

S. ELLIOTT.  
ELECTRICALLY OPERATED DOOR.  
APPLICATION FILED AUG. 7, 1916.

1,326,130.

Patented Dec. 23, 1919.

3 SHEETS—SHEET 1.

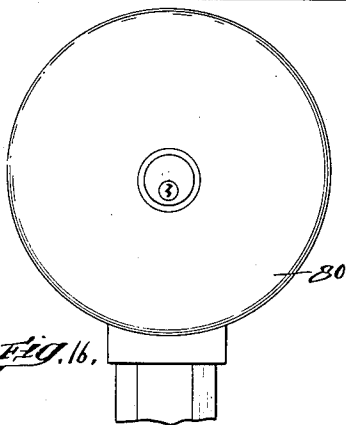
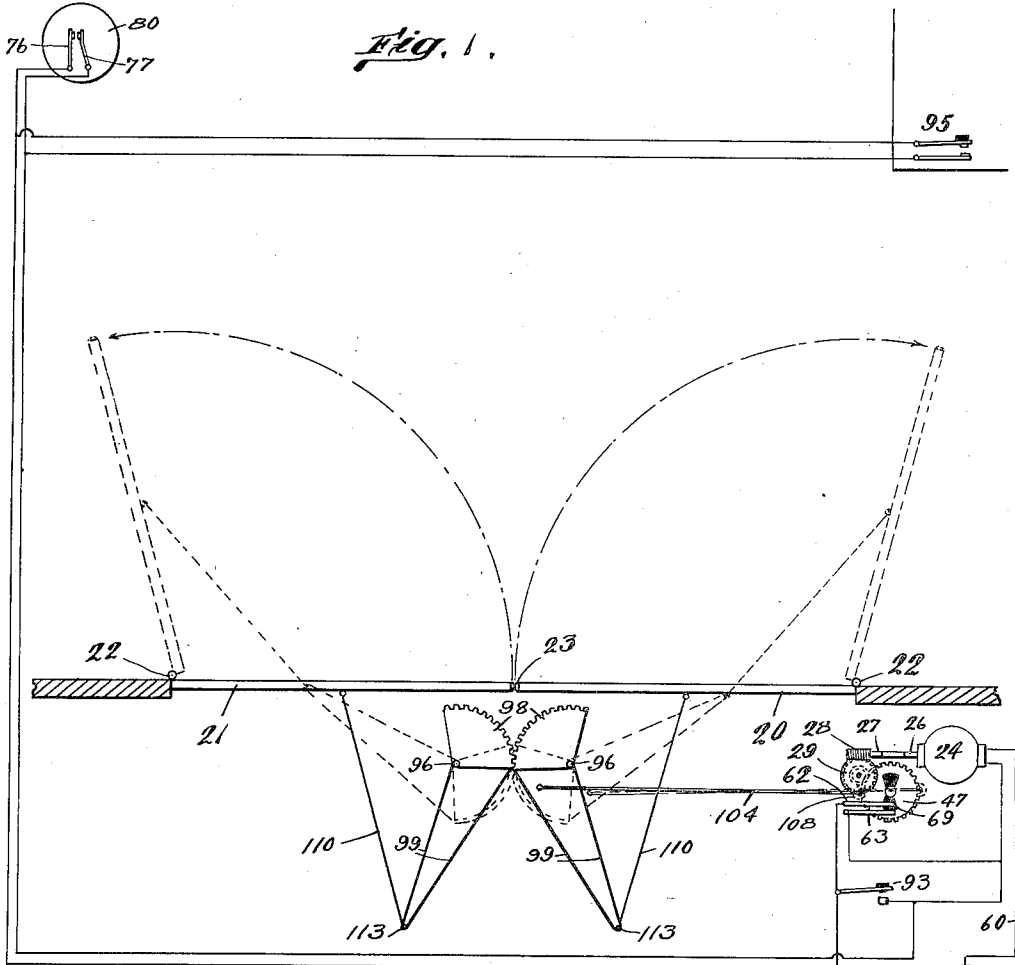


Fig. 16.

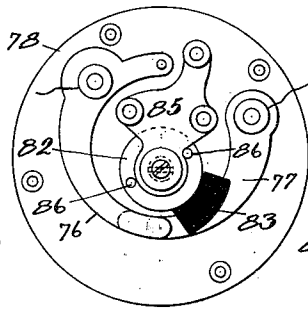


Fig. 17.

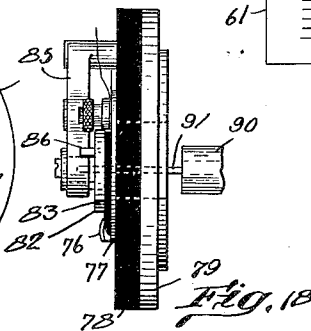


Fig. 18.

Witness,  
H. B. Davis

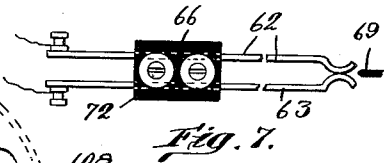
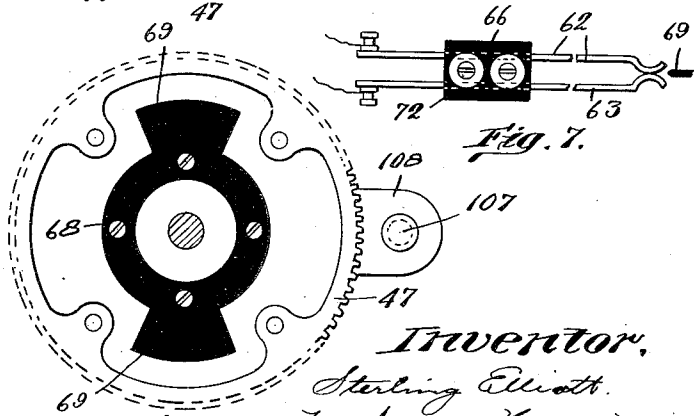
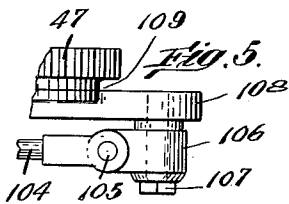
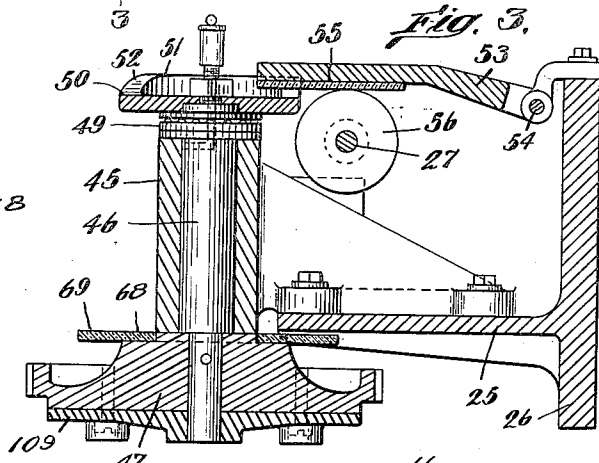
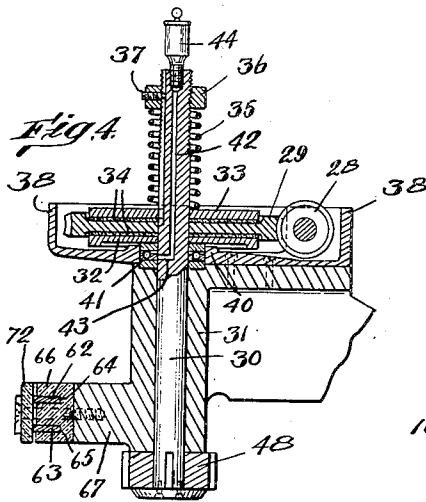
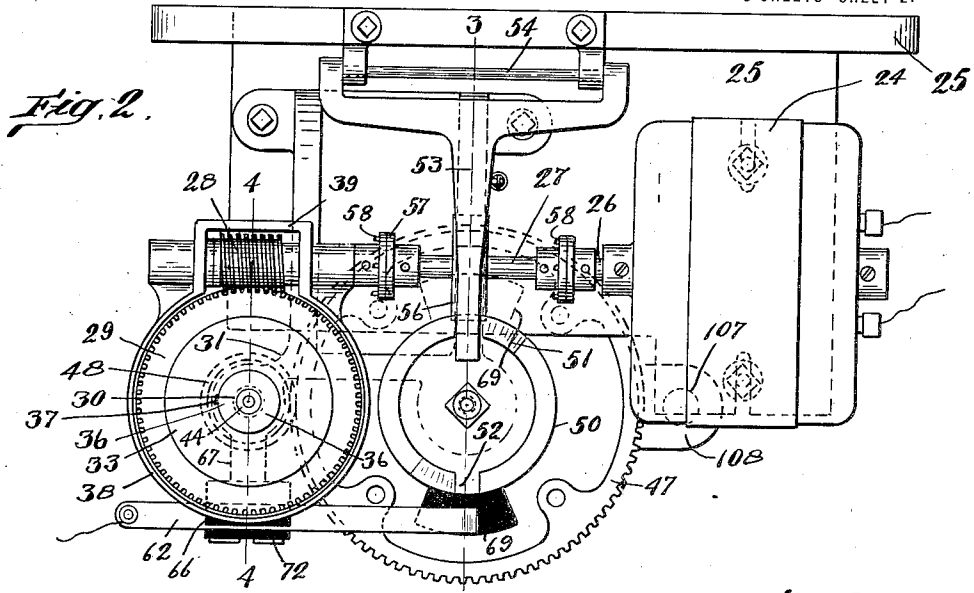
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3 SHEETS—SHEET 2.



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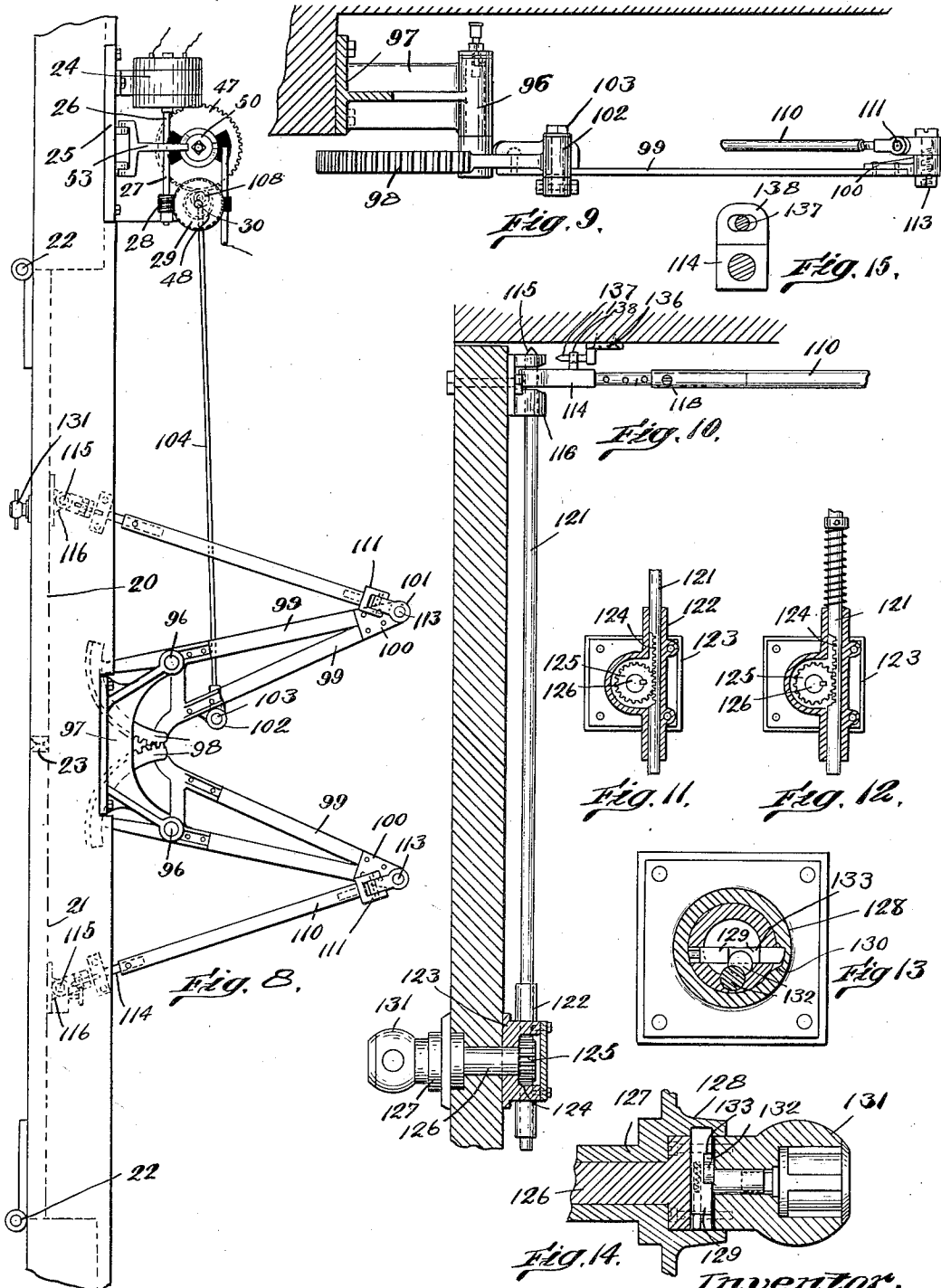
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3 SHEETS—SHEET 3.



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# UNITED STATES PATENT OFFICE.

STERLING ELLIOTT, OF NEWTON, MASSACHUSETTS.

ELECTRICALLY-OPERATED DOOR.

1,326,130.

Specification of Letters Patent.

Patented Dec. 23, 1919.

Application filed August 7, 1916. Serial No. 113,555.

*To all whom it may concern:*

Be it known that I, STERLING ELLIOTT, a citizen of the United States, residing at Newton, in the county of Middlesex and State of Massachusetts, have invented an Improvement in Electrically-Operated Doors, of which the following is a specification.

This invention relates to door-operating mechanism arranged for electrical control, by which a door, or a pair of doors may be positively opened and closed, and governed from one or more distant points.

The door-operating mechanism of the present invention is adapted for general use and application in those places where it is desirable to have the door or doors arranged to be automatically opened and closed, with the control of the automatic means adapted to be governed from one or more remote points.

In the present embodiment of my invention the door-operating mechanism is designed, when operated, to open the door or doors in case they are closed, or to close the door or doors in case they are open. The door-operating mechanism has an electric-motor, as a motive power, and the circuit of said motor is adapted to be controlled at a plurality of different points, as for instance, there may be a controller for the circuit of the motor arranged in the garage; another circuit-controller arranged adjacent the drive-way leading to the garage; and another circuit-controller arranged in the residence of the garage owner; and closure of any circuit-controller will cause the motor to operate.

The operating-mechanism is such that upon closure of any circuit-controller and consequent operation of the motor, the doors will be moved from the position they occupy to the other position, and the next succeeding closure of any circuit-controller will move them in the opposite direction or return them.

The motor circuit also has a switch adapted for automatic operation by the motor, by which to open the circuit at the end of a predetermined movement or cycle of operation of the operating-mechanism, to stop the motor when the doors have been moved to either opened or closed position, as the case may be.

The invention is also designed to provide a means whereby the motor-operated mechanism may be temporarily disconnected from the door or doors, to permit the latter to be

opened and closed by hand in the usual manner, when such operation is desired, as in the event of the automatic mechanism becoming inoperative from any cause.

In the drawings:—

Figure 1 is a diagrammatical view illustrating in plan the door-operating mechanism, actuating-means therefor, and controlling-means for said actuating-means.

Fig. 2 is a plan view of the motor and mechanical cooperating parts.

Fig. 3 is a section on the line 3—3 of Fig. 2.

Fig. 4 is a section on the line 4—4 of Fig. 2.

Fig. 5 is a broken detail in elevation showing the connection on the operating-rod with the motor-driven element.

Fig. 6 is a plan of the motor-driven element or gear illustrating the automatic switch.

Fig. 7 is a detail in elevation illustrating the connecting circuit contact arms for the motor switch.

Fig. 8 is a plan showing the mechanically operated parts of the structure in connected relation.

Fig. 9 is a view in elevation and partly in section, showing one of the door-carrying members of the actuating-mechanism.

Fig. 10 is a view in elevation, partly in section, illustrating the means for permitting temporary disconnection of a door operator from the door to allow ordinary hand operation of the door.

Fig. 11 is a vertical section illustrating the connection between the key-controller hand-turning member and the pivot-rod of the disconnecting means.

Fig. 12 is a similar view showing the same means for the opposing or other door.

Fig. 13 is a vertical transverse section illustrating the locking-means for the key-controlled hand-turning member.

Fig. 14 is a vertical longitudinal section of the same.

Fig. 15 is a detail of the supporting bracket for the connecting-rod.

Fig. 16 is a side elevation of a portion of a post for a key-controlled circuit-controller.

Fig. 17 is a plan of a key-controlled circuit-controller arranged at a suitable point for closing the circuit of the motor.

Fig. 18 is a side elevation of the key-controlled circuit-controller.

In the embodiment of my invention, as here

shown, 20 and 21 represent a pair of swinging doors for closing a private garage, or the like, said doors being mounted for swinging movement on hinges 22, see Figs. 1 and 8. These doors are, or may be, provided with half round rubber strips 23 at their meeting edges.

The door operators are arranged at the inside of the doors, usually at the top, and in case two doors are employed said operators are, or may be, of duplicate construction. 96, 96, represent the pivot shafts for the door operators, which are supported in bearings borne by the two arms of a bracket 97, fixed to an appropriate support immediately above and adjacent the meeting edges of the doors.

The door operators, as here shown, each comprise a toothed sector 98, and a skeleton-like frame bolted thereto, which frame includes a pair of bars 99, extended convergently from the sectors, and connected at their extremities by a plate 100, and means preferably adjustable connecting the connected extremities of the bars 99 with the door, such means comprising a tubular rod 110, one end of which is connected by a universal joint 111, with a pivot-pin 113, extended through the plate 100, and the other end of which slidably receives the stem of a hinge-connector 114, which is arranged on the pintle 115, of a hinge-member 116, which is secured to the door.

The sectors 98, 98, of the door operators are arranged in substantially the same horizontal plane and mesh with each other, so that their movements are alike, and movement of either will effect a corresponding movement of the other, resulting in swinging the doors alike, in both directions. The extent of swinging movement of the doors may be adjusted by adjusting the relative positions of the sliding stems of the hinge-connectors 114, thereby lengthening and shortening the door rods 110, and said stems are provided with a series of holes adapted to receive a screw 118, for the accomplishment of this result.

The bars 99 are made independent of the sectors and bolted thereto, so that they may yield independently in case of undue stress exerted upon them. Suitable actuating-mechanism is provided for oscillating the door operators on their pivots, thereby to open and close the doors, and said actuating-mechanism is connected with one of the door-operators and adapted to oscillate it, and by means of the toothed sectors the other door-operator will be correspondingly moved. As here shown one of the door operators has a perforated ear 102, arranged on one of the bars 99, or elsewhere, which receives a pivot-stud 103, to which is connected one end of a connecting-rod 104, and the other end of said rod is pivotally con-

nected by a pin 105, see Fig. 5, to a bearing collar 106, supported upon a crank-pin 107, fixed to an ear 108, extended radially from a disk-member 109, which is bolted or otherwise secured to the under side of a gear 47, forming a component part of the actuating-mechanism, and which is adapted to be rotated, as will be hereafter described. Upon rotation of said gear, and the consequent revolving of the crank-pin, the connecting-rod 104 will be reciprocated longitudinally, and the door operators moved on their pivots to swing the doors outward and inward, said doors moving in one direction upon longitudinal movement of the connection rod in one direction, and moving in the other direction upon longitudinal movement of the connecting rod in the other direction. Thus it will be seen that upon a half rotation of the gear, the doors will be moved in one direction, and upon the other half rotation thereof the doors will be moved in the other direction, a complete rotation of the gear resulting in opening and closing the doors.

The gear 47, or equivalent components of the actuating-mechanism is adapted to be rotatably driven by an electric motor through suitable speed reducing gearing, which serves as and constitutes an electrically operated actuating-mechanism for the door operators.

24 represents an electric motor which is supported upon a bracket 25, secured to a suitable support, inside of the garage, and 26 represents the motor-shaft.

The motor directly or indirectly operates a main-shaft 27, mounted in suitable bearings, and disposed in a plane parallel to the plane of the closed doors, and arranged at one side of the doors, see Fig. 8. On the end of the main-shaft 27, see Fig. 2, remote from the motor, is provided a worm 28, which engages a worm-gear 29, arranged on a vertical shaft 30, supported in bearings 31, fixed to a support. A pinion 48 is secured to said shaft 30, which engages the drive-gear 47.

It may happen that the doors in opening or closing will meet an obstruction which will restrain or prevent their further movement, hence it is desirable to permit independent movement of the worm-gear on the shaft 30, in such event, to avoid undue strain or breakage of the operating parts. To this end the worm-gear has a frictional clutch connection with the shaft 30, here shown as comprising a metallic disk 32, fixed upon the shaft 30, above which is loosely arranged the worm-gear 29, and above said worm-gear is arranged a disk 33, which is adapted to slide on the shaft but rotate therewith, and between the proximate faces of the disks 32 and 33, and worm-gear there are provided clutch-disks 34. The upper disk 33

is held in clutching operation through a spring 35 coiled about the shaft 30, which is adjusted to exert the desired degree of pressure by a nut 36, threaded upon the upper end of the shaft and held in locking position by a set screw 37. Under undue obstruction of the movement of the doors in either direction, the clutch engagement between the disks 32 and 33 and worm-gear 29, will be overcome, and the worm-gear permitted to move independently of the shaft 30, to permit a full operation of the motor, and thus avoid strain or possibility of breaking such parts.

To secure effective cooperation of the worm and worm-gear with minimum friction, and, at the same time, to avoid excessive noise of the gears, I prefer to employ on the support an oil or grease receptacle 38 in the form of a substantial open cylindrical body surrounding the gear and having an offset portion 39 inclosing the worm. The base of the oil receptacle is formed with a hub 40, encircling the shaft and between which and the shaft is arranged a thrust bearing 41 for supporting the lower clutch disk 32, and thereby the shaft. From the relatively outer portion, the bottom of the oil receptacle inclines downwardly toward the hub and the inner portion thereof is similarly inclined so that the offset portion of the oil receptacle is beneath that part of the gear and the worm 28. By this means the oil is directed to the worm by gravity and consequently the worm-gear and worm is effectively lubricated, as long as there is lubricant within the receptacle. To properly lubricate the thrust-bearing and thereby the shaft 30 in its bearing, said shaft is formed with a vertically extending channel 42 and lateral opening 43 leading to the thrust-bearing, the upper end of the channel being enlarged and arranged to receive an oil cup 44 to maintain a supply of oil to the thrust-bearing.

That portion of the supporting shaft 46, for the driving-gear 47, above the bearing 45, for said shaft, is provided with a thrust-bearing 49, and secured upon the shaft above the bearing is a cam-member 50, having a cam-portion 51, with diametrically opposed depressions 52. A brake-arm 53, is pivotally supported at 54 on the main support, and the under side of the free end of said arm has a brake shoe 55, adapted to cooperate with the brake disk 56, secured upon the main shaft 27. The free terminal of the arm 53 is adapted to ride upon the cam-portion 51, the normal or housed parts of said cam-portion serving to support the brake-shoe free from contact with the brake disk, the depressions 52 in the cam-portion serving to permit a downward movement of the arm and permitting operation between the shoe 55 and the disk 56. The depres-

sions 52 are so arranged as to tend to stop the main shaft at predetermined points in movement of the driving gear, in order that said gear may be correctly positioned to stop when the doors are fully opened or closed. Furthermore, for convenience in overcoming the binding action, in the event of distortion of the support or frame-work, the main-shaft 27 is composed of sections, see Fig. 2, connected at their respective terminals through disk-heads 57, the adjacent heads being connected with pins 58, projecting from one head and slidably entering the holes formed in the other head. This permits a limited independent longitudinal play of the several portions of the shaft beyond the motor, with the effect to compensate for irregularity, and prevent binding action particularly between the worm and worm-gear.

The operating circuit of the motor, as here shown, includes circuit wires 60, 61, leading, respectively, from opposite sides of any suitable source of electrical energy, the circuit wire 60 extending to one side of the motor, and the circuit wire 61 having arranged therein in series multiple a plurality of circuit controllers, and also an automatic switch extending to the other side of the motor.

The circuit controllers are adapted for manual operation and the automatic switch is associated with the motor and adapted to be operated by it at the end of a door-operating movement.

The automatic switch comprises a pair of contact arms 62, 63, the arm 62 being adapted to engage the arm 63, and said arms being connected by circuit wires with the motor.

The arms 62, 63, are resilient and are arranged in slots 64, 65, formed in an insulated block 66 secured to an offset portion 67 of the bearing 31 for the shaft 30, and said arms extend toward the gear 47 and into the path of movement of projections 69, of an insulated disk member 68, which is secured to the hub of said gear 47. At predetermined times in the rotation of the disk-member; that is, when said disk-member has been turned to a position to open or close the doors, one of said projections of the insulating disk-member will pass between the arms 62, 63, thereby interrupting the circuit and stopping the motor. At such time, the cam will operate the brake to prevent further or overrunning of the motor.

The transverse dimensions of the arms 62, 63, is slightly greater than the depth of the slots 65, and of block 66, and a clamping plate 72 is designed to be secured to the outer surface of the block 66, to bear upon the projecting portions of said arms and secure them against longitudinal movement in the slots 65. By loosening the clamping plate, the arms may be adjusted longitudi-

nally, and hence the exact point at which the motor circuit is opened may be determined, thus providing for an adjustable control for the motor, so that the doors may be fully  
5 opened and fully closed.

The several circuit controllers are adapted to close the motor circuit to start the motor, and one such circuit controller is adapted to be arranged on a post at the side of the  
10 drive-way leading to the garage, within convenient reach of the driver of a machine, so that when desired to enter the garage, he may stop at the post and operate said circuit controller and cause the doors to open,  
15 or when leaving with the car, he may stop at the post and operate said circuit controller and cause the doors to close. To avoid this circuit controller being operated by mischievous persons, it is adapted for operation by a suitable key. Said circuit controller, as here shown, (see Figs. 16, 17, and  
20 18) comprises essentially a pair of resilient contact arms 76, 77, which are circularly formed and attached at one end, their other ends overlapping one another, and normally held out of engagement with each other by suitable means to be described, and adapted for engagement with each other when permitted. These contact arms are supported  
25 by an insulated support 78 secured to a metal support 79. To normally hold the contact arms out of engagement, a rotatable member is provided consisting of a disk 82 having an insulated projection 83 arranged  
30 with respect to the circularly formed contact arms to be moved to a position between the free end-portions thereof to separate them and to be moved out of such position to permit them to engage each other. Such  
40 positions of the rotatable member are determined by pins 86, 86, arranged thereon and adapted for engagement with the side edges of a support 85, which is especially provided for said rotatable member, and  
45 which is secured to the insulated plate or support 78. These parts all being secured together constitute a unit which is adapted to be placed in a cylindrical case 80 adapted to be arranged on the post. There is provided in the case a lock of the Yale or other  
50 type, having a barrel 90 with a flat plate 91 projecting from its inner end, which passes through holes in the supports 79, and 78 and enters a hole in the rotatable member 82 by  
55 which to turn said member to move its insulating projection into and out of engagement with the contact arms. The insertion of the key and the rotative movement thereof thus operates to turn the rotatable member 82. It is important that the key shall  
60 not be withdrawn until the rotatable member has been restored to normal position, and the locking-means above described provide for the turning of the key only a short  
65 distance, thus admitting of its return to nor-

mal to permit of its withdrawal. The circuit will be closed by a turning movement of the key in one direction, and will be held closed until the key has been turned backward to normal position. 70

Also for the purpose of starting the motor from different locations there may be a circuit-controller 93 located in the garage, and adapted to control the motor circuit, and there may be another circuit-controller 75 95 located in the house of the owner likewise adapted to control the motor-circuit, and these circuit-controllers may be of any well-known or suitable construction adapted to close the circuit by manual operation and  
80 to hold the circuit closed at such point while held manually, until the circuit is closed by the action of the motor, through the medium of the spring arms 62, 63, and to open the circuit at such point when manual pressure  
85 is relieved.

With operating mechanism of this type, it is sometimes desirable, or necessary, in the event of failure of the current supply, to operate the doors by hand, and, in such case,  
90 to avoid the necessity of actuating the door operators and mechanism connected therewith by such hand movement of the doors, the present invention contemplates means whereby the door operators may be separately  
95 disconnected from the doors, so that the doors may be moved by hand in the usual manner. To this end, there is secured to each door means for withdrawing the  
100 pintle 115 of the hinge member of the door operators connected therewith, and, as here shown, a vertical rod 121, see Fig. 10, forms an extension of the pintle 115, which is made of considerable length, and at its lower end  
105 extends through a guide-sleeve 122, see Figs. 11 to 13, arranged in a casing 123, secured to the inside of the door. Within the guide sleeve said rod 121, is formed to provide a  
110 rack 124, which is engaged by a pinion 125, keyed upon the reduced end of a shaft 126, mounted in a bearing in the door. The shaft 126 is provided with operating means by which it is rotated to in turn move the rod  
115 121 longitudinally, and move the pintle out of or into engaging position. The operating means on one door will be arranged on the  
120 outside, and on the other door will be arranged on the inside, and if desired they may be made alike, but in any event the outside operating-means will be key controlled,  
125 in which event the shaft 126 is arranged in an annular casing 127, which is enlarged in the form of a barrel 128, see Fig. 13. A locking bolt 129 is arranged for transverse movement in the barrel, it being adapted, in  
130 locked position, to engage a notch 130, in the casing to provide rotative movement of the barrel, and hence prevent operation of the shaft 126. The barrel 128 is extended beyond the casing and provided with an op- 130

erating knob 131, which is arranged with a lock, as a Yale or similar type, the tumblers of which, 132, as illustrated, are adapted under key manipulation to be projected into a slot 133, of a locking bolt, so that a further turning of the key will withdraw the bolt from locking coöperation with the casing and permit operation of the shaft by turning the knob. It is not deemed necessary to provide a key-controlled lock for the inside operating means, hence in such instance, the barrel 128 may be free in the casing 127, adapting it to be operated at will by the knob.

When the pintle 115 is withdrawn, the extremity of the connecting-rod 110 will be disconnected from the hinge-member 116, and when the door is opened said extremity will be left unsupported, unless means are provided for supporting it at such time. Therefore, as here shown, a bracket 136 is secured to a support at the top of the door, having a laterally extended pin 137, arranged in parallel relation with the connecting-rod 110 and extended in a direction toward the door, and said pin is adapted to enter a hole in an ear 138, arranged on top of the hinge-connector 114, when the door is in closed position, and to support the extremity of the connecting rod when the pintle is withdrawn and the door is opened. Furthermore, it will be noted that the adjacent faces of the ears of the hinge-member 116 are, or may be, beveled to admit of the easy entrance therebetween of the hinge-connector, when the door is moved into closed position.

In case the pintle is not withdrawn and the door is opened, the hinge-connector will

slide along on the pin 137, and disengage said pin, but will be subsequently returned into engagement with the pin when the door is closed.

It is obvious that a single door may be operated by substantially the same means and in substantially the same manner as are the double doors here shown, and, therefore, both types come within the scope of my invention; and furthermore, the door or doors may be arranged to slide instead of to swing, as both such types are common.

I claim:—

1. A door-operating mechanism comprising door operators connected with the doors, actuating-mechanism therefor including a motor, means adapted for controlling said motor from a remote point, the door-operating mechanism being detachably connected with the doors, permitting said doors to be swung by hand when disconnected from the operating mechanism.

2. In a door operating mechanism, door operators connected with the doors, actuating mechanism therefor including an electric motor, a pair of contacts arranged in the motor circuit for the control thereof, and an insulating block carried by the actuating mechanism arranged to be rotated between said contacts in predetermined positions of the doors and to be rotated in the same direction from between said contacts.

In testimony whereof I have signed my name to this specification, in the presence of two subscribing witnesses.

STERLING ELLIOTT.

Witnesses:

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