

A. H. OTIS.
DOOR OPERATING DEVICE.

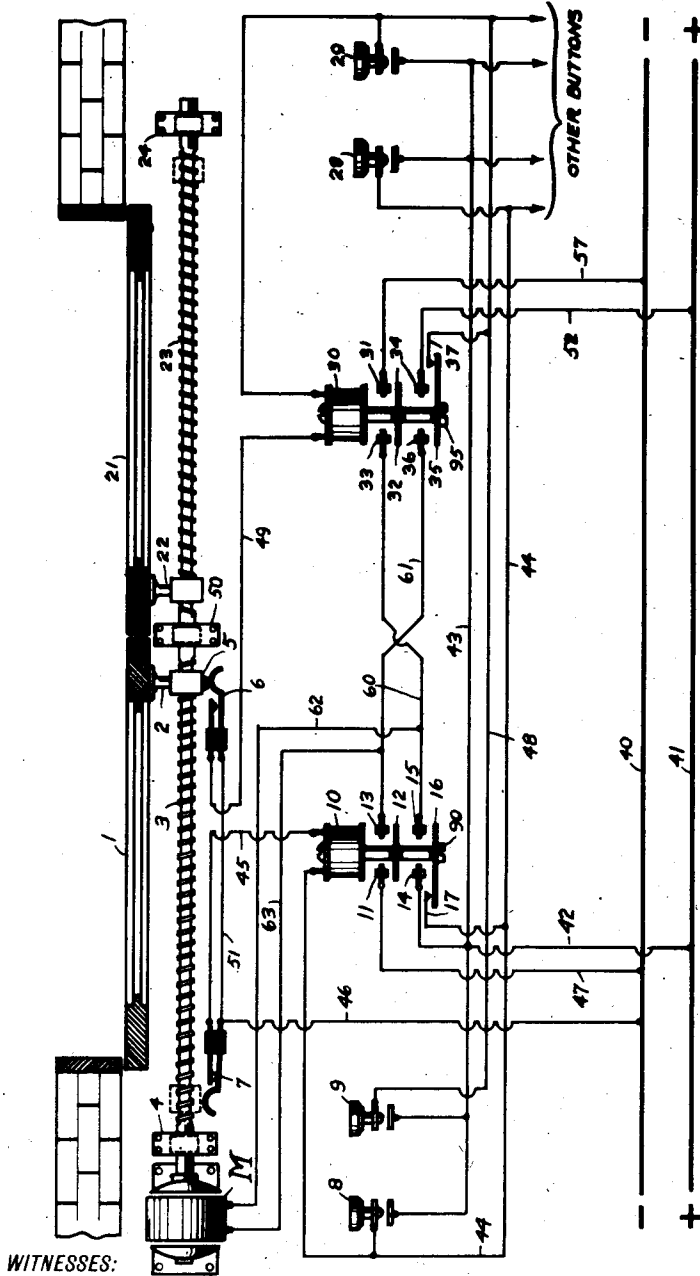
APPLICATION FILED AUG. 7, 1915. RENEWED DEC. 19, 1916.

1,215,573.

Patented Feb. 13, 1917.

2 SHEETS—SHEET 1.

Fig-1



WITNESSES:

Anna McBurne
Arthur Jeffery

INVENTOR

Arthur H. Otis

BY

Joseph L. Wright
ATTORNEY

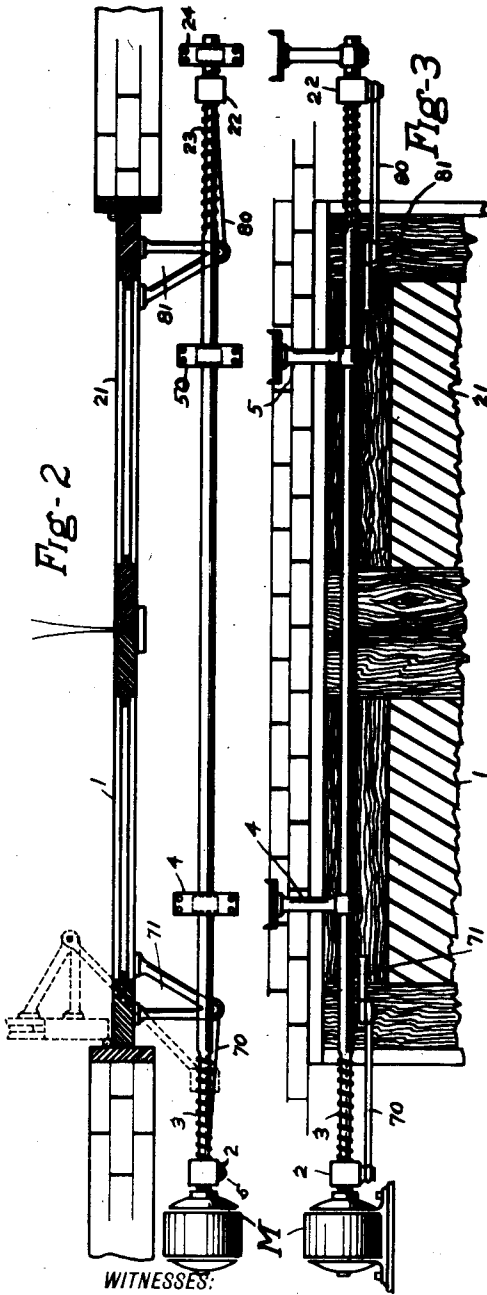
A. H. OTIS.
DOOR OPERATING DEVICE.

APPLICATION FILED AUG. 7, 1915. RENEWED DEC. 19, 1916.

1,215,573.

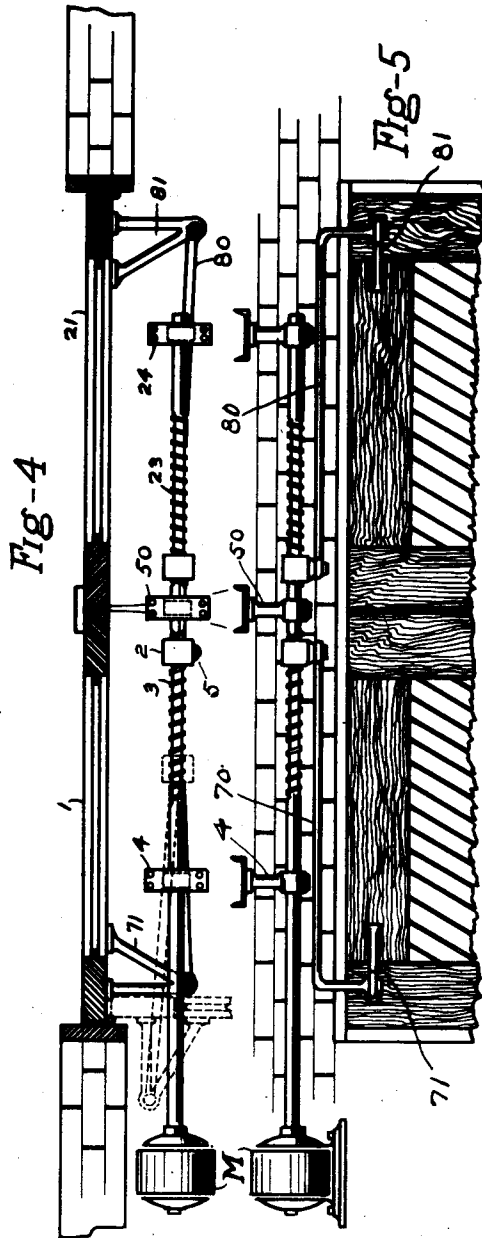
Patented Feb. 13, 1917.

2 SHEETS—SHEET 2.



WITNESSES:

Anna McGinnis
Arthur Jefferys



INVENTOR

Arthur H. Otis

BY

Joseph L. Wright
ATTORNEY

UNITED STATES PATENT OFFICE.

ARTHUR H. OTIS, OF CLEVELAND, OHIO.

DOOR-OPERATING DEVICE.

1,215,573.

Specification of Letters Patent.

Patented Feb. 13, 1917.

Application filed August 7, 1915, Serial No. 44,270. Renewed December 19, 1916. Serial No. 137,911.

To all whom it may concern:

Be it known that I, ARTHUR H. OTIS, a citizen of the United States, residing at Cleveland, in the county of Cuyahoga and State of Ohio, have invented certain new and useful Improvements in Door-Operating Devices, of which the following is a specification.

My invention relates to improvements in operating doors or gates. The invention has for its object means for automatically opening and closing doors by means of a suitable mechanism controlled from a distant point or points. The mechanism is electrically controlled and is so constructed that it is simple and efficient in its operation.

With my invention it is possible to open and close doors from a distant point whether they are the sliding type or doors that open inwardly or outwardly. The opening and closing of the doors is controlled by a motor and suitable mechanism with circuits arranged to control the direction of operation of the motor and for automatically stopping the same when the doors are either fully opened or closed as the case may be.

In order to operate the device to control the opening or closing of the doors it is only necessary to momentarily depress a button for starting the operating mechanism. After once being started this mechanism will continue in operation until the door is either opened or closed to its fullest extent.

My invention is illustrated in the accompanying drawings, wherein:

Figure 1 shows the controlling mechanism as applied to double doors of the sliding type.

Fig. 2 shows a plan view of double doors which swing inwardly.

Fig. 3 is a front view of the inwardly swinging doors.

Fig. 4 shows a plan view of the mechanism for controlling doors which swing outwardly.

Fig. 5 is a front view of the outwardly swinging doors.

Referring first to Fig. 1, 1 and 21 represent a set of sliding doors controlled by the motor M. The motor is provided with a rod or extension of the shaft. The shaft as shown at 3 and 23 is provided with left and right hand threads. When the shaft

is rotating the sliding doors 1 and 21 by means of these threads are operated in different directions. The collars or sleeves 2 and 22 are fastened rigidly to the doors 1 and 21 respectively. The collar 2 is threaded and engages the threaded portion 3 of the shaft while collar 22 which is also threaded engages the threaded portion 23 of the shaft.

From this arrangement it will be seen that when the motor M is operated in one direction and turns the shaft, the collars 2 and 22 are both forced by means of the threaded portions 3 and 23 in the proper direction to operate the doors.

8 and 28 show buttons for controlling the opening of the doors while buttons 9 and 29 control the closing of the doors. These buttons when operated energize their associated solenoids or magnets 10 and 30 for controlling the current for operating the motor M.

The buttons 8 and 9 can be located without the building while the buttons 28 and 29 can be located within the building. This arrangement permits the opening and closing of the doors from the inside or outside of the building. In fact additional sets of buttons can be added so as to control the doors from any number of points.

The arrow marks indicate the multiple connections extending to other buttons. The solenoids are provided with sets of contact disks 12, 16 and 32, 35, fastened to the cores or armatures 90 and 95 respectively. These disks serve to short circuit or connect together certain contacts, as will be described hereinafter.

The collar 2 is provided with a button 5 which controls the contacts 6 when the doors are in their closed position. When the doors are open in their extreme position this button 5 controls the set of contacts 7. When the button 5 engages contacts 7 the circuit of the winding solenoid 10 is opened and when contacts 6 are engaged the winding of solenoid 30 is opened.

Referring to Figs. 2 and 3 it will be seen that the shaft of the motor M is provided with the left and right hand threaded portions 3 and 23 as in Fig. 1, but they do not extend the full length of the shaft as in the former figure.

The threaded portions 3 and 23 are each provided with the sliding collars 2 and 22. Instead, however, of these collars being fastened rigidly to doors they are flexibly

connected to the brackets 71 and 81 as shown. These brackets are fastened rigidly to their respective doors and when the doors are opened these brackets assume the position as shown in the dotted lines of Fig. 2.

Fig. 3 shows how the sliding sleeves 2 and 22 are connected to these brackets by means of the coupling rods 70 and 80. These rods are pivoted to the sleeves and also to the brackets.

Referring to Figs. 4 and 5 it will be noted that the arrangement is similar to that of Figs. 2 and 3. The threaded portions 3 and 23 of the shaft are located toward the center of the swinging doors. The sliding collars 2 and 22 are connected with the brackets 71 and 81. The rods 70 and 80, however, in this instance, are L-shaped so that the doors can swing inwardly and pass beneath the main portion of the rods 70 and 80.

Referring to Fig. 1, I will now describe the operation of the circuits and mechanism for controlling the opening and closing of the doors.

We will assume that the doors are closed as shown in the drawings. In order to open the doors the button 8 is momentarily depressed closing the circuit of the solenoid 10 by the following path: positive source of current supply, 41, 42, 43, contacts of button 8, winding of solenoid 10, 45, contacts 7, 46, 40, to the negative source of current supply. The solenoid 10 operating draws up the core or armature thereby short circuiting the contacts 11 and 13 by means of the disk 12 and also short circuiting the contacts 14 and 15 by means of the disk 16. The disk 16 also connects the positive source of current supply to the winding of solenoid 10 by the following path: positive source of current supply, 42, 14, 16, 17, 44, winding of solenoid 10. This ground connection maintains the circuit of the solenoid closed after the contacts of the button 8 are opened when pressure is removed.

The operation of the solenoid 10 completes the circuit of the motor M by the following path: positive source of current supply, 41, 42, 14, 16, 15, 60, 62, M, 63, 61, 13, 12, 11, 47, 40, to the negative source of current supply.

The motor M in operating causes the threaded shaft to rotate. The rotation of this shaft causes the collars 2 and 22 to travel and carry with them their respective sliding doors 1 and 21. In opening, the door 1 moves to the left and door 21 to the right. When the button 5 of the collar 2 engages the contacts 7 these contacts are separated and disconnect the negative source of current supply from the winding of the solenoid 10. The solenoid then restores and opens the circuit of the motor M causing it to cease operating and causing the doors 1 and 21 to come to rest.

It will be noted that when the door 1 is in this open position the contacts at 6 are closed thus enabling the solenoid 30 to be operated in order to again close the doors. In order to close the doors the button 9 is depressed completing the circuit of the solenoid 30 by the following path: positive source of current supply, 41, 42, contacts of button 9, 48, winding of solenoid 30, 49, contacts 6, 51, 46, 40, to the negative source of current supply. The solenoid 30 when energized connects the positive source of current supply to one terminal of the solenoid 30 by the following path: positive source of current supply, 41, 52, 34, 35, 37, 48, to terminal of the solenoid 30. This connection insures the energization of the solenoid 30 after the button 9 is released. The operation of this solenoid 30 reverses current to the motor M and causes the motor to rotate in a reverse direction. The rotation of the motor in this reverse direction causes the collars 2 and 22 to travel toward their first position. The circuit of the motor M is completed by the following path: positive source of current supply, 41, 52, 34, 35, 36, 61, 63, M, 62, 60, 33, 32, 31, 57, 40 to the negative source of current supply.

When the button 5 carried by the collar 2 engages the contacts 6 the circuit of the solenoid 30 is broken as shown in the drawing. This solenoid in restoring disconnects the source of current supply, stopping the rotation of the motor and causing the doors 1 and 21 to come to rest in the position shown in the drawings.

In the drawings I have shown the shaft provided with the left and right hand threads connected or coupled directly to the shaft of the motor. Instead of this direct connection, a set of gears can be interposed between the shaft of the motor and the threaded shaft so as to regulate the speed in which the doors are to be opened or closed.

The manner of reducing or increasing the speed of the shafts or moving parts by means of suitable gears is well known in the art and therefore I have not thought it necessary to show such a modification.

Having thus described my invention, what I desire to secure by Letters Patent is:

1. The combination with a door, of a collar associated with said door, a threaded shaft engaging said collar, a motor to drive said shaft and move said collar to operate said door, electromagnetic means separate from and for controlling the operation of said motor, means for initially operating said electromagnetic means, means operated by said electromagnetic means for maintaining said electro-magnetic means in operation after being mutually operated, and means controlled by said collar in the operation of said door for disabling said electromagnetic means.

2. The combination with a door, of a collar permanently associated with said door, a threaded shaft engaging said collar, a motor to drive said shaft and move said collar to open or close said door, electromagnetic means separate from and for controlling the operation of said motor in one direction to open said door, electromagnetic means separate from and for controlling the operation of said motor in a reverse direction to close said door, a switch for each of said electromagnetic means for controlling their initial operation, means controlled by each of said electromagnetic means for maintaining said electro-magnetic means in operation after being mutually operated, and means controlled by said collar in the opening and closing of said door for disabling said electromagnetic means.

3. The combination with a door, of a collar permanently associated with said door, a threaded shaft engaging said collar, a motor to drive said shaft, electromagnetic means separate from and for controlling the operation of said motor in one direction to open said door, electromagnetic means separate from and for controlling the operation of said motor in a reverse direction to close said door, a switch for each of said electromagnetic means for controlling their initial operation, means associated with each of said electromagnetic means for maintaining said electro-magnetic means in operation after being mutually operated, and means comprising sets of contacts controlled by said collar for disabling said electromagnetic means.

4. The combination with a door, with a collar permanently associated with said door, a threaded shaft engaging said collar, a motor to drive said shaft and move said collar to open and close said door, electromagnetic means separate from and for operating said motor in one direction to open said door, electromagnetic means separate from and for operating said motor in a reverse direction to close said door, a switch individual to each of said electromagnetic

means for causing their initial operation, means controlled by each of said electromagnetic means for maintaining itself in operation, a set of contact springs individual to each of said electromagnetic means and engageable by said collar for disabling said electromagnetic means.

5. The combination with a door, of a collar associated with said door, a threaded shaft engaging said collar, a motor to drive said shaft and move said collar to open and close said door, electromagnetic means separate from and for controlling the operation of said motor in one direction to open said door, a second electromagnetic means separate from and for controlling the operation of said motor in a reverse direction to close said door, a controlling switch for each of said electromagnetic means, the operation of said switches serving to cause an initial operation of its respective magnetic means, means controlled by said collar for preventing the operation of the first mentioned electromagnetic means when the door is open, and means controlled by said collar for preventing the operation of the second mentioned electromagnetic means when the door is closed.

6. The combination with a door, of a collar associated with said door, a threaded shaft engaging said collar, a motor to drive said shaft to move said collar to open or close said door, a solenoid, means for controlling the operation of said solenoid to cause said motor to open said door, a second solenoid, means for controlling the operation of said solenoid to cause said motor to close said door, means controlled by each of said solenoids for maintaining said solenoids in operation after being mutually operated, and means controlled by said collar to disable either of said solenoids.

In testimony whereof I affix my signature in presence of two witnesses.

ARTHUR H. OTIS.

Witnesses:

VIRGIL J. TERRELL,
ANNA McCUNE.