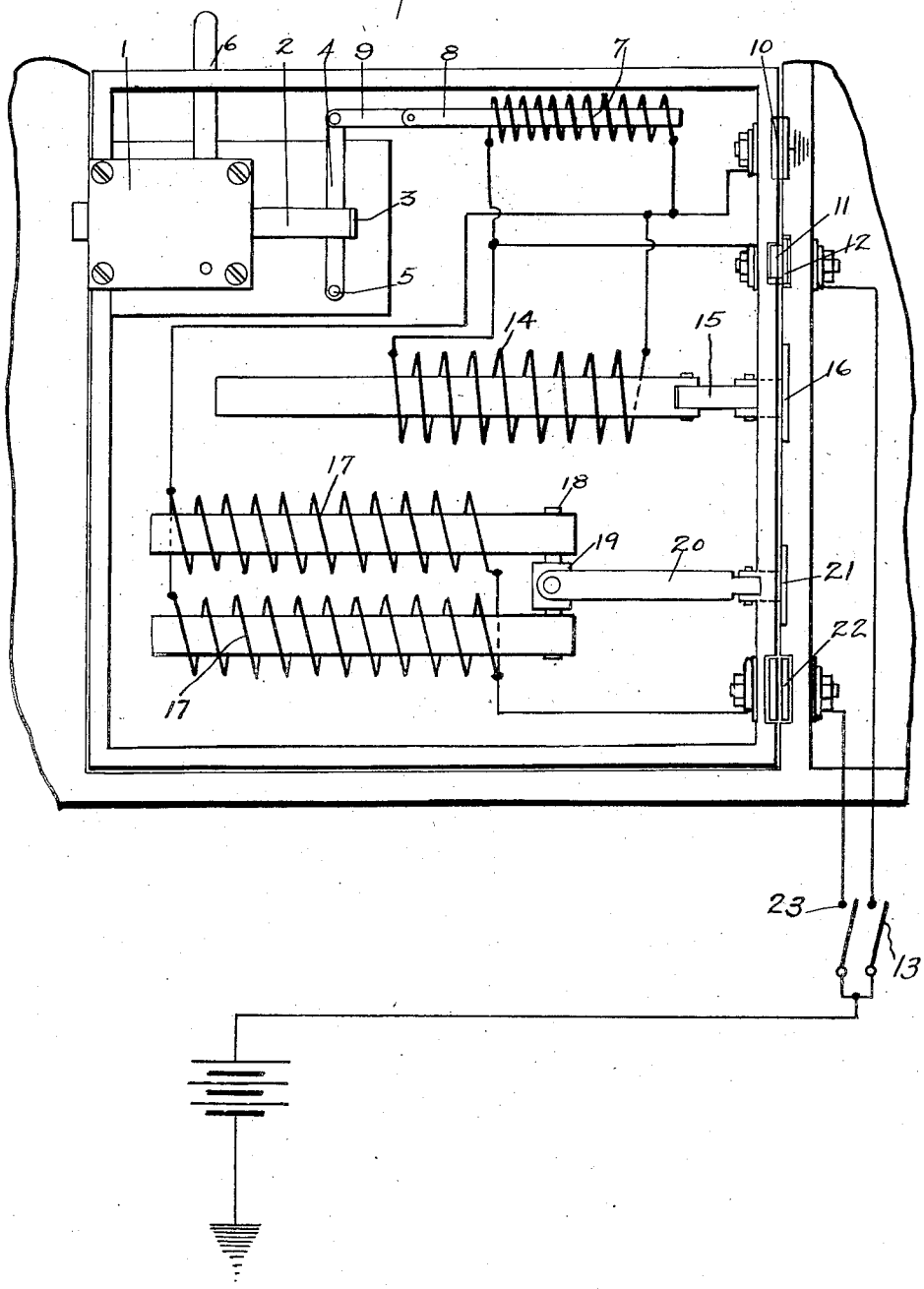
Jan. 11, 1927. 1,614,255

L. A. PHILBIN

ELECTRIC DOOR OPENING AND CLOSING APPARATUS

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Fig. 1.



INVENTOR
LOREN A. PHILBIN.
BY G. E. Hamaker
ATTORNEY.

Jan. 11, 1927. 1,614,255

L. A. PHILBIN

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Fig-2-

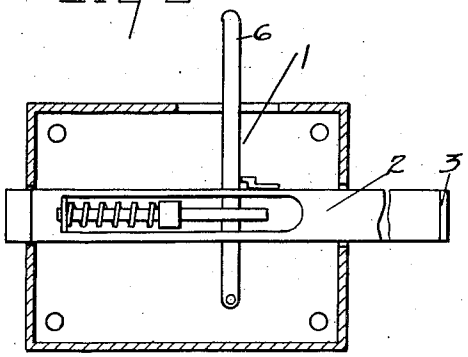


Fig-3-

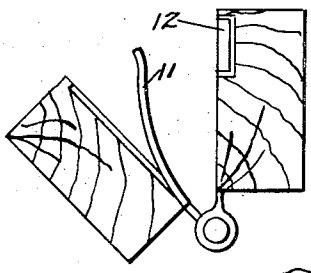


Fig-4-

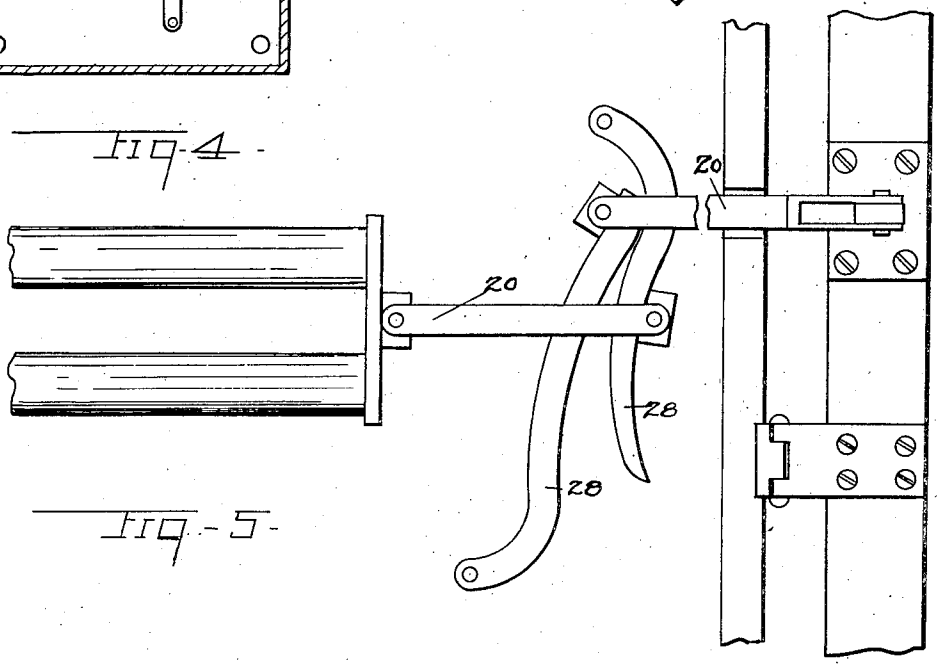
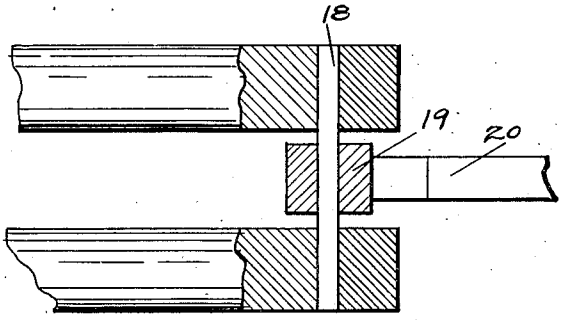


Fig-5-



WITNESS:

INVENTOR

LORAN A. PHILBIN,

BY G. E. Hamelen

ATTORNEY

Jan. 11, 1927. 1,614,255

L. A. PHILBIN

ELECTRIC DOOR OPENING AND CLOSING APPARATUS

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Fig-6-

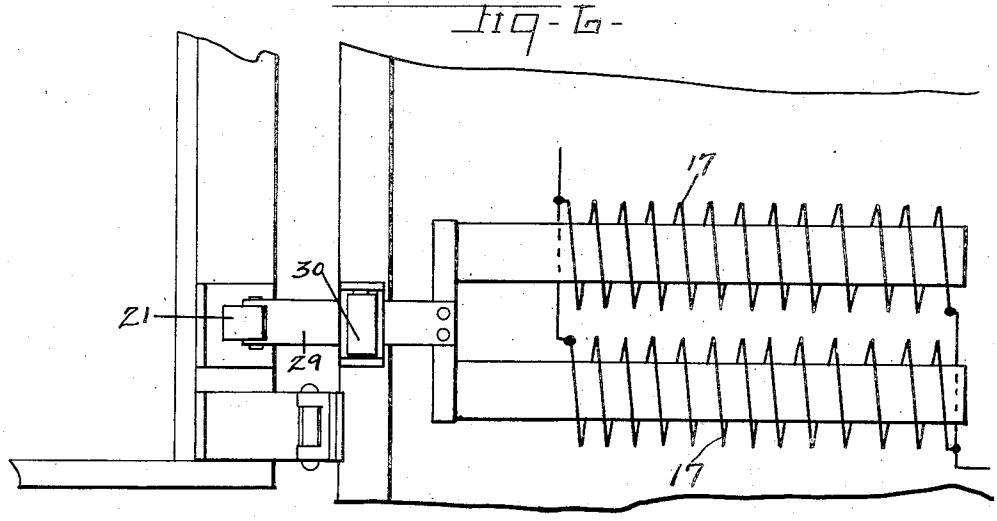


Fig-7-

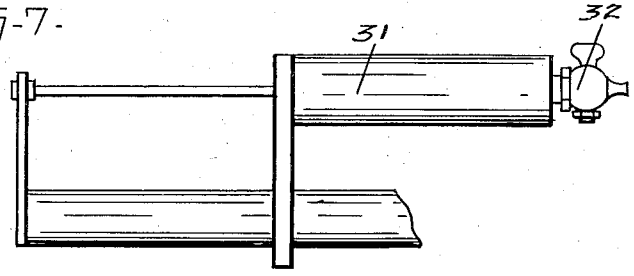
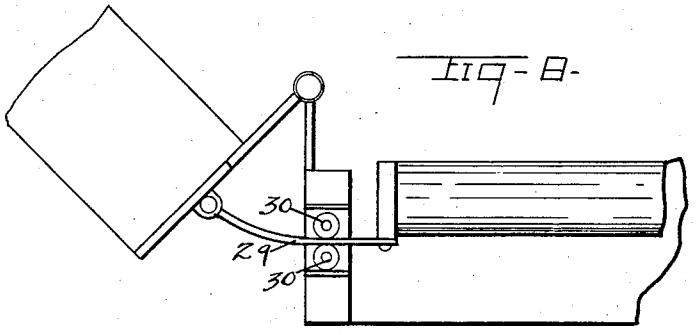


Fig-8-



INVENTOR
LOREN A. PHILBIN.
BY G. E. Hamaker
ATTORNEY

Patented Jan. 11, 1927.

1,614,255

UNITED STATES PATENT OFFICE.

LOREN A. PHILBIN, OF PORTLAND, OREGON, ASSIGNOR OF ONE-HALF TO ANTHONY JOSEPH NEISZ, OF PORTLAND, OREGON; A. J. NEISZ, ADMINISTRATOR OF SAID LOREN A. PHILBIN, DECEASED, ASSIGNOR OF ONE-HALF TO G. E. HAMAKER.

ELECTRIC DOOR OPENING AND CLOSING APPARATUS.

Application filed May 18, 1922. Serial No. 561,948.

My invention relates to a door opening and closing apparatus, composed of solenoid installed within the door casing or within the door itself, one solenoid magnet being to operate the latch and other solenoids being installed to open and close the door. The operating switches to the solenoids may be placed at any convenient point where the operation is desired to be made from some distant point.

The objects of my invention are: to provide an electric door opener by the application of solenoid installed within, or on the outside of the door or door casing; to connect the core of the magnet to one member which will cause said solenoids to bring the connecting rod together to install a solenoid within the door, the core of which is connected to the door latch and provided to operate the same; to provide a spring connection or connecting rod to the core of the solenoid, to act as a brake for the door; to install a dash pot in combination with the solenoid to provide means for controlling the motion of the door; to provide a switch through which the current to the latch solenoid will be broken except when the door is closed; to make electrical connections in such manner that the latch and opening solenoids will be operated by the same switch.

I attain these objects by the mechanism illustrated in the accompanying drawings, in which:

Figure 1 is an elevational view of the door, the arrangement of the various solenoids and the manner in which the electrical connection through the switches and the battery are made. Figure 2 is an elevational view of the latch with the case thereof in section, showing the extension of the latch operating arm and how the latch can be operated by hand as well as by the solenoid. Figure 3 is a plan view of the latch switch with the jambs of the door on which it is installed in section. Figure 4 is an elevational view of the solenoid cores connected to close the doors through the application of rocking levers. Figure 5 is a sectional view of the cores and the connecting rod cross-head, showing the manner in which the motion of said cores is transferred to the connecting rod. Figure 6 is an elevational view of the solenoid installed within the door casing and connected to the point of actuation through the spring connecting rod. Figure 7 is a plan view of the solenoid core and the dash pot, showing the manner in which the combination is used. Figure 8 is a plan view of the solenoid core with the spring connecting rod shown passing between the rollers which form the brake.

Similar numerals refer to similar parts throughout the several views.

It will be understood that my invention can be installed on the doors of automobiles, doors and windows of buildings which open by swinging on hinges, swinging gates or other structures of a similar nature. In this application, I do not desire to limit the application of my invention to any one of the above mentioned devices, as it can be used in combination with types of doors and windows mentioned, where electricity can be had to operate the solenoid.

In Figure 1, the magnets are assembled on an automobile door and the door is shown in the closed position. The latch 1 is of the type commonly used on this class of door, with an extension 2 welded to the latch mechanism and extending within the door in the manner shown in the figure. A hook 3 is built on the end of the extension and is made to engage with the lever 4 which is mounted and made movable on the pin 5. It will be seen that no change need be made in the latch, except for the addition of the latch extension, the hand lever 6 is allowed to remain in order that the door may be opened in case the mechanism should become out of order or the battery should become discharged.

The solenoid 7 can be mounted in the position shown, or below the latch and adapted to the structure of the door. The core 8 is movable within the coil and connected to the lever 4 through the connecting rod 9 as shown in the drawing. One side of the coil is connected to the grounded hinge 10, or can be connected to any point grounded to one side of the electrical supply. The remaining side of the coil is connected to the insulated breaker 11 which falls in contact with the live contact 12 mounted on the jamb of the door. The arrangement of the parts mentioned, is shown in Figure 3 where the jamb and part of the door are shown in section. The contact 12 is connected to the

remaining side of the battery or other supply of electricity, and the operation of the solenoid is governed by the switch 13 which can be mounted at any convenient point about the automobile, or on a desk in case the mechanism is installed in a building. It will be noticed that the core 8 of the latch solenoid is in the extended position when the door is closed, therefore, when the current is turned on the core will be drawn into the coil and the latch will be withdrawn by the connecting rod and the lever.

The solenoid 14 can be mounted at some convenient position on the door or on the door casing, in such manner that the door can be opened by the action of the solenoid through the connecting rod 15 and the bracket 16. It will be seen that the core of the solenoid 14 extends through the coil and projects on the opposite end of the coil from the connecting rod. One side of the coil is grounded to the hinge 10 and the other side is connected to the breaker 11, so that the solenoids 7 and 14 are operated by the same switch. The core of the solenoid 14 will be drawn to the center of the coil when the current is turned on. With the solenoids connected as described, and considering that the circuit has been closed by turning the switch 13, the latch will be unlocked and the door will be forced open by the solenoid 14.

Two solenoids 17 are mounted on the door, the cores thereof being parallel to each other and connected to operate together by the pin 18 passing through each of the cores. The cross-head 19 is mounted on the pin and between the cores in the manner shown in Figure 1 with the connecting rod 20 connecting the cross-head and the bracket 21, the bracket being mounted on the jamb of the door in the same manner as that indicated by the numeral 16. One side of the solenoids 17 are grounded through the hinge 10 and the remaining side of the coil is connected to the insulated hinge 22, which is connected to the battery through the switch 23. When the door is in the closed position, the cores of the magnets are within the coils as shown in Figure 1.

It is apparent that cores of solenoids 17 are withdrawn from the solenoids when the door is opened and that they are pulled back into the solenoids when said solenoids are energized by the actuation of switch 23.

The spring 24 functions as a retarding means for the closing action of the door and as an aid to the door opening solenoid, in opening the door. In case the spring is used, the solenoid 14 can be removed, it not being necessary to have both the spring and the solenoid to open the door. The spring is of such strength as to be compressed by the solenoids 17 when the door is being closed.

One solenoid can be installed in place of the two solenoids 17, and I therefore do not limit my invention to the number of solenoids that can be employed in place of those shown in the drawings.

The solenoids 17 can be connected to the rocking levers 28 in the manner shown in Figure 4, it being desirable to apply the application of such levers where the closing mechanism is installed to operate heavy doors, and where the pulling power of the solenoids are not great enough to over come the required resistance.

In some cases, it is desirable to have a brake on the door, in order to prevent slamming when the door is closed by the solenoids. In this case, a spring connecting rod 29 is installed to replace the rod 20, which passes between the rollers 30 in the manner shown in Figures 6 and 8 of the drawings. It can be seen how a braking effect will be caused by the action of the spring connecting rod while passing between the rollers and closing the door.

It is also desirable at times to provide a slow motion to the door throughout the closing operation. A dash pot 31 can be installed to replace the spring 24 in the manner shown in Figure 7. A valve 32 is fitted to the end of the dash pot to govern the passage of air from the same, and in this manner the motion of the core can be controlled.

It can be understood how all of the various fixtures can be applied to my invention if it is necessary in order to make the mechanism operate successfully, but in case only part of the various devices are used it will be understood that the parts left out are part of my invention.

Having fully described my invention, I claim and desire to protect by Letters Patent:

1. In an electrically operated mechanism, the combination of solenoids mounted on the door and controlled by a manually operated switch for simultaneously unlatching and swinging the door to open position, means to automatically break the door opening circuit when the door reaches open position, door closing solenoids mounted on the door and controlled independently of the door opening means by a separate manually operated switch, and means to manually unlatch the door when in closed position independently of the electrical means.

2. In a door opening device: a door; a solenoid mounted upon said door; a solenoid core; a fulcrum upon the casing of said door; and a connecting rod joining said core and said fulcrum.

3. A door; a solenoid upon said door; a core for said solenoid; a fulcrum upon the casing of said door; a connection between said core and said fulcrum; a spring mounted upon said door; and common means for compressing said spring as the door is closed

and for causing said spring to open said door when the door latch is released.

4. In a door opening device; a door; a pair of door hinges, one of said hinges being electrically grounded and the other of said hinges being insulated; an electric circuit breaker adapted to break an electric circuit when said door is opened; a door latch; a pair of electric switches; a source of electric energy; an electro-magnet adapted to release said door latch, said electro-magnet being connected in series with said source of electric energy; one of said switches, said circuit breaker, and said grounded hinge; means to impart to said door an initial opening impulse when said latch is released; and an electro-magnet adapted to close said door by a suitable system of leverage, said latter electro-magnet being connected in series with said source of electric energy, one of said switches; said insulated hinge; and said grounded hinge.

5. A door; a door latch; electro-magnetic means for releasing said door latch; mechanism for imparting an initial opening impulse to said door immediately said latch is released; shock absorbing means for bringing said door to rest when completely open; and electro-magnetic means for closing said door.

LOREN A. PHILBIN.