

July 19, 1932.

F. M. NUNEZ

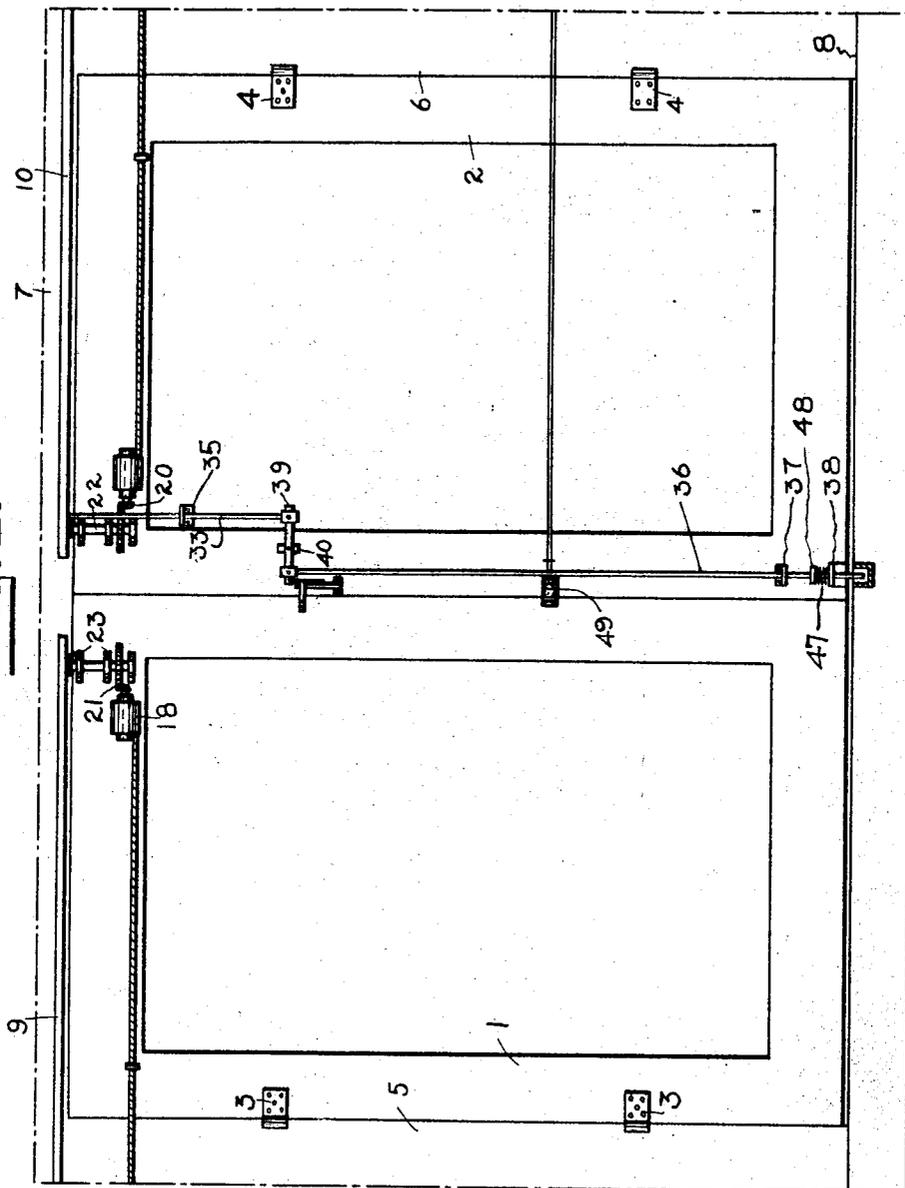
1,868,149

AUTOMATIC DOOR OPENER AND CLOSER

Filed Sept. 30, 1929

6 Sheets-Sheet 1

Fig. 1.



INVENTOR.

Frank M. Nunez

BY *Baldwin Vae*

ATTORNEY.

July 19, 1932.

F. M. NUNEZ

1,868,149

AUTOMATIC DOOR OPENER AND CLOSER

Filed Sept. 30, 1929

6 Sheets-Sheet 3

Fig. 6.

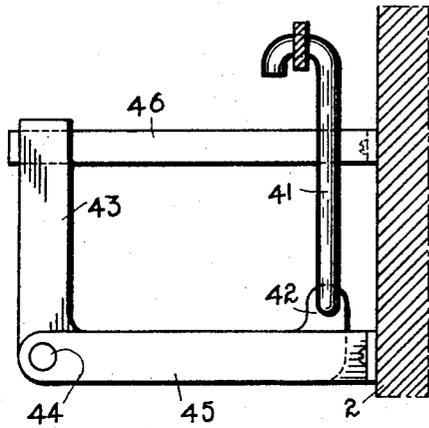


Fig. 7.

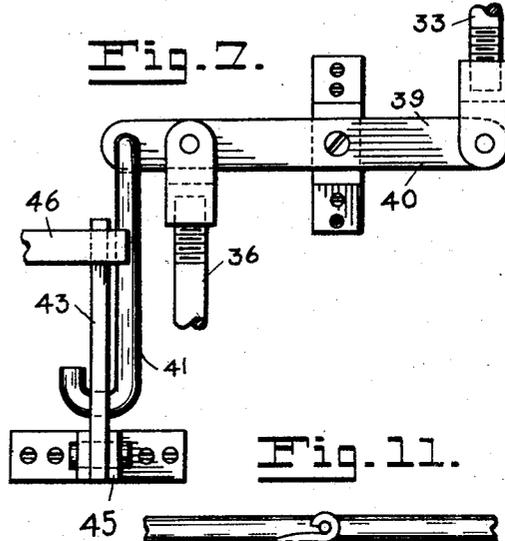


Fig. 11.

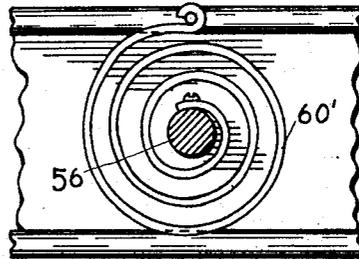


Fig. 8.

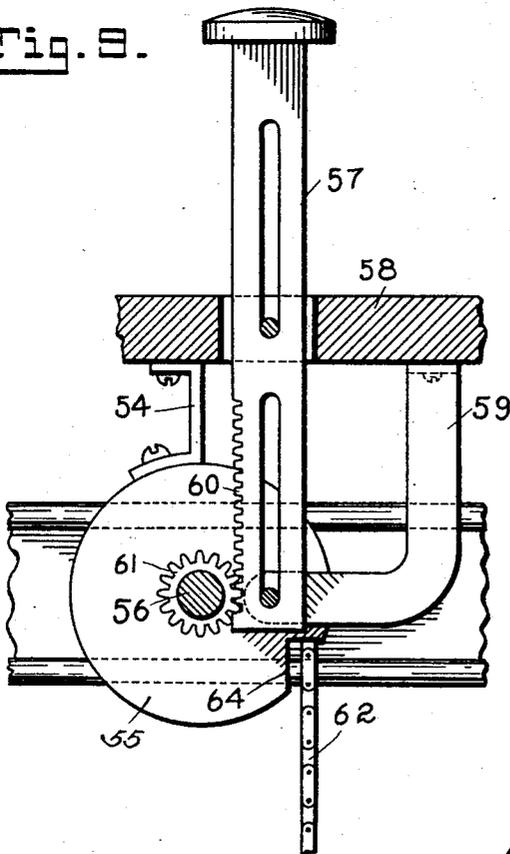
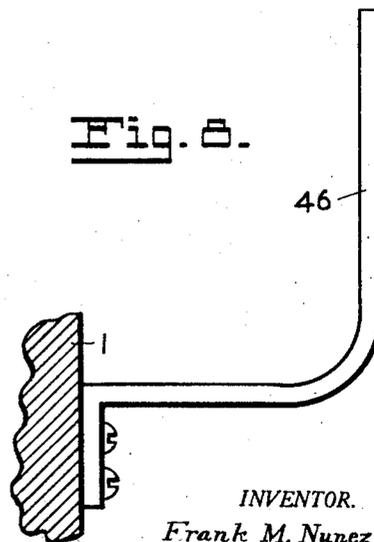


Fig. 9.



INVENTOR.
Frank M. Nunez

BY *Baldwin Vale*
ATTORNEY.

July 19, 1932.

F. M. NUNEZ

1,868,149

AUTOMATIC DOOR OPENER AND CLOSER

Filed Sept. 30, 1929

6 Sheets-Sheet 4

Fig. 13.

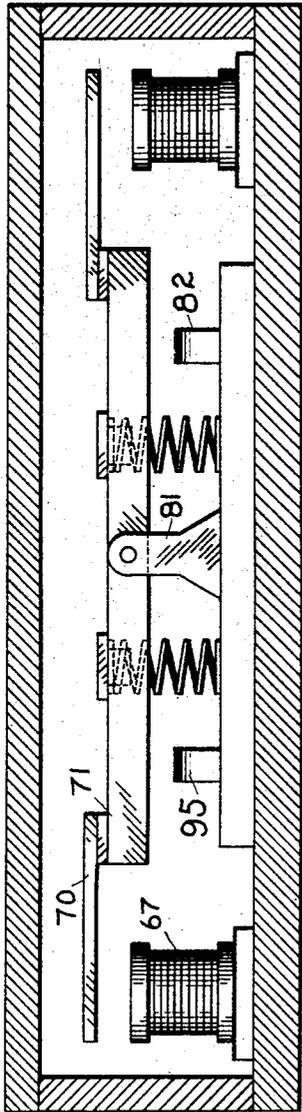


Fig. 3.

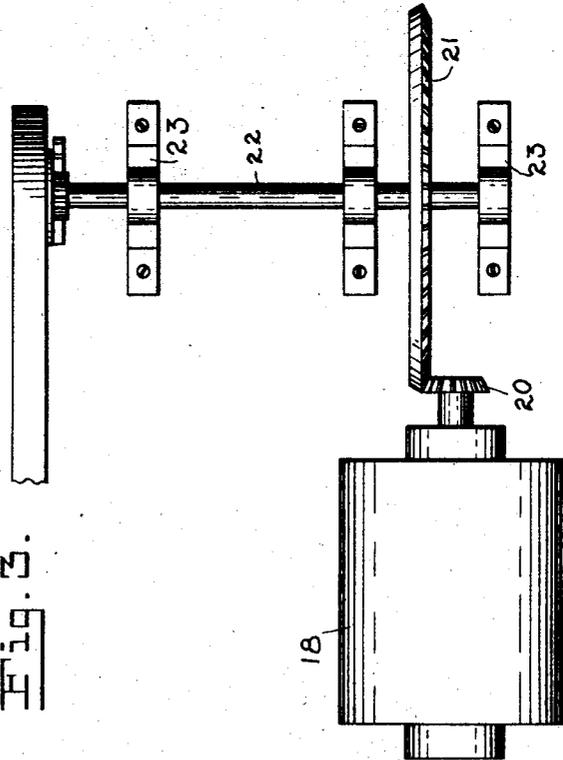
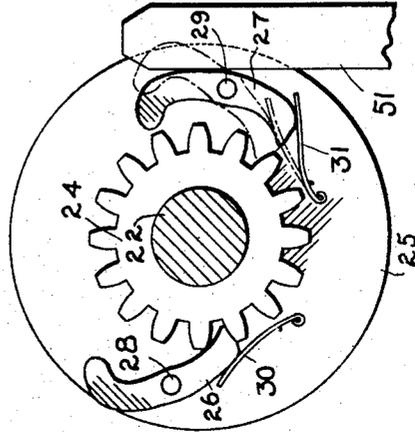


Fig. 4.



INVENTOR.
Frank M. Nunez
BY *Baldwin Vace*
ATTORNEY.

July 19, 1932.

F. M. NUNEZ

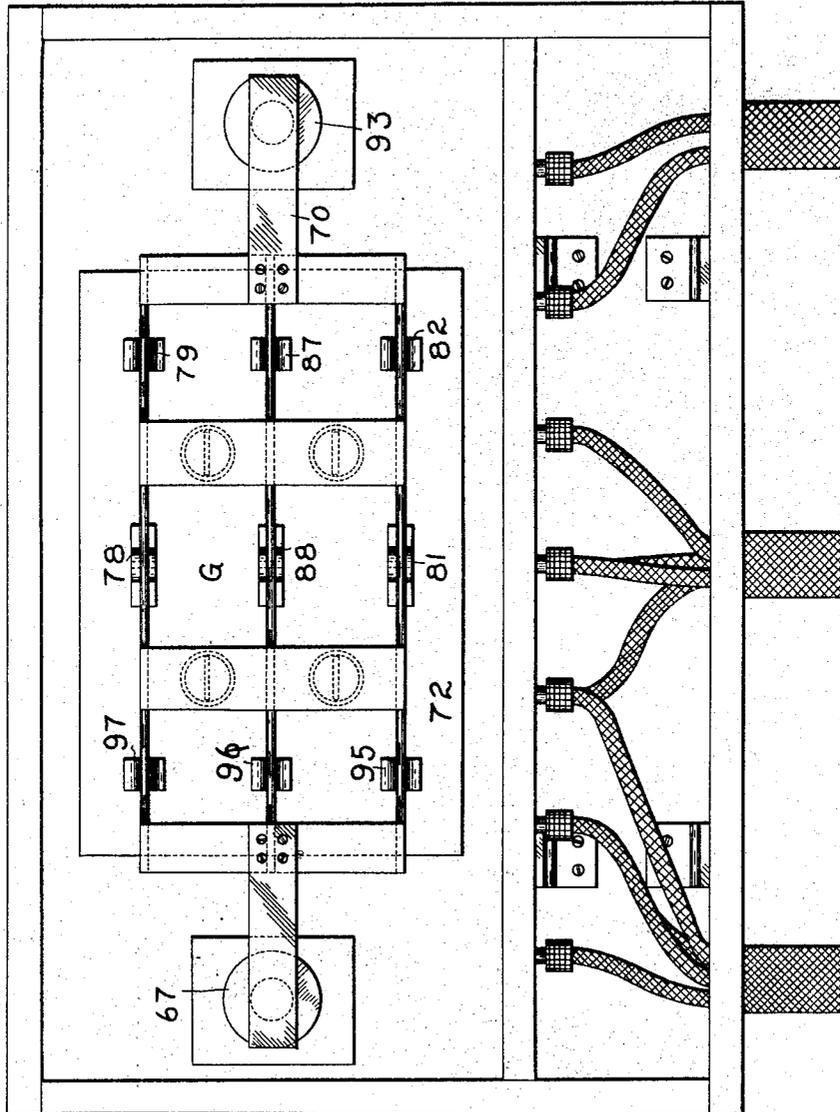
1,868,149

AUTOMATIC DOOR OPENER AND CLOSER

Filed Sept. 30, 1929

6 Sheets-Sheet 5

Fig. 12.



INVENTOR.

Frank M. Nunez

BY

Baldwin Lee

ATTORNEY.

July 19, 1932.

F. M. NUNEZ

1,868,149

AUTOMATIC DOOR OPENER AND CLOSER

Filed Sept. 30, 1929

6 Sheets-Sheet 6

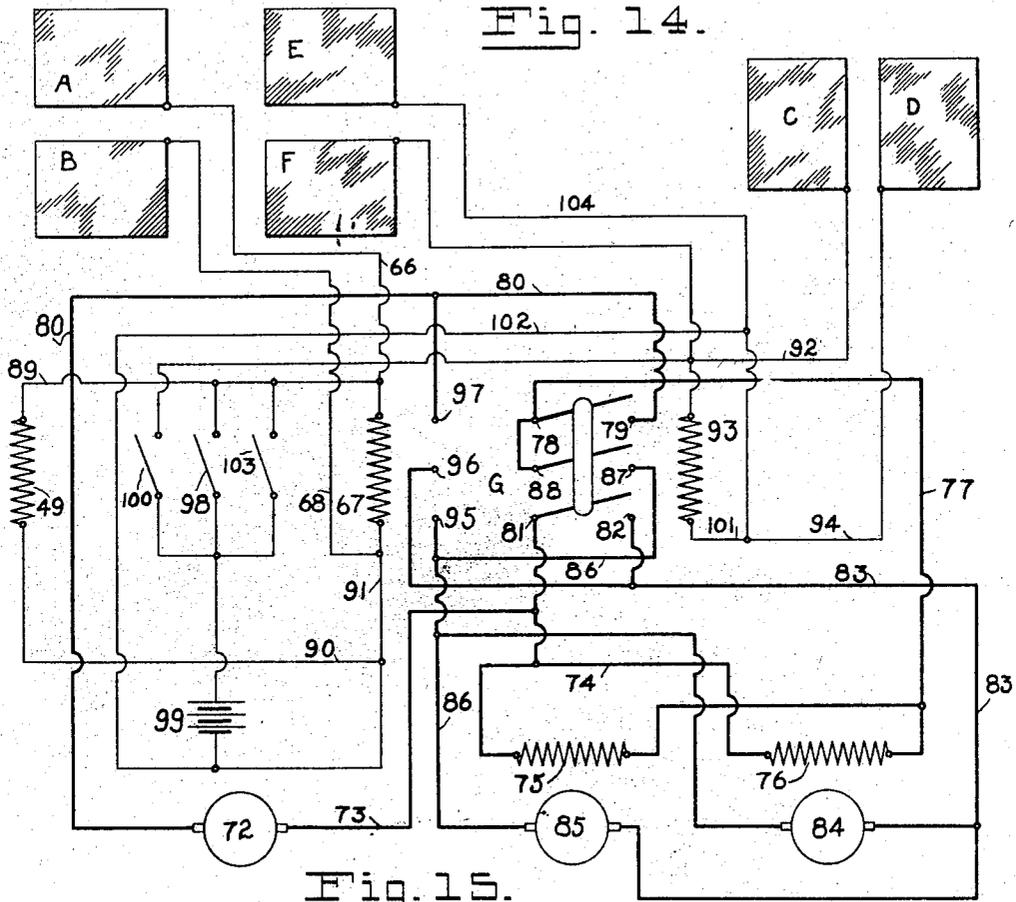
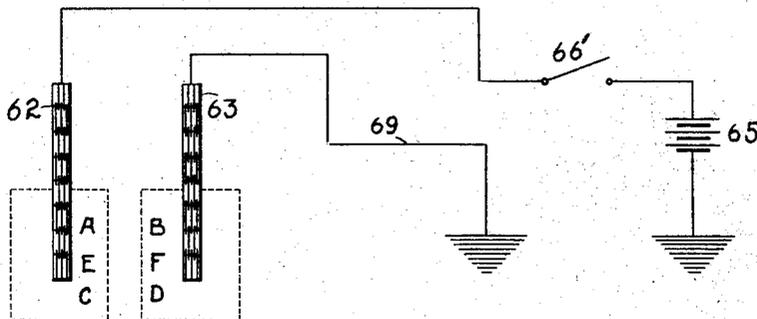


Fig. 15.



INVENTOR.

Frank M. Nunez

BY

Guadalupe Vale

ATTORNEY.

UNITED STATES PATENT OFFICE

FRANK M. NUNEZ, OF SAN FRANCISCO, CALIFORNIA

AUTOMATIC DOOR OPENER AND CLOSER

Application filed September 30, 1929. Serial No. 396,221.

This invention relates to improvements in automatic door openers and closers, and more particularly to electrical means for opening and closing doors by remote control.

The principal object of the invention is to provide means for opening and closing garage doors by the occupant of an automobile, without alighting from the vehicle.

Another object is to provide means for locking and unlocking the doors in addition to the opening and closing operation.

A further object is to so design, construct, and arrange the invention that it may be applied to the conventional types of doors.

Other objects and advantages will appear as the description progresses.

In this specification and the accompanying drawings the invention is disclosed in the preferred form. But it is to be understood that it is not limited to such form, because it may be embodied in other forms. It is also to be understood that in and by the claims following the description it is desired to cover the invention in whatsoever form it may be embodied.

This invention enables the occupant of a vehicle to stop the vehicle at a predetermined point before the garage door or doors and by means within the vehicle, cause the doors to automatically open or close.

After the vehicle has been driven into the garage the doors may be automatically closed from the vehicle.

The doors can also be opened and closed by power, controlled by a key lock switch independently of the vehicle.

The power for opening and closing the doors is automatically distributed and controlled after the proper switches have been closed by the operator.

The necessary stop means, to limit the opening and closing operations, and other safety means are electrically or mechanically introduced into the electric circuits or mechanical apparatus, to safeguard the apparatus and the operator.

In the accompanying six sheets of drawings:

Figure 1 is a front elevation of a pair of

vertically hinged swinging doors equipped in accordance with this invention.

Figure 2 is a diagrammatic plan view of the same.

Figure 3 is an enlarged detail in front elevation of the motor drive assembly.

Figure 4 is an enlarged detail in plan of the clutch in the motor drive.

Figure 5 is a fragmentary similar view of the drive pinion and segment.

Figure 6 is an enlarged fragmentary detail of the mechanical door bolt operating mechanism.

Figure 7 is a front elevation of the same.

Figure 8 is a side elevation of the locking bracket.

Figure 9 is a detail in side elevation of the remote control pedal, and

Figure 10 is a plan view from above of the remote control chain reeling mechanism.

Figure 11 is a detached detail of the rewind spring thereof.

Figure 12 is a plan view from above of the magnetic motor switch.

Figure 13 is a side elevation of the same, showing the enclosing box in cross section.

Figure 14 is a wiring diagram of the motor circuit, subactuating circuit, and

Figure 15 is a wiring diagram of the remote control circuit.

In detail the construction illustrated in the drawings, referring to Figure 1, comprises the doors 1 and 2, hinged at 3, 4 to the side frames 5, 6, between the lintel 7 and the floor 8, in the conventional manner.

The arcuate racks 9, 10 have their inner ends fixed to the lintel at 12, 13, and their outer ends 14, 15 fixed to the adjacent walls at 16, 17. These racks may be fixed to the ceiling, or otherwise mounted to meet architectural conditions. Their radii are struck from the pivot centers of their respective hinges 3, 4.

The doors 1, 2 are swung by the power of the pair of motors 18, 19, mounted upon their respective doors and engaging the racks 9, 10 through interposed reduction gearing.

This gearing (see Figures 3, 4, 5) comprises the bevel pinion 20, fixed on the motor shaft and enmeshed with the crown gear 21,

fixed on the shaft 22, mounted in the bracket bearings 23, 23 fixed to the door.

The spur pinion 24 is free on the end of the shaft 22 and is enmeshed with the rack 9.

5 This pinion is adapted to be driven in either direction by means of the disc 25 fixed on the shaft 22. The pawls 26, 27 are pivoted on the stud pivots 28, 29 respectively, which are fixed in the disc 25. These pawls are oppo-
10 sitely directed and one or the other normally held in engagement with the teeth of the pinion 24 by the springs 30, 31, respectively, mounted on the disc 25, for reasons which will later appear.

15 This motor drive is the same on both doors and is intended to open and close the doors by the forward and reverse operation of the motors.

The closed doors are locked by the top bolt 33 engaging the lintel 7 and slidable in the
20 bracket 34, fixed to the door. There is a similar bolt 36 guided in the brackets 37, 38, which engages the floor 8, to lock the door at the bottom.

25 These bolts 33, 36 are pivoted on the opposite ends of the walking beam 39, which is pivoted on the pivot 40 fixed to the door 2. The link 41, pivoted in the extreme end of the beam 39 pivotally engages the end 42 of
30 the bell crank 43, pivoted at 44 on the bracket 45 fixed to the door 2. (See Figures 1, 6, 7, 8.)

The angular bracket 46 is fixed on the door 1, and engages the bell crank 43 to cause the
35 link 41 to pull down on the beam 39 to push the bolts 33, 36 into engagement with the lintel 7 and floor 8 to mechanically bolt the two doors 1, 2 when they are closed by the motors. These bolts are held normally un-
40 locked by the expansion of the spring 47 encircling the bolt 36 between the bracket 38 and the set collar 48.

The door 1 is locked to door 2 by the electric and key operated lock 49.

45 The doors are closed by the normal rotation of the motors 18, 19 clockwise. When these motors are reversed the upper portions of the pinions 24—24 enmeshed with their respective segments 9, 10, fenculate or travel on
50 these segments to pull the doors open. The door 1 is timed slightly in advance to open first and close last. When the door 1 opens it withdraws the bracket 46 (see Figure 8) which releases the bolts 33, 36 which are with-
55 drawn by the expansion of the spring 47. This releases both doors from the lintel and the floor so that they may be swung open by the action of their respective motors 18, 19.

60 When the doors reach the fully open positions, the trips 50, 51 trip the pawls 27, then engaged, releasing the engagement of the driving discs 25—25 from further rotation of the pinions 24—24 in the "opening" direction, simultaneously with the full opening of the
65 doors and the disengagement of their driving

clutches, as described, the current is switched off and the motors stopped.

Contrawise when the current is reversed through the motors they operate contra-clockwise, with the pawls 26—26 in engagement
70 with the pinions 24—24 to cause them to roll along the segments 9, 10, to close the doors.

When the doors are fully closed the trips 52, 53, trip the pawls 26—26 out of engage-
75 ment with the pinions 24—24 to declutch the motors from further push on the doors in the "closing" direction, simultaneously with the opening of the motor circuits.

Declutching the motors, as described, protects them from being burnt out, should the
80 automatic switches fail to operate, as will hereinafter be more fully described.

The opening and closing stations or remote control of the doors, consist of pairs of insulated plates of ample area, A—B, C—D,
85 E—F, see Figure 14. These control circuits are preferably separate from the motor circuits so that they may be operated on lower voltage for obvious reasons. The motor circuit may be 110, 220 or other appropriate
90 voltage, and the control circuit may be transformed therefrom to 6 volts or be on separate battery or other source of current.

For opening the doors of garages, fire houses, and the like, wherein vehicles are
95 stored, the vehicles are provided with door opening controls. (See Figures 9, 10, 11.)

The underside of the floor boards of the vehicle is provided with the brackets 54—54
100 which support the casings 55—55, which in turn provide bearings for the transverse shaft 56. The push pedal 57 projects upward through the floor board 58 within convenient reach of the heel of the driver of the vehicle. This pedal is guided in the
105 bracket 59, fixed to the floor or in any other suitable manner. One edge of the pedal is provided with the rack teeth 60, enmeshed with the pinion 61, fixed on the shaft 56, whereby the thrust of the pedal 57 rotates the
110 shaft 56.

The rewind spring 60' has one end fixed to the shaft 56 and the other fixed to the adjacent casing 55, to rewind the shaft after the thrust of the pedal 57.

115 Suitable drums are fixed to the shaft 56 within the casings 55—55 to which one of the ends of the chains 62, 63 are fixed, so that the chains wind or unwind as the shaft 56 is rotated.

120 Pushing the remote control pedal down unwinds these chains, which descend through the casings at 64 until they rest upon the contact plates, as at A—B. This closes the actuating circuit through the chain 62 back to the chain 63, which is grounded in the auto-
125 mobile battery control circuit (see Figure 15) until the pedal is released and the spring 60 rewinds the chains and opens the circuit.

Closing the circuit as described causes cur- 125

rent to flow from the battery 65, across the switch 66', to the chain 62, to the plate A (see Figure 15.) From A it flows over the line 66 through the magnet 67, thence over the line 68, to the plate B and over the grounded line 69 back to the battery 65.

Energizing the magnet 67 (see Figures 12, 13, 14) attracts the armature 70 mounted on the dielectric bar 71, which closes the three pole contacts on the "open" side of the magnetic switch G. This permits the current to flow from the generator 72, over 73 to 74, through the magnetic field 75, 76 of the motors 18, 19 in the "opening" direction, thence over 77 across the G switch contacts 78, 79 to 80, thence back to the generator. From the generator 72 over 73, the current also passes from contacts 81, 82 of G to 83, through the armatures 84, 85 of the motors 18, 19, to 86, across contacts 87, 88, 78, 79 to 80 and thence back to the generator 72.

The magnetic latch 49 is in a shunt circuit 89, 90, 91 with the "opening" magnet 67, to release the latch 49 simultaneously with the closing of the G switch.

Thus utilizing the automobile battery 65 makes it impossible to open the doors 1, 2 by shortening the plates A—B, since there is no other source of power in the A—B circuit.

The motors 18, 19 will continue to function in the generator motor circuit until the doors 1, 2 are fully open and the trips 50, 51 have tripped their respective clutches out of engagement, as described.

The plates C—D are located within the garage. The automobile is driven into the garage as soon as the doors are fully open. The still pendant chains 62, 63 make contact with the plates C—D, sending current from the battery 65 across the plates C—D over 92 through the "closing" magnet 93, to reverse the G switch, back over 94 to the plate D and battery 65.

The motor current is then reversed through the armatures of the motors 18, 19, flowing from the generator 72, over 73 to contact 81, thence across switch G to 95, over 86 through armatures 85, 84 to 83, thence to contact 96, across G to 88, 78, 97, 80 and back to the generator 72.

The motors are thus reversed by reversing the direction of the current flow through their armatures. The motors continue to operate to fully close the doors, until declutched by the trips 52, 53.

The motors 18, 19 may be separately wired to the magnetic switch. In this case, the switch contacts may be timed so that the motor 19 receives current slightly ahead of the motor 18 to insure the proper functioning of the latch mechanism.

When the doors are fully closed the pedal 57 is released and the chains 62, 63 raised from contact with the plates C—D by the rewind spring 60', as described.

If it is desired to operate the doors independent of the automobile, they can be opened by closing the switch 98. The current then flows from the battery 99 across switch 98 to 89, through the latch 49, and magnet 67, thence over 90 and 91 back to the battery. Energizing the "open" magnet 67 closes the motor circuit to open the doors as previously described.

The operation is reversed by closing the switch 100. The current then flows from the battery 99 across the switch 100 to 92, through the "close" magnet 93 to 101, back to the battery 99. Operating the magnet 93 reverses the current through the motor circuit to close the doors as described.

The key switch 103 is mounted on the outside of the doors and is connected in parallel with the opening switch 98. The doors may thus be conveniently opened from the outside by closing the key switch. Current then flows from the battery 99 across the switch 103 to 89 and energizes the "open" magnet to open the doors.

This key switch could also be introduced into the motor circuit instead, if preferred. A transformer could be substituted for the battery 99, and its circuits thus operated off the motor circuit or other source of available current.

When the car is backed out of the garage, off the plates C—D, the pedal 57 is depressed so that the chains 62, 63 will contact the plates E—F, outside the garage doors.

The current flows from the battery 65, over switch 66 to plate E, thence over 104, 101, magnet 93, to plate F, thence over chain 63 and ground to the battery 65, thus closing the switch G to actuate the motor circuit to close the doors 1, 2, from the automobile.

There are three distinct electric circuits. The "remote control" circuit energized by the automobile battery 65; the "actuating circuit" energized by the batteries 65 or 99, to actuate or close the motor circuit selectively through the magnetic switch G; and the motor circuit energized by the generator 72. The remote control and actuating circuits are one in effect.

Having thus described this invention what is claimed and desired to secure by Letters Patent is:

1. In combination with a pair of hinged doors; arcuate rack segments fixed relative to the hinge centers of said doors; trips at the ends of said segments; an electric circuit, reversible motors on said doors engaging said segments, and a reversible switch in said circuit; a remote control for said switch; and clutches interposed between said motors and segments and engaging said trips.

2. In combination with a door, an electric motive circuit, motive means in said circuit adapted to open and close said doors, a reversing switch in said motive circuit, an open

actuating circuit controlling said switch and having a pair of spaced contact plates, flexible contacts in a vehicle battery circuit adapted to make contact with said plates to close said actuating circuit, and means for withdrawing said flexible contacts from said plates.

3. In combination with a door, an electric motive circuit, motive means in said circuit adapted to open and close said door, a reversing switch in said motive circuit, an open actuating circuit controlling said switch for the opening of said door and having a pair of spaced contact plates, a second open actuating circuit controlling said switch for the closing of said door, contacts in a vehicle battery circuit adapted to make contact with either pair of contact plates to close said actuating circuit.

4. In combination with a door, an electric circuit, a reversible motor in said circuit and mounted on said door, a segment fixed to the frame of the door relative to the hinge centers thereof and engaged by said motor, a trip at each end of said segment, a clutch interposed between said motor and segment and having a pawl adapted to be released by said trips.

5. In combination with a pair of doors hinged in a door frame, an electric motive circuit, motive means in said circuit for opening and closing said doors, a bolt on one of said doors adapted to engage said door frame when said door is closed, a bell crank connected to said bolt, a bracket mounted on the second door and adapted to engage said bell crank when the doors are closed to force said bolt into engagement with said door frame, and a latch for locking the two doors together when closed.

6. In combination with a pair of doors hinged in a door frame, an electric motive circuit, motive means in said circuit for opening and closing said doors, a bolt on one of said doors adapted to engage said door frame when said door is closed, a spring urging said bolt out of engagement with said door frame, a bell crank connected with said bolt, a bracket mounted on the second door and adapted to engage said bell crank when the doors are closed to force said bolt into engagement with said door frame against the tension of said spring and an electrically operated latch for locking the two doors together when closed.

In testimony whereof I have hereunto affixed my signature.

FRANK M. NUNEZ.