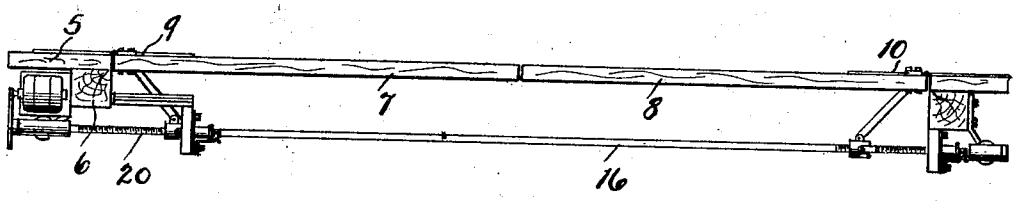


Fig. 3.

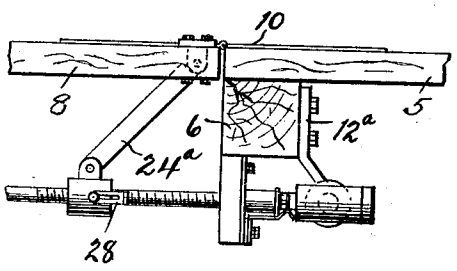


Fig. 4.

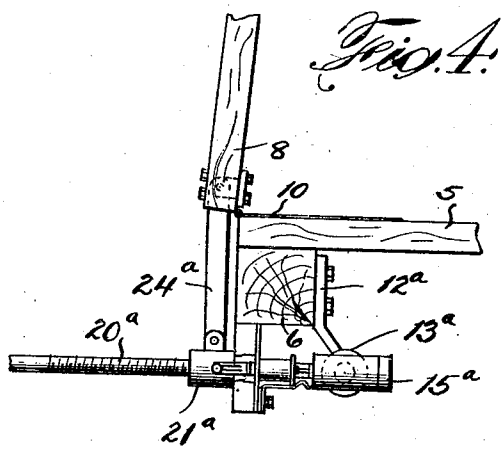
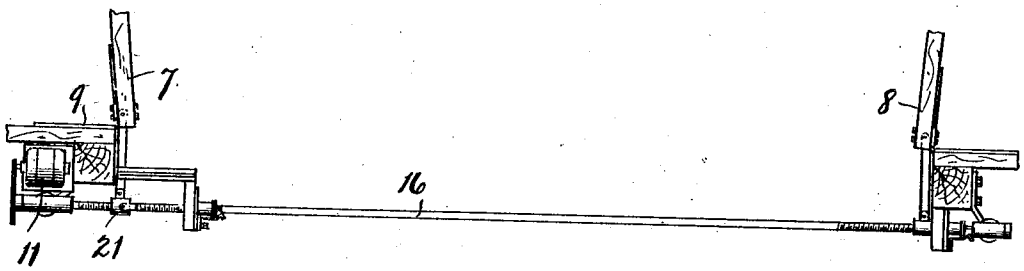


Fig. 2.



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Fig. 5.

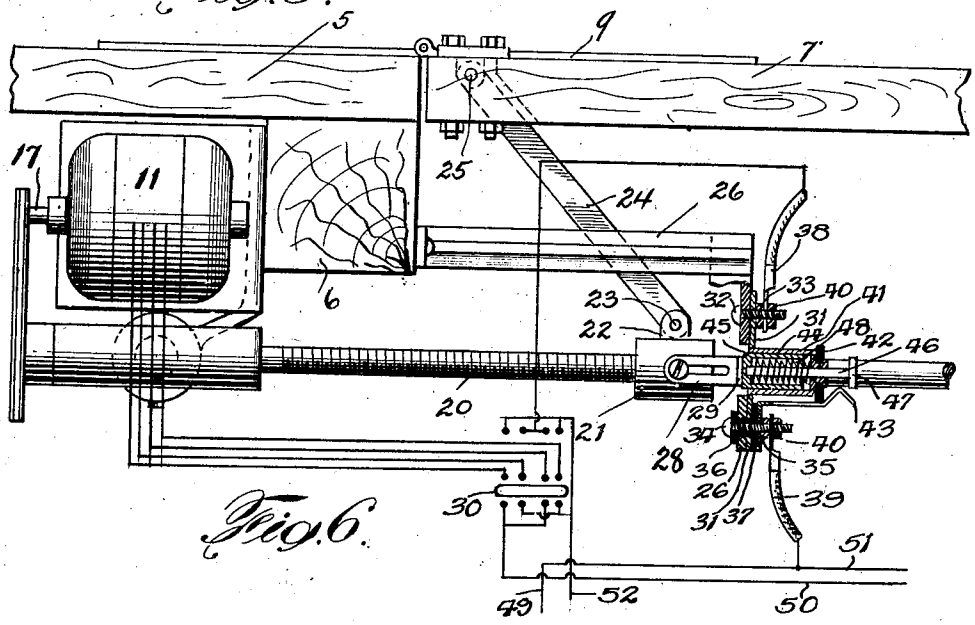
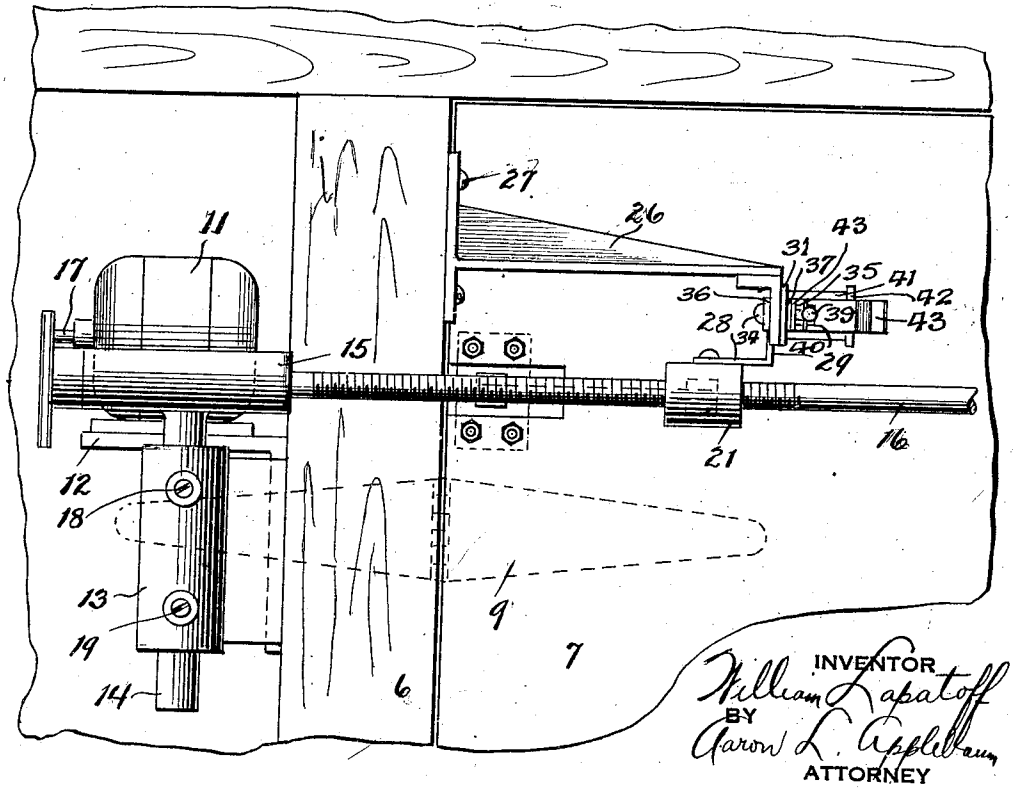


Fig. 6.



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UNITED STATES PATENT OFFICE

WILLIAM LAPATOFF, OF NEW YORK, N. Y.

DOOR OPENING MECHANISM

Application filed September 25, 1929. Serial No. 395,025.

This invention relates to door operating mechanism and has for its primary object to provide a novel and improved, simplified structure adapted to be installed to open and close garage doors of private and public garages.

One of the objects of my invention is to provide a motor driven door operating mechanism constructed and arranged preferably on the interior and adjacent the top of outwardly swinging garage doors including provision for automatically making and breaking an electric circuit to the motor when the doors have reached their fully open and closed positions.

More specifically, my invention resides in an automatic electrically operated door opening and closing construction including a single rotatable shaft having feed nuts thereon movable in opposite directions, each of said nuts having a lever connected to a swinging door to open and close the same.

To enable others skilled in the art to more fully comprehend the underlying features of my invention, reference is had to the accompanying drawings forming a part of the specification in which

Fig. 1 is a top plan illustrating my invention associated with a pair of hinged doors.

Fig. 2 is a view similar to Fig. 1 but showing the doors in their open positions.

Fig. 3 is a top plan showing the right hand door in its closed position.

Fig. 4 is a view similar to Fig. 3 showing the door in its open position.

Fig. 5 is an enlarged detail view showing the left hand door and its relation to the motor and rotatable shaft.

Fig. 6 is a front, inside view showing the motor mounting or support and its relation to the driven shaft.

Referring now to the drawings wherein like reference characters designates corresponding parts throughout the several views, 5 designates a portion of the front wall of a garage or building and 6 a corner beam or support. The outwardly swinging complementary doors, 7, 8, are preferably connected to the front wall by means of strap hinges 9, 10. Referring particularly to Figs. 5 and 6 of the drawings, an electric motor 11 is mounted on an inverted L-shaped bracket 12 preferably attached to the outside surface of the vertical beam or support 6, said bracket having a bearing or sleeve 13 for a vertical shaft 14. Preferably integral with a shaft 14, is a horizontal bearing 15 for a right and left hand threaded, rotatable screw shaft 16. On the outer end of the shaft 16 there is mounted a pulley wheel, which may be driven by a belt trained over a similar pulley wheel on the motor shaft 17. Instead of a pulley and belt construction for driving the shaft 16, by the motor 11, a gear and worm wheel may be provided to accomplish the same result. The shaft 16 and its bearing are vertically adjustable in that the vertical shaft 14 may be raised or lowered in the bearing or sleeve and held secure by screws 18, 19.

On the left hand threaded portion 20 of the shaft 16, I provide an internally threaded feed nut 21 having lugs 22 formed therewith to which is pivotally connected at 23 one end of an arm 24, the opposite end of said arm being in turn fulcrumed upon a bracket mounted upon the outside of, and extending into a clearance opening in the door 7 as indicated by numeral 25.

A supporting bracket 26 fastened to the outside surface of the vertical beam or support 6, as at 27, carries a circuit breaker or circuit closing device which is offset from the shaft 16 as clearly shown by Figs. 5 and 6 of the drawings. The feed nut 21 is provided with a slotted extension plate 28, the arm 29 of which is adapted to cooperate with the closing device to break the circuit and stop the operation of the motor when the door 7 is in its maximum fully closed position.

The opposite complementary door 8 being similarly connected by an arm 24*a* to a feed nut 21*a* opens and closes simultaneously with the door 7, the feed nut 21*a* however being operable and movable toward the right on the right hand threaded portion 20*a* of the shaft. A bracket 12*a* attached to the opposite post 6 carries a bearing 13*a* and sleeve 15*a* in which the opposite end of the screw shaft is rotatably supported. The post 6

also supports a circuit making device, in circuit with the motor. It will of course be understood that the circuit making and breaking devices may be interchanged or associated with the opposite doors. In actual practice the circuit may be closed from a switch 30 at some point exterior of the garage doors as in a drive way.

The circuit making and breaking devices, or switches, by means of which the operation of the motor is automatically controlled when the doors approach, and are in, the extreme positions of opening or closing, may be operated by one of the feed nuts 21 and 21*a*, or, as shown in the drawings, each one of these feed nuts may operate one of the circuit making and breaking devices. In the drawings, the feed nut 21*a* engages upon a circuit making and breaking device when the doors are in a fully opened position. The feed nut 21 engages upon a circuit making and breaking device or switch when the doors are closed. The circuit making and breaking devices or switches, operated by the feed nuts 21 and 21*a*, are similar in construction, and the latter one is shown in enlarged detail in Figs. 5 and 6.

The base 31 of the circuit making and breaking device is fastened upon the bracket 26 by means of a bolt 32 and a nut 33, and, at its other end, by a bolt 34 and a nut 35; the bolt 34 and the nut 35 are, however, insulated from the bracket 26 and from the base 31 by a bushing 36 and a washer 37. By means of the lugs and wires 38 and 39, which are clamped onto the bolts 32 and 34 by nuts 40, the circuit making and breaking device is connected into the operating circuit.

From the base 31 extends an inverted cup 41, upon the bottom of which is mounted a large insulating disc 42. A contact spring 43 is insulatedly clamped upon the bracket 26 and the base 31 by being clamped onto the washer 37 below the nut 35 on the bolt 34. The contacting spring 43 is tensioned towards the cup 41 and normally rests upon the insulated disc 42. A shell 44 is slidably inserted into the open end of the cup 41. The base 45 of said shell normally extends out from the cup 41 and is engaged in abutment by the arm 29 of the extension plate 28, when the feed nut 21 is in the position of Figs. 5 and 6, i. e., the door is closed. From the base 45 extends, on the inside of the shell 44, a piston 46 with a head 47. The piston 46 is slidably supported by the cup 41 and a compression spring is arranged around said piston on the inside of the shell 44. The ends of the compression spring 48 rest upon the bottom of the shell 45 and the cup 41, and that spring tends to push the shell 45 out of the cup 41. When the shell 44 and the piston 46 are not pushed into the position of Figs. 5 and 6, by the arm 29, the shell and piston are slid to the left, the head 47 of the piston 46 stopping the movement when it comes to rest in abutment against the outside of the base of the cup 41. In that position of the piston, the contact spring 43 rests upon the head 47 and an electric contact is thereby established between the wires 48 and 49; whereas the circuit between said wires 48 and 49 is broken, when the contact spring 43 and the sliding parts of the circuit making and breaking device are in the positions of Figs. 5 and 6.

The wires 38 and 39 of the circuit making and breaking device of Figs. 5 and 6 connect to the four-pole, double-throw switch 30 and the current feeder 49, respectively; the connecting wires 50 and 51 of the circuit making and breaking device, upon the right side of the door, which is operated by the feed nut 21*a*, also connect to the switch 30 and the current feeder 49, respectively. But the wire 50 is connected to the opposite side of the switch 30, so that one of the circuit making and breaking devices is connected into the circuit which supplies power for normal rotation to the motor 11, from the current feeders 49 and 52, whereas the other circuit making and breaking device is connected into the circuit which serves for the reverse operation of the motor.

When the doors are in an intermediary position, both circuit making and breaking devices are closed. The circuit which rotates the shaft 20 in such direction, so that the feed screws 21 and 21*a* move towards each other, is connected in series with the circuit making and breaking device of Fig. 6, so that the said circuit is opened when the two feed nuts reach their closest position and the doors are shut. Figs. 5 and 6 show that position of the operation of my device. But in the view of Fig. 5 the switch 30 is thrown down, so that the other circuit, which includes the closed circuit making and breaking device at the right side of the door, is closed, and the rotation of the shaft 20 starts to move the feed nuts 21 and 21*a* away from each other. As soon as the feed nut 21 is moved for a short distance to the left, the circuit of the circuit making and breaking device, which is controlled by said feed nut, closes, whereas the other circuit making and breaking device is opened when the feed nuts 21 and 21*a* reach their furthest position apart, when the door is open. When that happens, the motor comes to a stop, and the circuits are open until the double throw switch 30 is thrown up and the operation of the motor closes the door again. In this manner the function of my device requires manual operation of the reversing switch 30 only. That switch is only used to start the opening operation when the door is closed or to start the closing operation when the door is open, the current supply for the respective operations being automatically shut off at the end of said operations by the feed nuts 21 and 21*a*, respectively.

While I have shown and described my invention with some degree of particularity, it will be realized that other modifications and changes may be resorted to under special conditions. I therefore do not wish to be limited and restricted to the exact details shown and described but reserve the right to make such changes and modifications as may fairly fall within the scope of the subject matter now being claimed.

Having shown and described my invention, what I claim as new and desire to secure by Letters Patent is:—

A double door operating mechanism comprising in combination a pair of hingedly connected, outwardly swinging doors, a motor, a right and left threaded screw shaft connected by a belt drive to said motor, end bearings for said shaft, a vertical shaft formed with each of said end bearings, a sleeve for each of the vertical shafts and means for vertically and angularly adjusting said bearings, internally threaded feed nuts on said screw shaft operable in unison, pivoted arms connecting the feed nuts to said doors to open and close the same and means carried by said feed nuts to open and close a circuit to the motor to interrupt the operation of the screw shaft when said doors are in their fully opened and closed positions.

In testimony whereof I affix my signature.

WILLIAM LAPATOFF.