May 24, 1927.

C. A. MARTINDALE

1,630,127

ELECTRIC DOOR OPENER

Filed Jan. 30, 1926

2 Sheets-Sheet 1

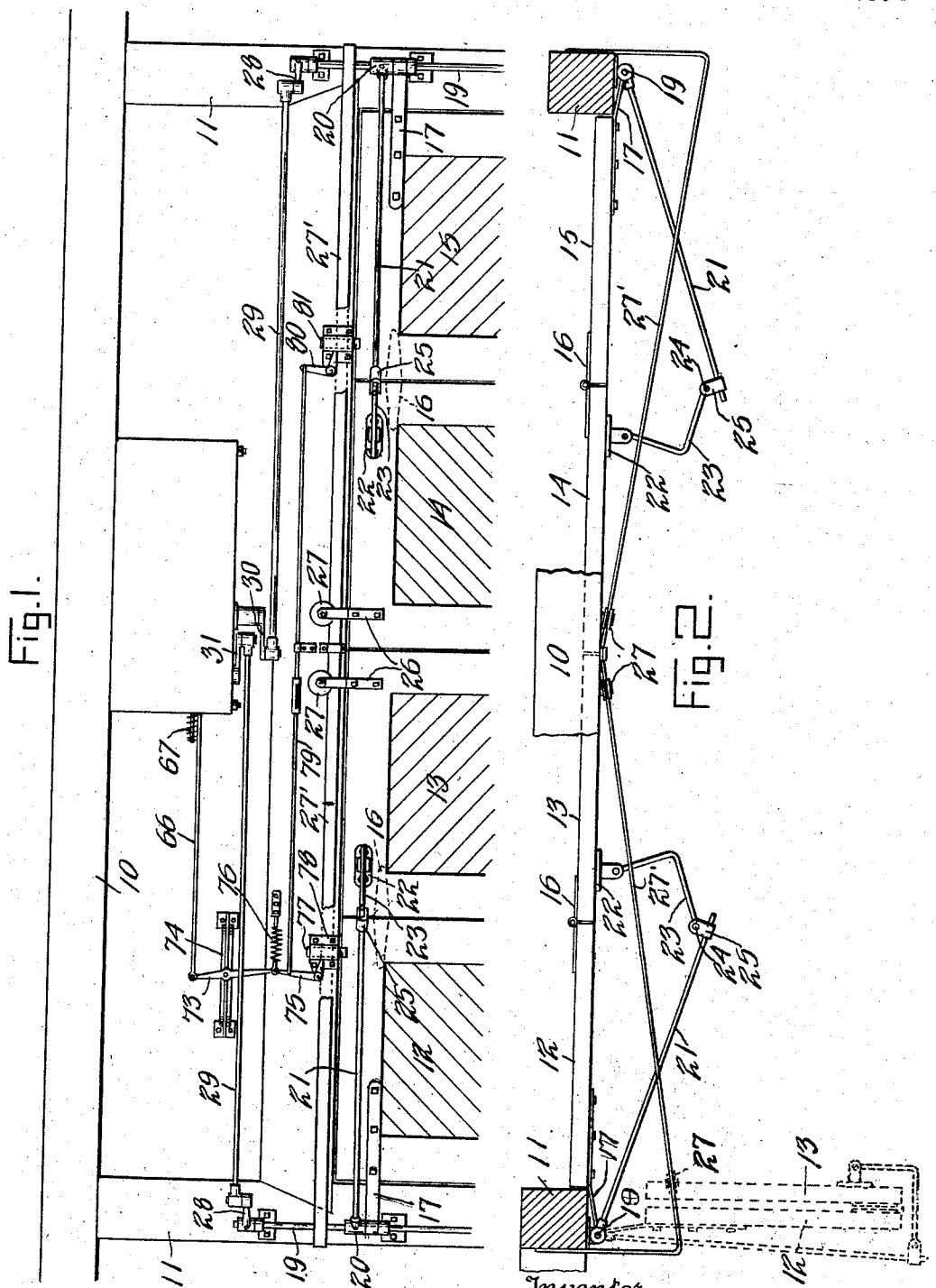


Fig. 1.

Fig. 2.

Inventor
Charles A. Martindale

By E. W. Bradford
Attorney

May 24, 1927. 1,630,127

C. A. MARTINDALE

ELECTRIC DOOR OPENER

Filed Jan. 30, 1926 2 Sheets-Sheet 2

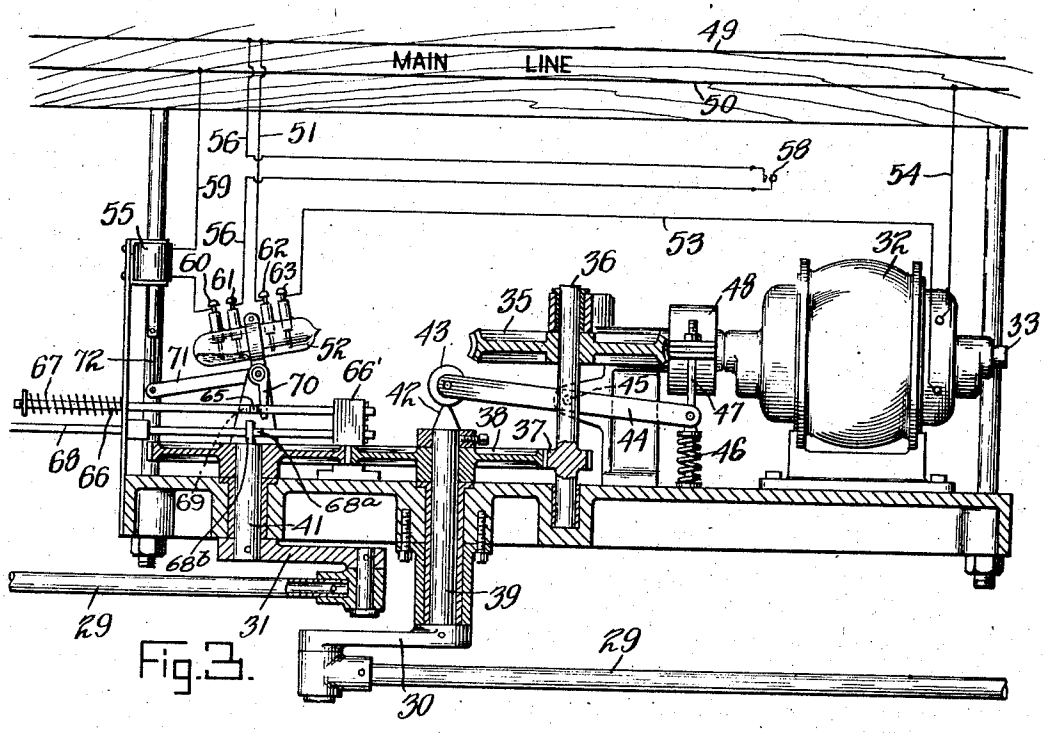
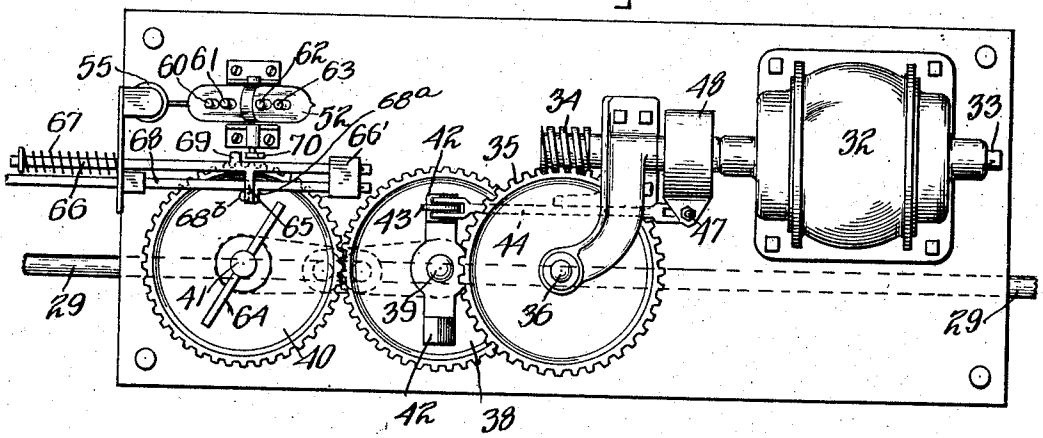


Fig. 3.

Fig. 4.



Inventor
Charles A. Martindale

By E. W. Bradford

Attorney

Patented May 24, 1927. 1,630,127

UNITED STATES PATENT OFFICE.

CHARLES A. MARTINDALE, OF ANDERSON, INDIANA, ASSIGNOR TO THE RELIABLE MACHINE COMPANY, OF ANDERSON, INDIANA, A CORPORATION OF INDIANA.

ELECTRIC DOOR OPENER.

Application filed January 30, 1926. Serial No. 85,039.

My said invention relates to a mechanical door opener intended primarily for use on garage doors whether large or small and applicable in other analogous situations, as for opening windows, etc.

It is an object of my invention to provide a simple mechanism which shall open folding doors wide so as to provide a maximum space for entry and exit and shall also close them, all by the use of mechanical force and without manual exertion.

Referring to the accompanying drawings, which are made a part hereof and on which similar reference characters indicate similar parts,

Figure 1 is an elevation of a set of folding doors equipped with my improved mechanism,

Fig. 2, a top plan of the same,

Fig. 3, an elevation partly in section showing operating mechanism, and

Fig. 4, a top plan of said mechanism with parts omitted.

In the drawings reference character 10 indicates the lintel of a door frame having jambs 11. A plurality of doors 12, 13, 14 and 15 are arranged in pairs, the doors of each pair being connected by hinges 16 and the outer doors of the set having hinges 17 journaled on upright rods 19. The rods 19 carry collars 20 which are secured to the rods 19 by pins or in any other suitable or convenient manner. Rockarms 21 project from the collars 20, these arms being attached to doors 13 and 14 respectively near the hinges 16 of the same by means comprising a bracket 22 on each of said doors having a hinged connection with a bent rod 23 pivotally connected at 24 to a bracket 25 slidingly adjustable on the corresponding arm 21.

The inner door of each pair is provided with a swivel fitting 26 of well-known type carrying a roller 27 which runs on one of a pair of outwardly diverging tracks 27'. The rollers are swivelled to the doors to permit the necessary relative change of position as the doors move toward the fully open position illustrated in dotted lines in Fig. 2. It may be noted that the hinges 17 have arms extending some distance past the inner edge of the jamb 11 prior to engagement with the door. This engagement permits the doors when fully open to fold back approximately in line with the inner face of the jamb 11 so as to make the opening as wide as possible.

At the upper end of each rod 19 is a rockarm 28. Rods 29 are pivotally attached at one end to the rockarms 28 and at the other end one of them is connected to a crank 30 and the other to a crank 31.

The motor 32 for operating the doors drives a shaft 33 on which is mounted a worm 34 meshing with a worm wheel 35 on a shaft 36. The shaft 36 has a spur pinion 37 at its lower end meshing with a spur gear 38 on a shaft 39. The shaft 39, at its lower end, carries a crank 30, previously referred to, for opening and closing one pair of doors. The gear 38 drives a gear 40 on a shaft 41 which shaft at its lower end carries the crank 31 for operating the other set of doors.

The shaft 39 at its upper end is provided with oppositely extending arms carrying a pair of cams 42 so located as to lift a roller 43 journaled in the forked end of a lever 44 pivoted at 45. A spring 46 at the end of the lever remote from the roller 43 serves to move the lever clockwise and so pulls downward on a link 47 to operate a brake 48 which may be in the form of a band encircling the drum on the shaft 33. The brake is applied by operation of cams 42 and is immediately released when the cams have passed, by means of the spring 46.

Current is supplied to the motor from positive and negative wires 49 and 50 of the main line by means of a circuit including a conductor 51, a mercury switch 52 and a conductor 53 connected to the motor, and a conductor 54 leading from the motor back to the negative wire 50 of the main line, this operation being under control of the mercury switch. A solenoid 55 is controlled by a circuit including conductors 56 and 57, an interposed push button 58 leading from the positive side of the main line to the winding of the solenoid and a conductor 59 leading from said winding back to the negative side of the solenoid. It will be evident that on the closing of the push button the solenoid will be energized to tilt the mercury switch 52 so as to break the connection between the contacts 60 and 61 of the solenoid circuit and close the motor circuit which up to this time has been broken between the contacts 62 and

63. The parts will remain in the position indicated with the motor circuit closed until the gears 38 and 40 have moved through an arc of 180° or sufficient to carry an arm 64 into position to strike a lug 65 on a slidable rod 66 normally held in the position indicated in Fig. 4 by means of a spring 67. A block 66′ supports the end of the rod 66 and acts as an abutment for a pin mounted in the rod to limit its movement. The rod 66 is provided with a lug 69 positioned to engage a depending arm 70 on the trunnion of the switch 52 so as to move the pivoted switch counterclockwise and thus break the motor circuit. This movement, by means of a horizontal arm 71 and a connecting rod 72, pulls the armature of the solenoid downward as well, this armature being maintained in its uppermost position by the weight of the mercury which may be made to overbalance the comparatively light armature.

A rod 68 is mounted parallel to the rod 66 and carries a lug 68^a which lies in the path of movement of a lug 68^b carried by the gear 40. In their normal position the lugs 68^a and 68^b are in contact, but as soon as the gear 40 starts to rotate, the lug 68^b pushes on lug 68^a imparting an endwise movement to the rod 68, which extends to the left in Fig. 1 beyond the casing which encloses the motor and the gearing operated thereby and the rod is pivotally connected at its upper end to a lever 73 pivotally supported by a bracket 74. The lever is connected at its lower end to the upper end of a bent lever 75 moved in a clockwise direction by a spring 76. The lower arm of the bent lever engages a notch in a bolt 77 slidably supported in a bracket 78 on the lintel and adapted to engage at its lower end against the outer side of the door or in a socket mounted on the door for locking the door in closed position. A rod 79 extends along the lintel and is connected at its right-hand end to another bent lever 80 which operates a bolt 81 similar to the bolt 77. Similar bolts may be arranged at the bottom of the door and connected with this operating mechanism if desired.

It is thought that the operation of the device may be substantially understood from the foregoing description. When the push button is pressed the circuit of the solenoid will be closed and this will move the pivoted switch 52 to close the motor circuit. Thereupon the motor will revolve and drive the gearing to move the rods 29 in opposite directions and thus swing the doors 12 and 15 on their hinges 17 while at the same time causing the doors 13 and 14 to slide along tracks 27′ and swing on their hinges 16 into the wide open position of Fig. 2. While this action is taking place the shafts 41 and 39 are rotating through an arc of 180° and as this is completed the arm 64 will strike a lug 65 and operate the switch member 52 to open the motor circuit, the solenoid circuit having been broken as soon as the push button has been released. At the same time one of the cams 42 rides under lever 44 and applies the brake 48 to the motor shaft.

The parts remain in the position just described until it is desired to shut the door when the button is again pressed, closing the circuit of the solenoid and tilting the switch member 52 to close the motor circuit, whereupon the motor is again energized and causes the various parts to move until the shafts 39 and 41 have again rotated through 180° when the other arm 64 strikes the lug 65 and in a manner similar to that above described causes the motor circuit to be broken. At the same time the brake 48 is again applied. It may be noted that the shafts 39 and 41 always rotate in the same direction.

It will be obvious to those skilled in the art that various changes may be made in my device without departing from the spirit of the invention and therefore I do not limit myself to what is shown in the drawings and described in the specification but only as indicated in the appended claims.

Having thus fully described my said invention, what I claim as new and desire to secure by Letters Patent, is:

1. The combination of a door frame, a door section hinged thereto, a track, a door section slidably connected to said track, hinges connecting the door sections, a rockarm at the outer side of the door extending at an angle to the plane of the door, a link connecting said rockarm to the second-named door section, a second rockarm rigidly connected to the first, a motor operatively connected to the second rockarm, a normally open circuit controlling the motor, and a manually operable switch in said circuit, substantially as set forth.

2. The combination of a door frame, a door section hinged thereto, a track, a door section slidably connected to said track, hinges connecting the door sections, a rockarm at the outer side of the door extending at an angle to the plane of the door, a link connecting said rockarm to the second-named door section, a second rockarm rigidly connected to the first, a motor operatively connected the second rockarm, a normally open circuit controlling the motor, a manually operable switch in said circuit, and door locking means controlled by the motor, substantially as set forth.

3. The combination of a door frame, a pair of doors supported on rods fulcrumed on said frame said doors being movable in opposite directions, a motor, a pair of intermeshing gears driven by said motor, cranks fixed to the respective gears, rockarms operatively connected to the respec-

tive door rods, links each connecting one of said cranks to one of said rockarms, a normally open circuit for said motor, a switch in said circuit, manually controlled means for closing the switch, and mechanical means operated by the rotation of one of said gears for opening the switch, substantially as set forth.

4. The combination of a door frame, a pair of doors supported thereby said doors being movable in opposite directions, a motor, a pair of intermeshing gears driven by said motor, cranks fixed to the respective gears, rockarms operatively connected to the respective doors, links each connecting one of said cranks to one of said rockarms, a normally open circuit for said motor, a switch in said circuit, manually controlled means for closing the switch, mechanical means operated by the rotation of one of said gears for opening the switch as the doors reach fully opened or fully closed position, and locking means for the doors operated by means carried by one of said intermeshing gears, substantially as set forth.

5. The combination of a door frame, a pair of doors supported thereby said doors being movable in opposite directions, a motor, a pair of intermeshing gears driven by said motor, cranks fixed to the respective gears, rockarms operatively connected to the respective doors, links each connecting one of said cranks to one of said rockarms, a normally open circuit for said motor, a switch in said circuit, manually controlled means for closing the switch, mechanical means operated by the rotation of one of said gears for opening the switch, and mechanical means carried by one of said gears for unlocking the locking means for the doors, substantially as described out of operation as the doors approach closed position and releasing said means when the doors are closed, substantially as set forth.

6. The combination of a door frame, a pair of doors supported thereby said doors being movable in opposite directions, a motor, a pair of intermeshing gears driven by said motor, cranks fixed to the respective gears, rockarms operatively connected to the respective doors, links each connecting one of said cranks to one of said rockarms, a normally open circuit for said motor, a mechanically operated switch in said circuit, manually controlled means for closing the switch, a slidable rod adapted to co-act with said switch for breaking the motor circuit, and a lug on one of said gears for moving the rod in a direction to break said circuit, substantially as set forth.

7. The combination of a door frame, a pair of doors supported thereby said doors being movable in opposite directions, a motor, a pair of intermeshing gears driven by said motor, cranks fixed to the respective gears, rockarms operatively connected to the respective doors, links each connecting one of said cranks to one of said rockarms, a normally open circuit for said motor, a switch in said circuit, manually controlled means for closing the switch, a slidable rod connected to the switch for breaking the motor circuit, a lug on one of said gears for moving the rod in a direction to break said circuit, and resilient means to return the rod after the circuit is broken, substantially as set forth.

8. The combination of a door frame, a pair of doors supported thereby said doors being movable in opposite directions, a motor, a pair of intermeshing gears driven by said motor, cranks fixed to the respective gears, rockarms operatively connected to the respective doors, links each connecting one of said cranks to one of said rockarms, a normally open circuit for said motor, a switch in said circuit, manually controlled means for closing the switch, a slidable rod connected to the switch for breaking the motor circuit, a lug on one of said gears for moving the rod in a direction to break said circuit, resilient means to return the rod after the circuit is broken, locking means for the doors, and operating connections from the locking means to said rod, substantially as set forth.

9. The combination of a door frame, a pair of doors supported thereby said doors being movable in opposite directions, a motor, a pair of intermeshing gears driven by said motor, cranks fixed to the respective gears, rockarms operatively connected to the respective doors, links each connecting one of said cranks to one of said rockarms, a pair of oppositely positioned lugs on one of said gears, a brake for the motor shaft, a pivoted lever for operating the brake, and an abutment on the lever in the path of movement of said lugs whereby the brake is applied as the doors reach their extreme open or closed positions, substantially as set forth.

In witness whereof, I have hereunto set my hand at Anderson, Indiana, this 25th day of January, A. D. nineteen hundred and twenty-six.

CHARLES A. MARTINDALE.