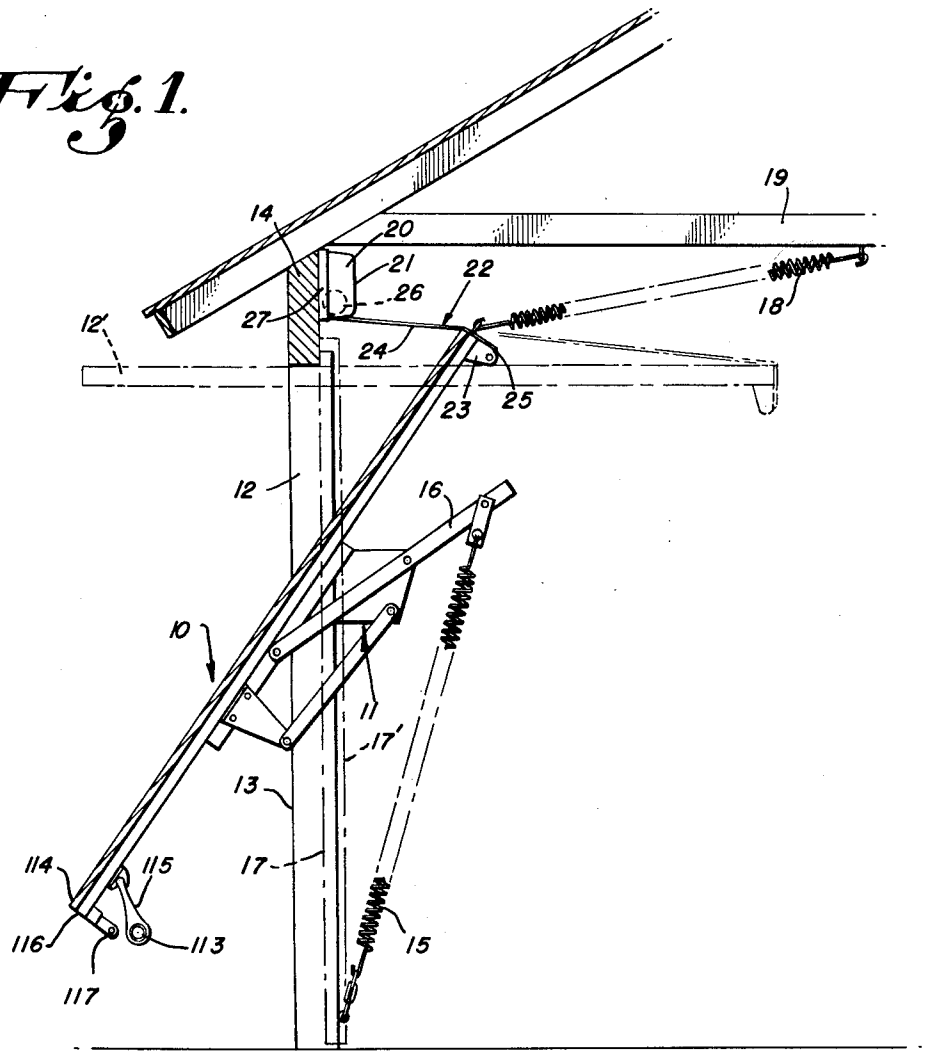
May 23, 1961 G. H. MARMONT ET AL 2,985,446

GARAGE DOOR OPERATING MECHANISM

Filed Aug. 20, 1956 4 Sheets-Sheet 1

Fig. 1.



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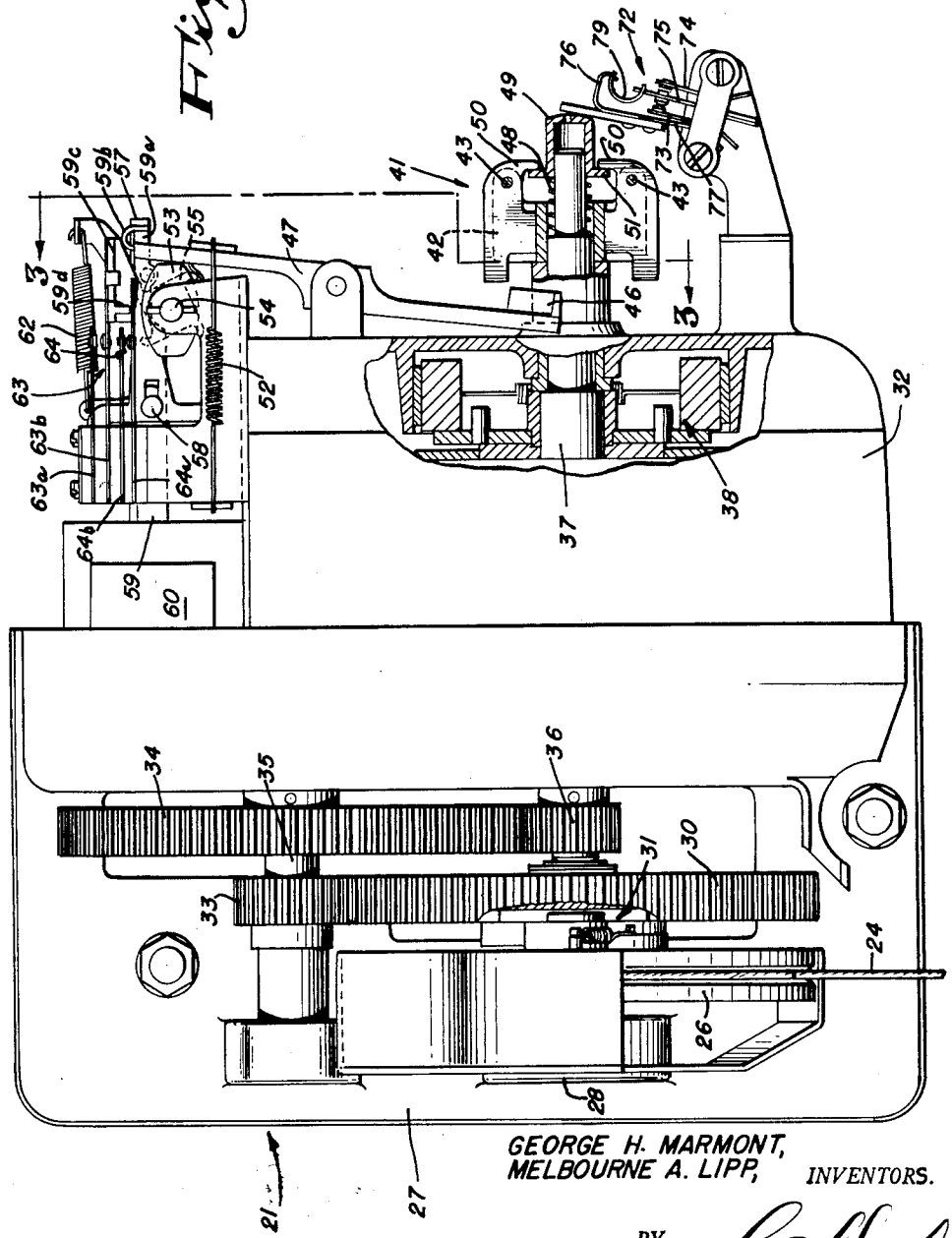
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GARAGE DOOR OPERATING MECHANISM

Filed Aug. 20, 1956 4 Sheets-Sheet 2

Fig. 2.



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GARAGE DOOR OPERATING MECHANISM

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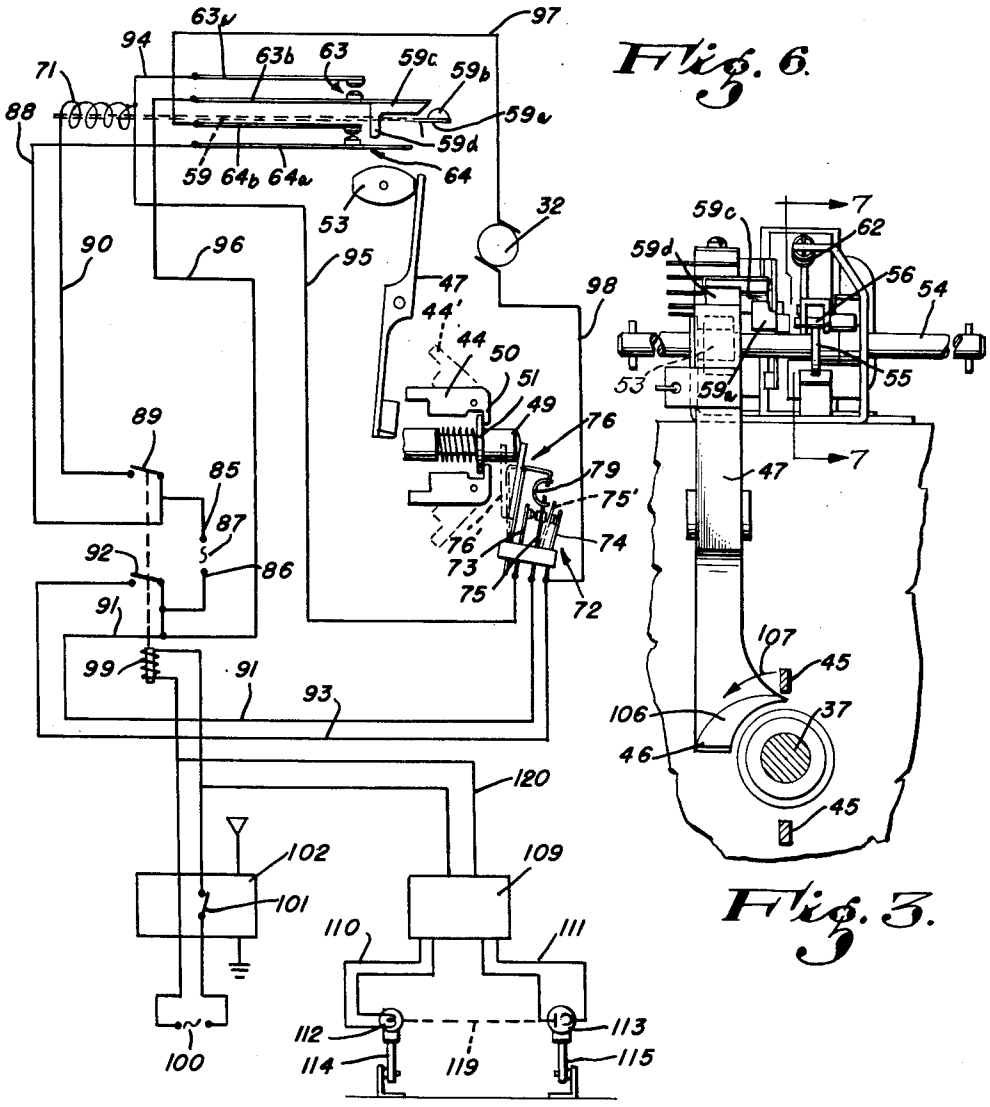


Fig. 6.

Fig. 3.

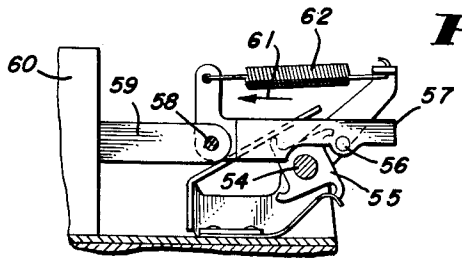


Fig. 7.

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GARAGE DOOR OPERATING MECHANISM

Filed Aug. 20, 1956 4 Sheets-Sheet 4

Fig. 4.

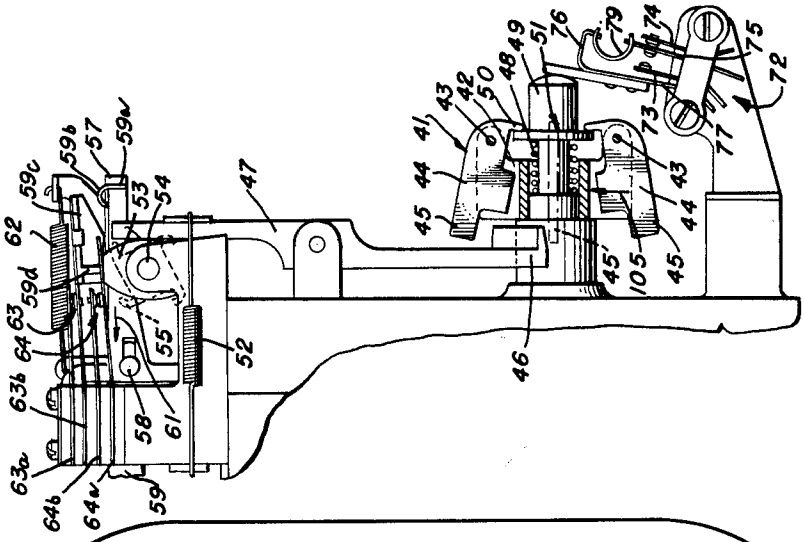
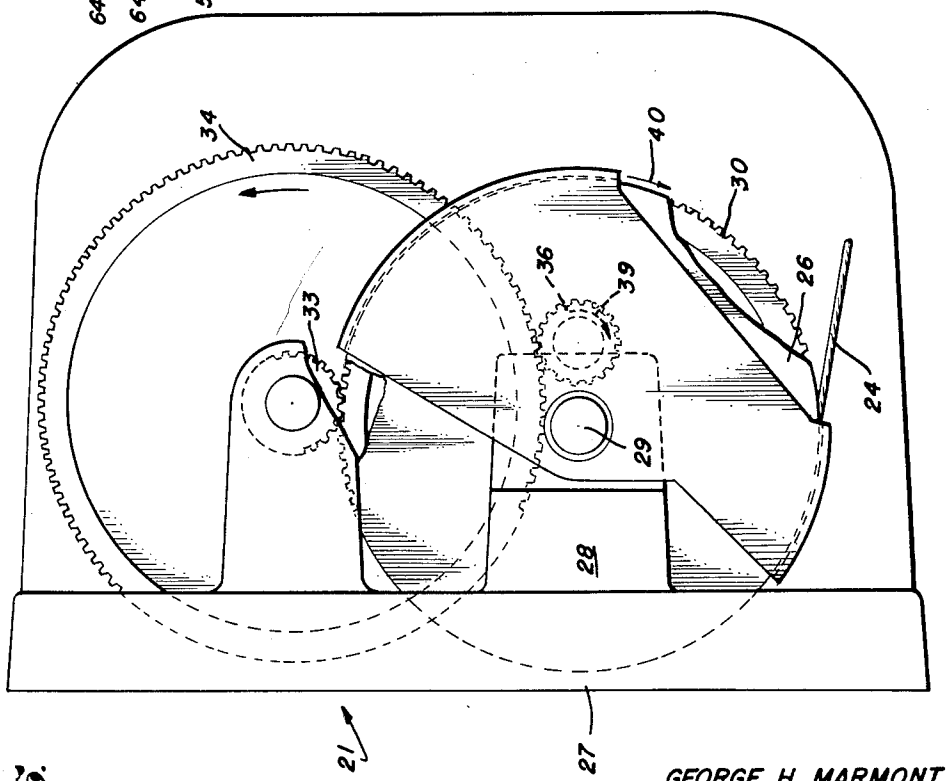


Fig. 5.



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Patented May 23, 1961

2,985,446

GARAGE DOOR OPERATING MECHANISM

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Filed Aug. 20, 1956, Ser. No. 604,885

16 Claims. (Cl. 268—74)

This invention relates in general to devices for operating closures and relates in particular to a device for opening and closing garage doors, especially those of the overhead type. It is an object of the invention to provide a simple and dependable device, adapted to be remotely controlled for opening and closing door members. Herein an embodiment of the invention will be described which is especially suited for the opening and closing of an overhead garage door, but it is to be understood that the specific terminology employed in connection with doors for garages, for example, is not intended to place a limitation on the type of closure with which the invention may be employed.

Garage doors of the overhead type are supported and/or guided so that they may be moved upwardly from vertical, doorway-closing position to a raised position in a substantially horizontal plane contiguous to the upper margin of the doorway. It is an object of the invention to provide a door actuator having means, adapted for remote control, for applying power to move the door downwardly from raised position to closed position against the force of a spring which is capable of moving the door from closed to open position when a latching or holding mechanism of the device is released.

It is an object of the invention to provide a door actuator which may be electrically controlled from a switch which may be manually actuated or has means of actuation responding to a transmitted wave originating, for example, in apparatus carried by an automotive vehicle.

It is an object of the invention to provide a door closing mechanism having means for yieldably applying a force, such as a spring, for example, tending to move the door in one of its directions, and power driven means for moving the door in its opposite direction of movement, and latch means for holding the door against movement by the yieldable means for applying force thereto, and means for releasing the latch, selectively operable by a person desiring to effect movement of the door.

It is a further object of the invention to provide a door actuating mechanism wherein the means for moving the door in a direction opposite the yieldably applied force consists of a flexible line such as a cable arranged to have one end wound upon a power driven reel, reverse rotation of which is prevented by a latch.

A further object of the invention is to provide a door operating mechanism which is motor driven and is provided with a motor controlling switch means for closing an electric circuit through the motor, there being means for deenergizing the motor when the door has been moved into an extreme position.

A further object of the invention is to provide a door operating mechanism wherein the speed of the motor reduces or the motor stalls when the door has been moved into its extreme position, and wherein the means for deenergizing the motor responds to a reduction in speed or stalling of the motor.

In the preferred form of the invention a latch means

acts, when the motor is deenergized, to prevent reverse rotation of the motor and thereby holds the door in the position in which it has been moved. Simple means are provided for releasing the latch so that the motor may rotate in reverse direction and permit the spring, or other yieldable force exerting means, to move the door into its other position.

Further objects and advantages of the invention may be brought out in the following part of the specification wherein many small details have been described for the purpose of competence of disclosure, without intending to limit the scope of the invention which is set forth in the appended claims.

Referring to the accompanying drawings which are for illustrative purposes only:

Fig. 1 is an elevational section schematically showing a preferred embodiment of the invention connected to a garage door and the frame therefor;

Fig. 2 is a sectional view of the power mechanism of Fig. 1 to a larger scale;

Fig. 3 is a fragmentary sectional view looking leftwardly from the plane 3—3 of Fig. 2;

Fig. 4 is a fragmentary face view of the switch and control mechanism of Fig. 2 in a second position thereof;

Fig. 5 is a side view of the power device taken from the position indicated by the line 5—5 of Fig. 2;

Fig. 6 is a wiring diagram of the electrical equipment of the invention; and

Fig. 7 is a fragmentary sectional view taken as indicated by the line 7—7 of Fig. 3.

Fig. 1 shows a garage door member **10** supported by hinge means **11** so that it may be swung from a vertical position in which it closes the door opening **12** defined by a door frame **13**, upwardly in clockwise direction to a raised horizontal position contiguous to the lintel **14** of the door frame **13**, as shown by dotted lines **12'**. The hinge mechanism **11** includes a counterbalancing tension spring **15** which is connected to the inner end of one of the levers **16** of the hinge mechanism **11**. Dotted lines **17** indicate one extreme position, namely the closed position, of a door member **10**, and the dotted lines **12'** indicate the other extreme position of the door member **10**.

The invention includes yieldable means for urging the door member into one of its positions and power operated means for moving it into the other of its positions. As this description proceeds, it will be understood that the yieldable means may be employed so as to urge the door member **10** into either one of its positions and that the power operated means may be then employed to move the door member into the other of its positions. In the form of the invention shown a helper spring **18** is connected to the upper end of the door member **10** and to a rafter **19** of the garage, so that it will act in tension to move the door member in a first direction, namely, upwardly and clockwise, into the position **12'** which may be referred to as the first extreme position of the door member. An actuator **20** is connected to the door member **10** and the frame member **13** and is actuated to act, against the tension of the spring **18**, to move the door member **10** from the first position **12'** thereof, counterclockwise and downwardly into the vertical position **17'** which may be referred to as the second extreme position of the door member **10**.

Although the positions of the actuator parts may be reversed, the disclosed form of the actuator **20** is shown as including a power unit **21** which is connected to the header or lintel **14** above the center of the door member **10** and a linkage **22** extending from the power unit **21** and being connected to the upper edge of the door by use of an attaching bracket **23**. The linkage **22** comprises a cable **24** which is wound upon and extends from a sheave **25**, mounted contiguous to the upper edge of

the door member 10, to the bracket 23. As the reel 26 is rotated in clockwise direction tension is applied to the cable 24 with the result that a force then acts tending to move the lintel member 14 and the upper end of the door member 10 toward each other, but since only the door member 10 is movably supported, this force results in movement of the door member in counterclockwise direction toward and in a vertical door-closing position 17 with relation to the frame member 13.

The power unit 21 includes a base 27 which is adapted to be attached to the header 14 by screws. It has members 28 supporting a shaft 29 on which the reel 26 is rotatable. A gear 30, also rotatable on the shaft 29, is connected to the reel 26 through a one-way or free wheeling clutch 31. The gear 30 is adapted to be driven by a motor 32 through reduction gears 33 and 34, fixed on a shaft 35 and driven by a pinion 36 which is fixed on a motor driven rotary member 37, consisting of the shaft of the motor 32. The motor 32 is of shaded pole type and has therein a speed limiting means 38 of known centrifugal type.

The forward driving direction of the motor 32 is indicated by an arrow 39 which corresponds to the forward clockwise direction 40 of the reel 26 required to wind the cable 24 thereon. Releasable means 41 are provided for preventing reverse rotation of the rotatable member or shaft 37. It comprises a bracket 42 mounted on the rear end of the shaft 37 and having pins 43 supported on opposite sides of the axis of rotation of the shaft 37 and carrying counterweights 44 having projecting swingable ends 45. The releasable means 41 also includes a latching dog 46 supported by a fulcrum lever 47 in such a manner that during one sequence of the operation of the device the dog 46 will rest in a position to be engaged by one of the projecting ends 45 of the retracted counterweights 44, and prevent reverse rotation of the shaft 37.

The counterweights 44 are normally urged into the retracted position in which they are shown in Fig. 2 by a compression spring 48, which surrounds a portion of the shaft 37, a flanged sleeve 49 arranged upon the shaft 37 so as to be urged inwardly of the motor 32 by short levers 50 which project shaftwardly from the counterweights 44 into the outward path of movement of a flange 51 which is formed on the sleeve 49. A spring 52 normally urges the lever 47 in counterclockwise direction into its latching position shown in Fig. 4, and an oval solenoid-operated rotary cam 53 is arranged to swing the lever 47 in clockwise direction, thereby moving the latching plate 46 leftwardly out of the latching position thereof. The cam 53 is fixed on a shaft 54 which also has thereon a four-toothed ratchet 55, Fig. 7, adapted to be shifted by the shoulder 56 of a pawl 57 connected by a hinge pin 58 to the armature 59 of an actuating solenoid 60 adapted, when energized, to attract the armature 59 in the direction indicated by the arrow 61. A spring 62 one end of which is connected to the pawl 57 acts to return the pawl 57 and the armature 59 to their initial positions shown in Fig. 7, and to rotate the pawl 57 in clockwise direction.

On a side of the cam 53 adjacent the lever 47 there is a switch assembly comprising first and second switches 63 and 64 which are open when the lever 47 is positioned as shown in Figs. 2 and 6, and are closed when the cam 53 is rotated 90° in counterclockwise direction from the position in which it is shown in Fig. 2 into the position in which it is shown in Fig. 4. The first cycle of operation of the solenoid 60, caused by electrical energization and deenergization of its winding 71, will result in the armature 59 being attracted in the direction indicated by the arrow 61 and then released, with the result that the shoulder 56 of the pawl 57 will act upon a tooth of the ratchet 55 to rotate the cam 53 in counterclockwise direction through an angle of 90°. As the rotation of the cam 53 is initiated, the cam 53 will be moved from its position in Fig. 2 to its position in Fig. 4 permitting the lever 47 to swing in counterclockwise direction so as to move the latching plate 46 into the path of movement of the counterweight ends 45, and closing the switches 63 and 64. The next cycle of operation of the solenoid 60 will rotate the cam 53 through an additional 90° whereupon the lever 47 will be returned to its initial position, shown in Fig. 2, and the switches 63 and 64 will be opened.

The switch mechanism, however, is provided with an auxiliary mechanism for independently closing switch 63 whenever the armature 59 is moved leftwardly from the position in which it is shown in Fig. 2 to the position in which it is shown in Fig. 4. This consists of an arm 59*a* extending rightwardly from the solenoid 59 in a plane parallel to the pawl 57, a rounded projection 59*b* arranged to engage a cam 59*c* which is mounted on the end of the switch contact 63*b*. At the leftward end of the cam 59*c* there is a projection 59*d* which is arranged to be engaged by the spring contact 64*a* when the same is moved upwardly by the cam 53, thereby moving the switch contact 63*b* into engagement with the contact 63*a*. When the armature 59 is moved leftwardly from the position in which it is shown in Fig. 4, to rotate the cam 53 from the switch-closing position in which it is shown in Fig. 4 to the switch-opening position in which it is shown in Fig. 2, the projection 59*b* will be moved leftwardly, engaging the cam 59*c* and holding the contact 63*b* upwardly in engagement with the contact 63*a* so long as the armature is maintained in retracted position as the result of closing switch 89.

In addition to serving as the holding means for the shaft 37, the holding means 41 and particularly the counterweights 44 serve as a part of the means for opening the motor circuit when the door member 10 has been moved into its closed position 17. A quick acting, double throw switch 72 is arranged to be actuated by the movement of the sleeve 49 on the shaft 37. This switch 72 comprises stationary contacts 73 and 74 disposed on opposite sides of a movable contact 75. The switch 72 has an actuating element 76 supported by a leaf spring 77 so that it normally tends to swing leftward from the position in which it is shown in Figs. 2 and 6. When the counterweights 44 are in retracted position, the rightward end of the sleeve 49 under force of the spring 48 swings the member 76 into the position in which it is shown in Fig. 2, at which time a C-spring 79 acts between the member 76 and the movable contact 75 to hold the movable contact 75 in engagement with the stationary contact 73. When the motor 32 is energized, rotation of the counterweights 44 around the axis of the shaft 37 causes them to swing outwardly, with consequent movement of the sleeve 49 leftwardly against the pressure of the spring 48, so that the leaf spring 77 may move the actuating element 76 of the switch 72 leftwardly, whereupon the C-spring 79 will snap the contact 75 rightwardly out of engagement with the contact 73 and into engagement with the contact 74.

Fig. 6 schematically shows the switches 63, 64 and 72 of Fig. 2 in the positions thereof when the garage door is raised. There are conductors or terminals 85 and 86 for connection to a source of electrical current which may be a 110 volt alternating current supply 87. The terminal 85 is connected through a conductor 88 where the one contact 64*a* of the switch 64, and the terminal 85 is also connected through a switch 89 and a conductor 90 with one end of the solenoid coil 71. The terminal 86 is connected through a conductor 91 with the movable contact 75 of the switch 72, and it is also connected through a switch 92 and a conductor 93 with the contact 74 of the switch 72. The remaining end of the solenoid coil 71 is connected through a conductor 94 with the contact 63*a* of the switch 63, and through a conductor 95 with the contact 73 of the switch 72. The remaining contact 63*b* of the switch 63 is con-

nected through a conductor 96 with the current source terminal 86. The motor 32 is connected through a conductor 97 with the contact 64*b* of the switch 64 and through a conductor 98 with the contact 74 of the switch 72.

The switches 89 and 92 are gang-connected for simultaneous opening and closing operations thereof. It will be understood that the switches 89 and 92 may be operated mechanically but for their actuation we have schematically indicated a solenoid 99 adapted to be energized from an outside source of electrical energy 100 through a switch 101 forming part of a radio receiver 102 in response to a signal received from a radio transmitter which may be mounted upon an automobile. When the control 99 is actuated to close the switches 89 and 92, current will pass through the solenoid coil 71 along a path from the terminal 85 consisting of the switch 89, conductor 90, coil 71, conductor 95, switch contacts 73 and 75 and the conductor 91 which is connected directly to the terminal 86. The electrical energization of the coil 71 will effect a rotation of the cam 53 from the position in which it is shown in Fig. 6, through an angle of 90°, to the position thereof shown in Fig. 4, moving the cam lobe 65 into a position effecting closing of the switches 63 and 64, and permitting the lever 47 to swing in counterclockwise direction.

The movement of the contact 64*a* into engagement with the contact 64*b* will close a circut through the motor 32 consisting of the conductor 88 which leads from the terminal 85, the contacts 64*a* and 64*b*, conductor 97, the windings of the motor 32, conductor 98, conductor 93 and switch 92, to the terminal 86 of the current source 87. Also, the rightward terminal of the solenoid winding 71 will be connected through conductor 94, switch contacts 63*a* and 63*b* and conductor 96 with the terminal 86, so that as long as the switches 89 and 92 are closed the winding 71 will be continuously energized independently of any opening and closing of the switch means consisting of the contacts 73 and 75 of the switch 72.

Operation of the motor 32 will cause the counterweights 44 to revolve around the axis of the shaft 37, with the result that the counterweights 44 will move outwardly into the position indicated at 44', Fig. 6, and the levers 50 of the counterweights 44 will act leftwardly against the flange 51 to move the sleeve 49 leftwardly, to permit the part 76 of the switch 72 to move leftwardly into the position 76' thereof. This will result, as shown in Fig. 4, in a leftward movement of the upper end of the C-spring 79 so that the C-spring will then act to snap the movable contact 75 rightwardly into the position 75' thereof wherein it engages the contact 74 of the switch 72, to close a circuit through the motor 32 independently of the switch 92 which opens along with the switch 89 due to deenergization of the control 99. The electrical path from the motor 32 to the terminal 86 will then be through conductor 98, switch parts 74 and 75 and conductor 91, and the motor 32 will continue to operate until this current path is opened, which occurs when the door 10 reaches its closed position indicated by dotted lines 17 in Fig. 1. The stalling of the motor 32 at this time results in stopping of the rotation of the counterweights 44 around the axis of the shaft 37 so that they then swing back into the retracted positions thereof shown in full lines, permitting the sleeve 49 to move rightwardly so as to actuate the switch 72 to swing the contacts 75 out of engagement with the contact 74, into engagement with the contact 73, thereby opening the electrical circuit through the motor 32.

After the motor 32 is stopped as a result of its stalling, tension in the cable or tape 24 will apply force to the motor shaft tending to rotate it in reverse direction, but reverse direction of the motor shaft will be prevented by the stop plate 46 which will now be positioned as shown in Fig. 4 as the result of the cam 65 having been rotated from the position in which it is shown in Figs. 2 and 6 into the position in which it is shown in Fig. 4. The end 45 of one of the counterweights 44 will engage the stop member 46 as shown by dotted lines 45' in Fig. 4, thereby preventing rotation of this counterweight 44 in the clockwise direction indicated by the arrow 105. Since the motor shaft 37 cannot now be revolved in reverse direction, tension will be maintained in the cable 24 and the door 10 will be held in its closed position until release of the latch mechanism consisting of the counterweights 44 and the stop member 46.

Opening of a garage door is accomplished by energizing the solenoid 99, Fig. 6, so as to close the switches 89 and 92 which will effect an energization of the solenoid coil 71 which will rotate the cam 53 through an angle of 90° from the position in which it is shown in Fig. 4 into a transverse position such as shown in Figs. 2 and 6, opening the switch 64 in the motor circuit and also opening the switch 63. This rotation of the cam 65 will likewise result in the swinging of the lever 47 in clockwise direction out of the position in which it is shown in Fig. 4, thereby moving the stop 46 leftwardly out of the path of movement of the counterweight end 45', thereby permitting the shaft 37 to rotate in reverse direction so that the reel 26 may rotate in reverse direction and permit the cable 24 to unwind therefrom as the spring 18 moves the upper end of the door 10 rightwardly through the position in which it is shown in full lines in Fig. 1 into the raised position indicated by dotted lines 12'. During this movement of the door 10 into raised position, the rotating parts of the actuator 20 will be rotated in reverse direction, and centrifugal force acting in the counterweights 44 will act to swing them outwardly so that the sleeve 49 will be retracted leftwardly, permitting the switch member 77 to move leftwardly and swing the switch member 75 rightwardly out of engagement with the contact 73, thereby opening the circuit of the solenoid coil 71 which includes the conductor 95. Since the circuit through the solenoid coil 71 which includes the conductor 96 is at this time also open because of the opening of the switch 63, the actuation of the switches 89 and 92 to accomplish a closing of the door 10 will not be effective until the door has been moved by the spring 18 into its raised, substantially horizontal position 12', whereupon stopping of the rotation of the motor shaft will effect the movement of the contact 75 back into engagement with the contact 73 to close the circuit, including the conductor 95 through which the solenoid coil 71 may be energized when the switch 63 is open.

As shown in Fig. 3, the stop member 46 has a spiral cam portion 106 extending therefrom for lifting the ends 45 of the counterweights 44 when they are moved in forward direction, indicated by the arrow 107 during the time the lever 47 positioned as shown in Fig. 2 holds the stop member 46 in the path of movement of the counterweight ends 45.

The shaft 54 which supports the cam 53 extends in opposite directions, as shown in Fig. 3, so that its ends may be engaged, by use of a key, to rotate the cam from the position in which it is shown in Fig. 4 to the position in which it is shown in Fig. 2, to retract the member 46 and open the door independently of the electrical system.

The invention includes auxiliary means for instantly stopping the downward travel of the door 10 during the closing movement thereof and causing the door to return to open position, should an obstruction be encountered. In Fig. 6, we show an auxiliary means 109 which consists of a photoelectric signal device of the character employed as an alarm to indicate when a person or object has passed through a doorway. The auxiliary device 109 includes conductors 110 and 111 extending respectively to a lamp 112 and the photoelectric cell 113 mounted by brackets 114 and 115 on the inner face of the door 10 at the lower corners thereof, these brackets 114 and 115 supporting the lamp 112 and the cell 113 inwardly of the lower edge 116 of the door and also inwardly of the transverse brace

117 which is secured to the lower elge portion of the door. As shown by dotted line 119 in Fig. 6, a light beam passes from the lamp 112 to the photoelectric cell 113 and, during closing movement of the door an obstructing object is encountered which interrupts the passage of light from the lamp 112 to the cell 113, the auxiliary device 109 will transmit an electrical impulse through conductors 120 which are electrically connected to the winding of the solenoid 99 so as to momentarily close the switches 89 and 92, so that the solenoid winding 71 will be energized and activate that part of the control mechanism which deenergizes the motor 32 and moves the latch lever 47 into the position which is shown in Fig. 6 whereupon the door will move into open position. At any time the cam 65 is positioned as shown in Fig. 4, that is to say during the operation of the motor to move the door toward its closed position or during the holding of the door in its closed position, the door opening control means of the device may be actuated. This is accomplished by closing the switches 92 and 89. But, during the time the door is moving from open to closed position, and the cam 53 is in the position in which it is shown in Fig. 6, the door closing control means cannot be actuated, but the door must reach its fully open position before the door closing control can be actuated. The reason for this is that during the time the door is moving toward its open position the motor 32 is operated in a reverse direction and its shaft 37 is revolving so that the counterweights 44 are swung outwardly actuating the switch 72 so as to move the contact 75 into the position in which it is shown in dotted lines 75' so that the contacts 73 and 75 will be out of contact and the circuit through the solenoid coil 71 will be open and therefore the closing of the switches 89 and 92 cannot energize the solenoid 71 until the rotation of the motor shaft 37 has stopped and as the result thereof, the switch contact 75 is moved back into engagement with the switch contact 73, this occurring when the stopping of the door 10 in raised position is accompanied by cessation of the reverse operation of the motor 32.

The auxiliary switch closing means 59 prevents intermittent or repeated operation of the solenoid 60 should the switches 89 and 92 be closed during the door-closing operation of the device. During the time the motor 32 is being driven so as to move the door toward closed position, the control parts will be positioned as shown in Fig. 4. That is to say, switches 63 and 64 will be closed, and contact 75 will be swung into engagement with contact 74. Were it not for the switch closing means 59*d*, energization of the solenoid winding 71 to pull the armature 59 leftwardly so as to effect rotation of the cam 53 from the position in which it is shown in Fig. 4 toward the position in which it is shown in Fig. 6, the current through the winding 71 would be interrupted and then reestablished as a result of the swinging of the contact 75 leftwardly into engagement with the contact 73 caused by the momentary stopping of the motor. That is to say, during the closing of the door, the motor will be driven in forward direction and the counterweights 44 will be swung outwardly, but the opening of the switch 64 will deenergize the motor 32 resulting in its being brought to a stop as the result of tension in the cable. When the motor is thus brought to a stop, the counterweights 44 will return to retracted position and the switch actuating element 76 will be moved rightwardly so that the contact 75 will move leftwardly into engagement with the contact 73, thereby closing the circuit through the solenoid winding 71 should the switch 89 be closed at this time. The member 59*b* acting in conjunction with the cam 59*c*, prevents this for the reason that the switch 63 will be held closed so long as the winding 71 is energized by the closing of the switch 89, independently of the fact that the motor switch 64 may have been opened by rotation of the cam 53 into the position in which it is shown in Figs. 2 and 6.

We claim:

1. In a mechanism for effecting movement in first and second directions of, and thereby opening and closing a door member with relation to a frame member: means yieldably exerting a force on said door member to move it in said first direction; means for moving said door in said second direction, comprising a linkage element having one end thereof connected to one of said members, motor means mounted on the other of said members for applying a force to said linkage element which will effect movement of said door in said second direction; releasable holding means acting upon said motor for preventing movement of said door in said first direction by said means for yieldably exerting a force; and means for releasing said holding means so that said means for yieldably exerting a force may then act to move said door in said first direction.

2. A mechanism as defined in claim 1 wherein said linkage element comprises a cable having one end thereof connected to one of said members, wherein said means for applying force to said linkage element comprises a reel on which the other end of said cable is wound, and wherein said holding means is arranged to prevent rotation of said reel, so that said cable cannot be unwound therefrom, and thereby prevent movement of said door in said first direction until released.

3. A mechanism as defined in claim 1 wherein said means for applying force to said linkage element comprises an electric motor driving a shaft means and an electric circuit for energizing said motor, said circuit having therein switch means controlled by said shaft means movement and operating as the result of a decrease in the speed of rotation of said shaft means to open said circuit.

4. A mechanism as defined in claim 1 wherein said means for applying force to said linkage element comprises an electric motor and a shaft driven thereby, wherein said holding means is mounted on said shaft and comprises weights which are supported so that they will be swung out of latching position by centrifugal force, there being spring means acting to swing said weights back into latching position when rotation of said shaft is reduced.

5. A mechanism as defined in claim 4 wherein said means for energizing said motor includes a circuit for connecting said motor to a source of electrical current, said circuit having therein first and second switches in series, means for closing said first switch when operation of said motor is desired and means operating in response to outward movement of said weights to close said second switch.

6. A mechanism as defined in claim 1 wherein said holding means comprises a latch mechanism and said releasing means comprises an electromagnet for releasing said latch mechanism.

7. A mechanism as defined in claim 1 wherein said means for applying a force to said linkage element comprises an electric motor and a rotatable part connected to said motor in driven relationship, and wherein said holding means are arranged to prevent said rotatable part from rotating, the release of said holding means permitting said rotatable part to rotate in reverse direction as said door is moved in said first direction by said means for yieldably exerting a force thereon.

8. A mechanism as defined in claim 7 wherein said holding means comprises a stop disposed next to said rotatable part, and a spring-retracted part on said rotatable part positioned so as to engage said stop when it is retracted, said spring retracted part being arranged to move in response to rotation of said rotatable part into a position wherein it is disengaged from said stop.

9. A mechanism as defined in claim 7 wherein said motor is arranged to stall when said door reaches the end of its movement in said second direction, having means operating in consequence of the decrease in speed of said motor to deenergize said motor so that it will cease application of force tending to move said door in

said second direction, said releasable holding means then holding said door from movement in said first direction.

10. A mechanism as defined in claim 7 wherein said motor is arranged to stall when said door reaches the end of its movement in said second direction, having means connected to a member rotatable by said motor and operating in consequence of the slowing of said member to deenergize said motor so that it will cease application of force tending to move said door in said second direction, said releasable holding means then holding said door from movement in said first direction.

11. In a mechanism for effecting movement of a door from open to closed position with relation to a door frame, against the action of spring means arranged to exert a force tending to move said door from closed to open position: a reel mounted on said door frame; a cable wound on said reel; means for attaching the free end of the cable to the door so that winding of the cable on the reel will shorten the effective length of the cable extending between the door and the frame and thereby move said door into closed position; means for rotating said reel in a direction to wind said cable thereon comprising a rotatable part and a motor for effecting rotation thereof; releasable holding means connected to said motor for restraining said rotatable part against reverse rotation by the action of said spring means when said door has been moved into closed position, thereby maintaining tension in said cable to hold said door in closed position; and means for releasing said holding means so that said rotatable part and said reel may revolve in reverse direction, thereby permitting said cable to unwind and said door to be moved into open position by said spring means.

12. A mechanism as defined in claim 1 having centrifugal brake means for controlling the rate of movement of said door.

13. A mechanism as defined in claim 11 having brake means for limiting the rate of rotation of said reel so that the rate of movement of said door member will be maintained within a selected value.

14. In a door actuating unit, a motor energizable for unidirectional operation and having a driving shaft; a cable reel driven from said shaft in a direction to wind a cable thereon, and being operable in a cable unwinding direction by a pulling force on the cable to rotate said motor shaft; means connected to said shaft and responsive to a reduction in the speed of rotation of said

shaft for deenergizing said motor at a predetermined wound condition of said cable; means for locking said reel against unwinding movement from said wound condition of said cable; and means for releasing said locking means.

15. In a door actuating unit, a motor energizable for unidirectional operation and having a driving shaft; a cable reel driven from said shaft in a direction to wind a cable thereon, and being operable in a cable unwinding direction by a pulling force on the cable to rotate said motor shaft; means responsive to a reduction in the speed of rotation of said shaft for deenergizing said motor at a predetermined wound condition of said cable; means for locking said reel against unwinding movement from said wound condition of said cable including a member movable to locked and unlocked positions; and electromagnetic means operable upon successive energizations to alternately move said member to said locked and unlocked positions.

16. In a door actuating unit, a motor energizable for unidirectional operation and having a driving shaft; a cable reel driven by said shaft in a direction to wind a cable thereon, and being operable in a cable unwinding direction by a pulling force on the cable to rotate said motor shaft; means responsive to the speed of rotation of said shaft for deenergizing said motor at a predetermined wound condition of said cable, including a weight movable in response to centrifugal force changes resulting from variations in the speed of said shaft; means for locking said reel against unwinding movement from said wound condition of said cable including a member movable into and out of cooperative relationship with said weight; and electromagnetic means operable upon successive energizations to alternately move said member into and out of said cooperative relationship with said weight.

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