

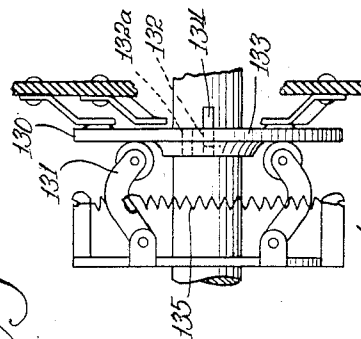
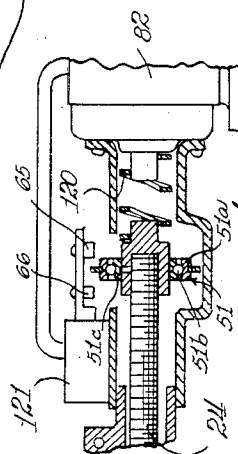
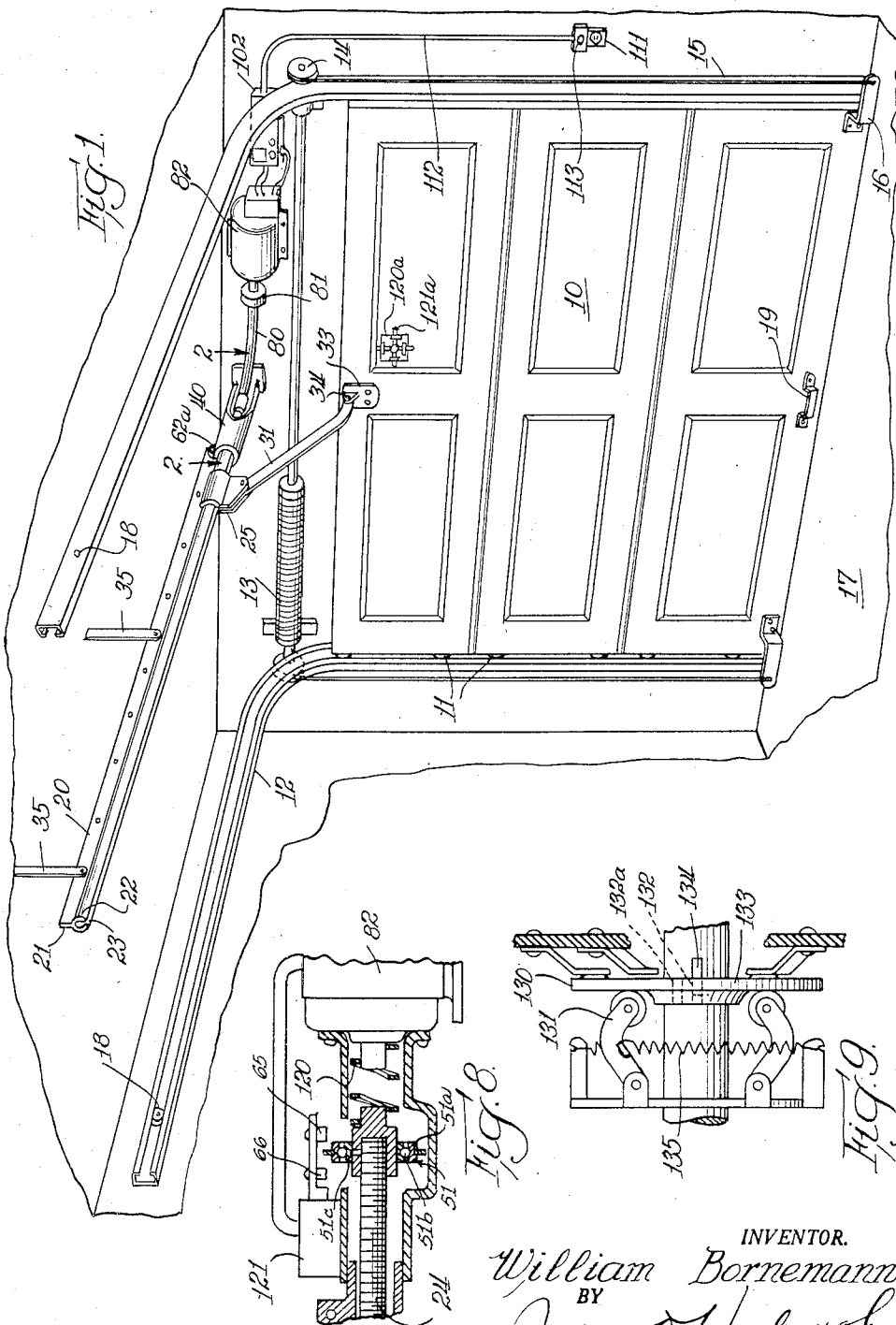
April 21, 1959

W. BORNEMANN
AUTOMATIC DOOR OPENER

2,883,182

Filed March 25, 1955

4 Sheets-Sheet 1



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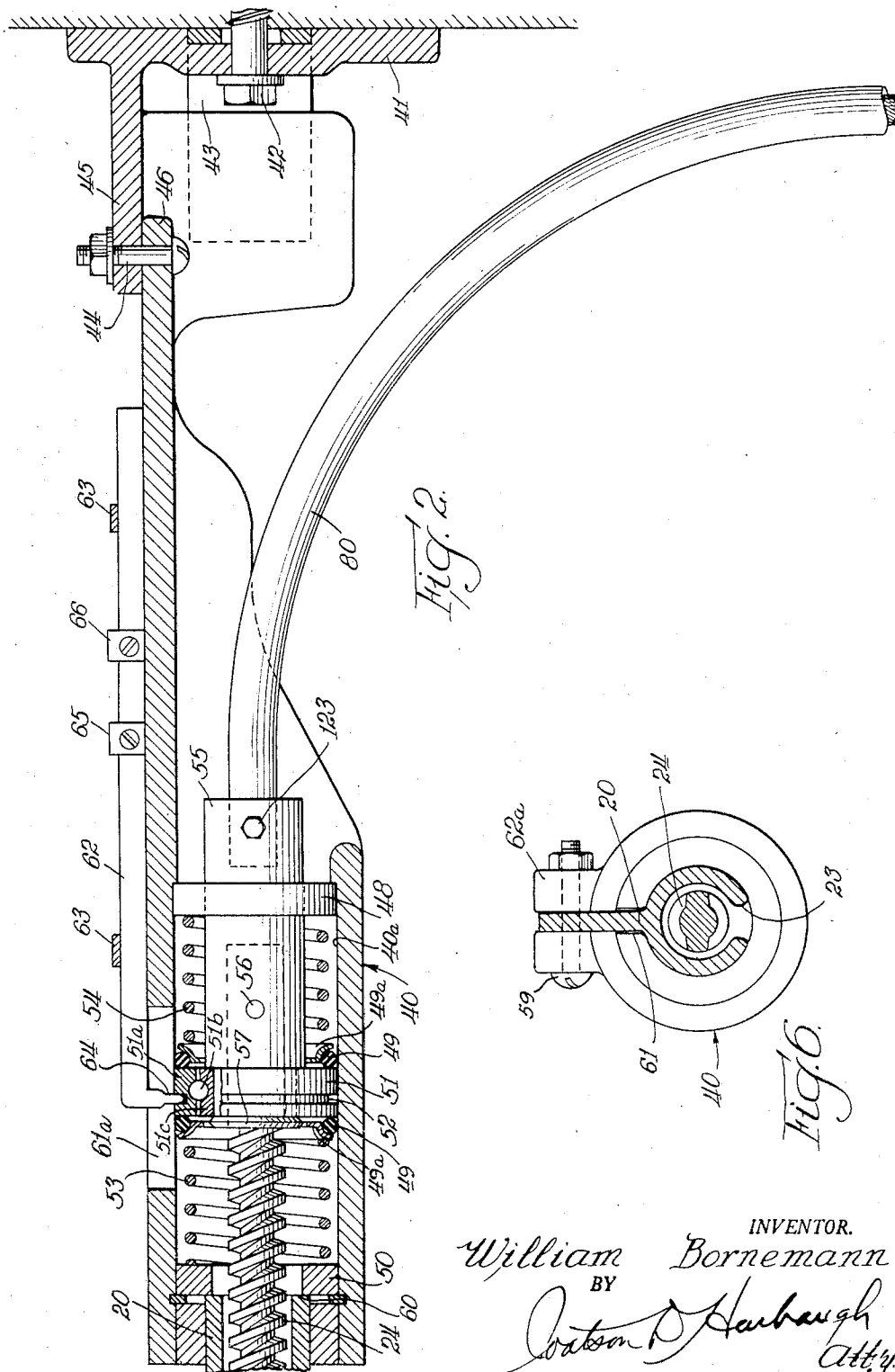
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4 Sheets-Sheet 2



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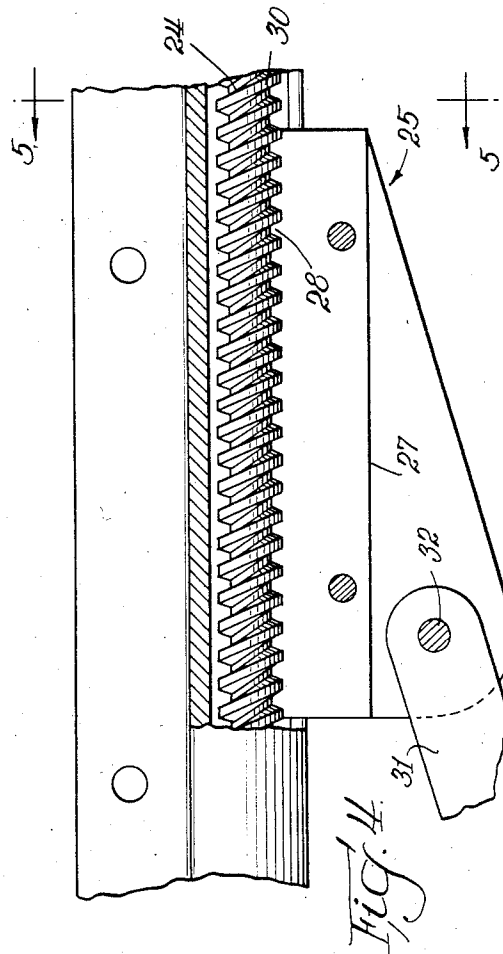
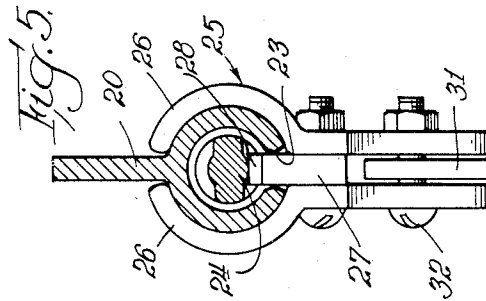
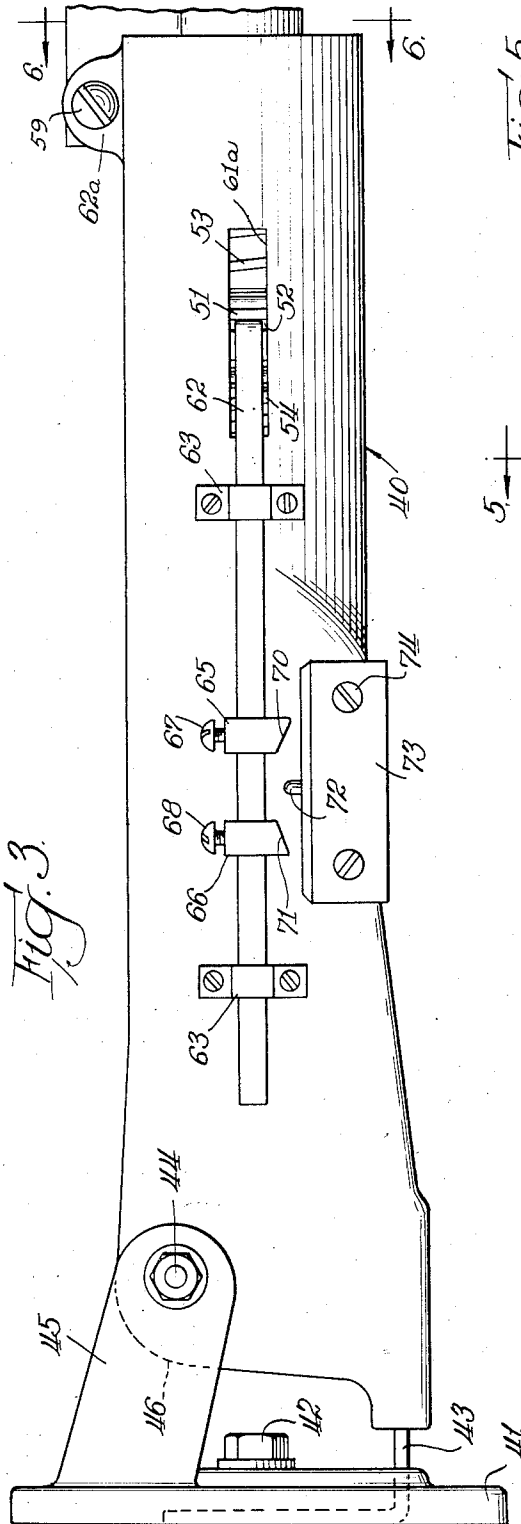
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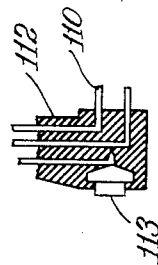
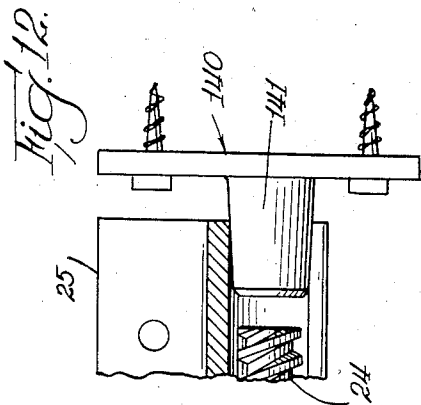
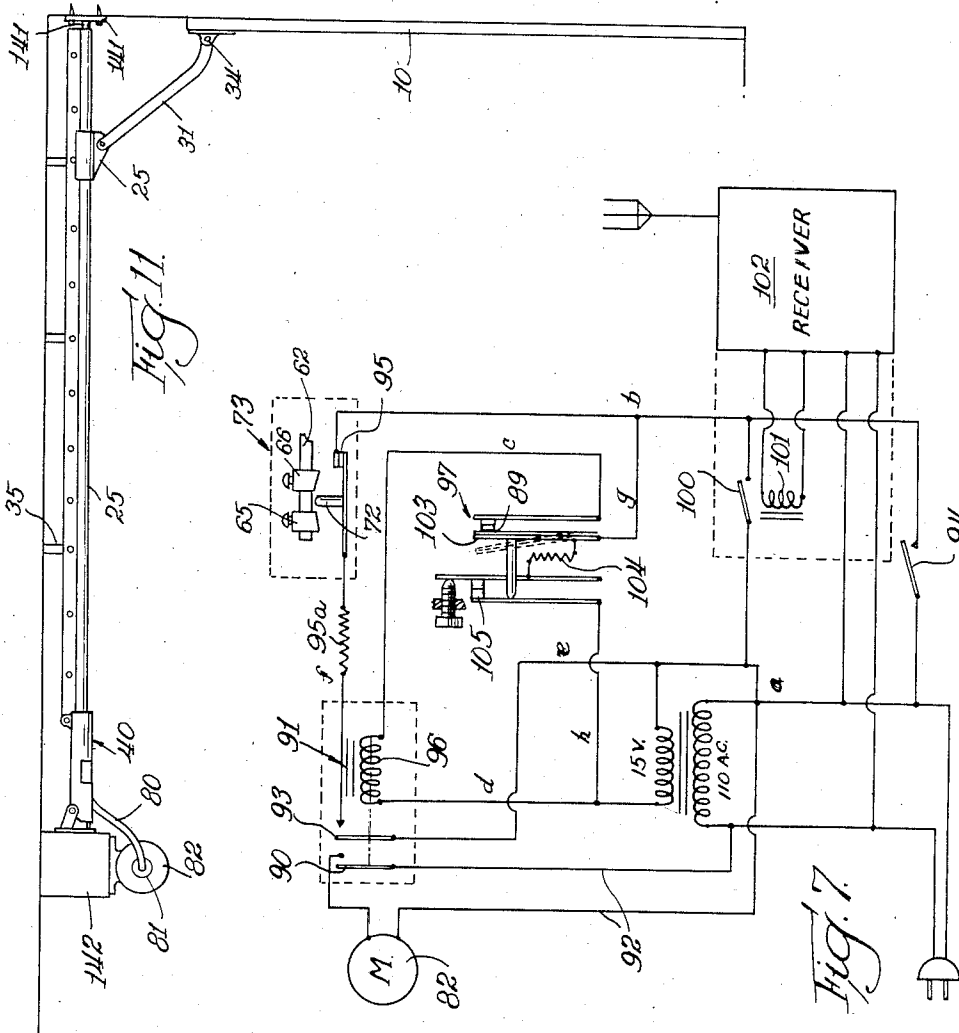
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4 Sheets-Sheet 4



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AUTOMATIC DOOR OPENER

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9 Claims. (Cl. 268—59)

The present invention relates to door opening devices and particularly to manually and electronically controlled electrically driven operators for heavy doors or gates such as those used for garages, shipping docks and fireproof barriers, either hinged or moved along tracks.

The principal object of the invention is to provide a door operator that is simple in construction, simple in operation and easily installed by those unskilled mechanically.

A further object is to provide a readily adjustable arrangement by which a surge of door opening power is available to overcome snow packed against it or a heavy initial door movement load, yet will stop temporarily from operating upon closing without damage to any articles which might obstruct the closing.

A further object of the invention is to provide a door operator which is rendered temporarily inoperative if abused or played with over a time greater than that required to perform several cycles of operation so that the motor will not be burned out nor anything injured that might be present in the path of the door.

The invention is further characterized by an arrangement in which the direction of movement of the door is automatically reversed when obstructed so that the next succeeding actuation of the motor, even by a person who is excited, will move the door away from the obstruction to clear it.

The operation of the invention also avoids the possibility that a manually controlled switch can be held closed continuously to accomplish prolonged operation of the door operating device.

A further object of the invention is to provide a manual means which is effective temporarily to attain the full thrust of the motor momentarily when starting the door operating device.

These being among the objects of the invention, other and further objects will become apparent from the drawings, the description relating thereto and the appended claims.

In the drawings,

Fig. 1 is a perspective view showing the preferred embodiment of the invention installed, ready for operation in opening and closing a sectional garage door that travels upon tracks;

Fig. 2 is an enlarged sectional view taken upon the line 2—2 in Fig. 1;

Fig. 3 is a side elevational view of the element shown in Fig. 2;

Fig. 4 is an enlarged sectional view of a portion of the embodiment shown in Fig. 1;

Fig. 5 is a section taken upon line 5—5 of Fig. 4;

Fig. 6 is a section taken upon line 6 of Fig. 3;

Fig. 7 is a schematic line diagram of the circuit controlling the operation of the preferred embodiment;

Fig. 8 is a sectional view similar to that of Fig. 2 illustrating another embodiment of the invention;

Fig. 9 is a diagrammatic view of the self-reversing motor switch forming a part of the motor construction;

2

Fig. 10 is a section through the manual control switch shown in Fig. 1;

Fig. 11 is a side elevation of the invention installed in alternate position; and

Fig. 12 is an enlarged section taken at one end of the device shown in Fig. 11.

The invention contemplates a rotatable worm shaft with a segmented gear disposed in mesh therewith to apply an opening and closing force upon a slidably mounted garage door. The shaft rotates at motor speed (1750 r.p.m.) for fast operation of the door, and is supported against whipping in an extruded housing. Reversing the direction of the rotation of the worm provides for the opening and closing movements of the door. The worm shaft is also mounted for axial movement in opposite directions in its housing as opposed by compression springs. A self-reversing motor is employed to drive the shaft and once started in a predetermined direction, will continue rotation in that direction as powered through a self-energizing relay until the load on the worm shaft compresses one of the springs enough to open a switch in the field circuit of the relay.

Referring now to the drawings in greater detail, a sectional garage door 10 is shown as mounted by rollers 11 to roll upwardly and horizontally on tracks 12. A torsion spring 13 balances the weight of the door as applied through reels 14 having lift lines 15 connected to the bottom of the door by bracket 16. The floor 17 of the garage limits the downward movement, whereas stops 18 upon the tracks 12 or upon the worm housing limit the upward movement of the door. A handle 19 upon the door provides means for raising and lowering the door manually, if desired.

Just above the uppermost level of the door in its opening movement is mounted a horizontally disposed extrusion 20 whose section is best shown in Fig. 5, same comprising a vertical flange portion 21 and a cylindrical depending portion 22 slotted longitudinally of its length along the bottom as at 23. A threaded worm shaft 24 is journaled with reasonable close tolerances in the cylindrical portion 22 against whipping when rotated at high speed and a slidably mounted follower 25 mates with the outer cylindrical surface of the lower portion 22 to slide therealong from one end of the extrusion 20 to the other.

The follower 25 is made up of three elements bolted together. The two outermost elements engage the depending cylindrical portion 22 and have bolted between them a rack member 27 whose gear teeth 28 mesh with the worm threads 30 upon the worm shaft 24. Below the rack 27 the two elements 26 extend far enough down to provide a throat between them to receive the upper end of a tie bar 31 in pivotal relationship upon a smooth shank spacer bolt 32. Thus, as the worm shaft 24 is rotated, the follower 25 is moved along the extrusion from one end to the other depending upon the direction of rotation.

The lower end of the tie bar 31 is secured to the top of the door by a bracket 33 in releasable engagement by a removable pin 34.

The upstanding flange portion 21 of the extrusion is perforated along its length and suspension brackets 35 are employed to support the assembly against forces having a downward component.

Above the door and mounted upon the lintel thereof is a bracket 40 which, as more particularly shown in Fig. 2, comprises a base portion 41 bolted to the door lintel by a lag screw 42 with an adjustable bracket 43 embedded therein to permit the remainder of the bracket to be raised or lowered as desired as ultimately held in rigid position by a clamp screw 44 extending through two overlapping

ears 45 and 46, this arrangement being useful for a purpose later described.

The outer end of the bracket 40 is cylindrical in form and counterbored as at 40a longitudinally to receive loosely therein stop washers 48 and 50 and the outer race 51a of a ball bearing 51 having an external groove 52 therein. The ball bearing 51 including the bearing balls 51b and the inner race 51c supported thereby is held equidistance from the stops 48 and 50 by compression springs 53 and 54. O-rings 49 of synthetic rubber are located on opposite sides of the bearing to engage the wall of the counterbore 40a as forced outwardly by washers 49a between each of them and the respective springs 53 and 54.

The inner race 51c of the ball bearing receives the reduced end of a drive member 55 which is fastened to the worm shaft 24 by the cross-pin 56. The outer end of the drive member 55 is flared as at 57 to secure the inner race and the drive member 55 rigidly together. Thus the drive member, the inner race and the worm shaft turn together as a unit.

The outer stop 50 is held in place by the end 60 of the extrusion beyond which the end of the bracket is slotted as at 61 through ears 62a to receive the flange of the extrusion therebetween in rigid relationship as held by the bolt 59.

With the construction described thus far, it will be seen how the worm shaft is supported for rotary movement in the cylindrical portion of the extrusion 20 without danger of its whipping when rotating at high speed. Yet it can move when forced to do so in either axial direction against the springs 53 or 54 through the ball bearing 51 and the drive member 55 that joins the two together. When the screw member moves in either axial direction, the outer race 51a moves with it.

An aperture 61a in the wall of the cylindrical portion of the bracket exposes the groove 52 of the bearing 51 so that a switch rod 62 slidably mounted upon the bracket by elements 63 will follow the movement of the bearing through a finger 64 engaging in the groove 52.

As more particularly shown in Fig. 3, adjustable cam members 65 and 66 are secured to the switch rod 62 by set screws 67 and 68 respectively with the cam surfaces 70 and 71 movable with the switch rod along paths interfering with the button 72 of a conventional normally closed microswitch 73 mounted upon the bracket by screws 74. This arrangement operates to open the microswitch 73 whenever the switch rod 62 is moved far enough in either direction that either one of the cams 70 and 71 depress the button 72.

The drive member 55 is driven through a flexible shaft 80 and friction clutch 81 by self-reversing motor 82. The motor 82 is identified as a self-reversing motor because its alternate starting windings are under the control of a two position switch 130 rotatable about said motor axis between fixed points, and which opens in an axial direction as the motor reaches full speed as the centrifugal elements 131 move outwardly. A keyway arrangement 132 holds the switch in either one of its two positions until the body 133 clears the key 134 as the elements 131 centrifugate. Then, once cleared, the body 130 is rotated by its inertia to its other position and the second keyway 132a is ready to engage the key and close in the new position when the motor slows up and stops, and the centrifugal elements 131 yield to springs 135 for that purpose. As the armature makes its last two or three revolutions the starting switch is then closed in its alternate position by axial movement of the body 130 in which it places the starting windings of the motor for rotation in the opposite direction in contact with each other preliminarily to the next time that the motor is again energized.

The operation of the device as described thus far is as follows:

The motor 82 having stopped in a door closing direction has its starting windings set for rotation in an opening

direction. Then whenever the motor is energized, it will rotate the friction clutch 81, flexible shaft 80, and the worm shaft 24 in the direction carrying the follower along the extrusion 20 to pull the top of the door 10 upwardly and rearwardly through the link 31. As the door opens, the torsion spring 13 will assist the motor in bearing the weight of the door. When the door reaches its raised limit as determined by the stops 18, the strain upon the worm shaft 24, now opposed by the follower 25 being held stationary, will cause the spring 54 to be collapsed and the continued rotation of the worm shaft causes the worm shaft to be moved in that direction. The ball bearing 51 will carry the switch rod 62 rearwardly to bring the cam 70 in contact and depress the switch button 72 to break the supply of current to the motor relay. Thereupon the motor will stop and the starting windings for starting the motor in reverse direction will be closed. The strain upon the worm shaft being relieved by the stopping of the motor, the ball bearing 51 will recover itself enough for the engagement between the cam 70 and the switch button 72 to be terminated. The tension exerted on the O-rings by the compressed spring will cause the O-ring to press radially outwardly against the inner wall of the counterbore 40a and snub out any tendency of the worm shaft to chatter or bounce longitudinally under load and cause a false actuation of the switch button 72. The greater the tendency to compress one of the springs 53 or 54 with inertias of starting loads, the greater the compression of the corresponding O-ring and the greater the snubbing tendency thereof to prevent longitudinal bounce between springs 53 and 54.

Thereafter when the motor is again energized, it will rotate the armature in the opposite direction and correspondingly the worm shaft 24 to move the follower 25 in the opposite direction driving the link 31 in a direction forcing the door to close. When the door is fully closed, a strain is developed upon the worm shaft in the opposite direction under continued rotation of the motor, the spring 53 will be compressed, the switch bar 62 moved in the direction opposite to its previous movement and the cam 71 will engage the switch button 72 to open the circuit controlling the motor. The starting switch of the motor is again reversed.

Referring now to Fig. 7, the schematic circuit controlling energization of the motor is illustrated wherein the motor 82 is under the control of the normally open switch 90 of a relay 91 as powered with 110 A.C. electrical current through leads 92. The other switch 93 of the relay is a self-energizing switch for the relay 91 and is connected in series with a normally open manual switch 94 and the microswitch 95. A 40 ohm resistor 95a is included to control the safety cut-out switch or circuit breaker. In parallel with the switches 93 and 95 is a circuit which includes the coil 96 of the relay and a 15 volt source of transformer power which is so indicated.

This last circuit also includes a safety circuit breaker of novel design 97 which will be described shortly.

When the manual switch 94 is closed, the field coil 96 of the solenoid 91 is energized through the last-mentioned circuit "a" to "d" inclusive. Energization of the coil 96 closes the switch 93 and the switch 90. The switch 90 starts the motor whereas the switch 93 sustains energization of the coil 96 through the microswitch 95 and the safety breaker 97. This circuit is identified by the letters "e," "f," "b," "g," "h." Thus, when either the microswitch 95 or the overload switch 97 is opened, the coil 96 is de-energized and the motor switch 90 drops out to stop the motor.

Connected in parallel with the manual switch 94 and supplementing its operation is a switch 100 of a relay 101 powered from a radio receiver 102. The radio receiver is pretuned to receive a signal sent momentarily from a transmitter carried by the automobile or any other device such as fire alarm broadcast whose opera-

tion is intended to ultimately culminate in a closure or opening of the door.

Referring now to the overload safety device same includes a bimetal 103 subjected to the heat of a heater 104 when energized quickly by the closure of a circuit 5 which includes a manual switch 94 and a switch 105 controlled by the bimetal 103, or very slowly while the motor is running. The first circuit includes the leads *a*, *b*, *g*, *h*, while the second circuit *e*, *f*, *b*, *g*, *h*, includes the coil 96 and switch 93, which if "on" too long will be shut off as a safety precaution.

As shown in Fig. 10, the power plug-in and the switch 94 are formed in a single unit as molded in soft rubber so that prongs 110 can be inserted in the convenience outlet 111 (Fig. 1) and a third wire through the cord 112 leads to the switch blade of the switch 94 which is actuated by an insulated button 113. With this arrangement, the entire device can be mounted according to the units as shown in the lower set of broken lines of Fig. 7 with the extension cord plugged into a convenience outlet to provide not only a connection with the house current but also a switch for manually starting the motor either to open or close the door.

The embodiment shown in Fig. 8 is one which essentially substitutes a combination drive and compression spring 120 as a substitute for the flexible drive 80 and the compression springs 53 and 54, a mounting element 121 carrying switch control elements 65 and 66 operated by ball bearing 51 as hereinbefore described. With the single spring 120 not only is the shaft 24 rotated but the spring 120 itself will accommodate axial movement of the shaft for purposes of actuating the microswitch 73 or any other kind of normally closed switch. The drive shown in Fig. 8 may or may not include the friction clutch 81. As shown the friction clutch is not included.

A better understanding of the significance of the arrangement of the elements can be had from a detailed consideration of the adjustments and the flexibility of operation available with the device described.

If it is assumed that the door might be extra heavy or of another type, requiring extra power to start movement of the door, as where in winter it might be snowed in from the outside, the operator can press and hold the button 113 of switch 100. This will prevent any opening of the microswitch affecting the operation of the motor because the manual switch 94 continues to energize the relay. Thus the full power of the motor within the limits of the frictional clutch 81 is applied to start the opening of the door. However, if the holding of the switch 100 continues too long, the heater 104 heats up the bimetal to deflect in a direction opening switch 89 and breaking the circuit *d*, *e*, *f*, whereupon the coil 96 is de-energized to open the motor switch 90. The motor cannot then be started again until after the bimetal has cooled off in five or six seconds and the switch 89 again closed. If the load is too much for the system to carry, the motor 82 will turn but the clutch 81 will slip to avoid possible damage to the operating parts.

However, if the door is consistently hard to start, the cam 70 can be adjusted to provide a greater distance of travel for the switch bar 62 before the button 72 of the microswitch 73 is contacted. Thus the spring 54 has to be compressed more before the microswitch is opened and this adjustment thereby determines the amount of energy that is applied to move the door without holding the switch 100 closed any length of time. In this connection, it is to be noted that the energy to raise the door should be set at a higher level than that required to close the door. Thus the closing cam stop 71 is adjusted closer to the button 72 so that slight resistance to the closure of the door will compress the spring 53 to open the microswitch 72. Then when anything is

under the door, and the device has been tested with a person's hand resting there, no damage is done. In fact, an automobile can be left halfway outside the garage with the door open and somebody press the switch 113 accidentally without doing any damage to the automobile.

Another feature of the invention resides in the fact that when the flexible shaft 80 is used the motor can be located above the ceiling of the garage or any other place either on the right hand side or the left hand side wherever desired, it being preferred to have the outlet of the radio plugged into the control box mounted on the back end of the motor so that the motor can be reached any place it is located by a plug-in connection from the radio to not only supply the control, but also the power for the motor.

In those instances where the tracks upon which the door moves are inclined tracks, the extrusion support 20 should also be inclined. Thus once the bolt 42 is mounted to secure the bracket 41 in place against the door lintel, the bolt 44 being left out, the extrusion 20 can be located at any inclination desired through the flexing of the spring 43. Thereafter once the position of the extrusion 20 is determined the overlapping ears 45 and 46 can be drilled to provide coincident openings and the bolt 44 inserted and tightened in place to clamp the bracket 40 in its proper position.

Also, provision has been made in the invention that in the event of power failure in a community when the owner wishes to open his garage door, a key can be used to remove a trap door 120a near the bracket 33. Through the opening thus provided the bolt 34 can be withdrawn to permit the door to be opened. Turning of a key releases shot bolts 121a by retracting them in much the same manner that the door of a safe is unlocked and opened.

The installation of the embodiment of the invention is particularly easy, it coming within the "do-it-yourself" category for those unskilled mechanically. The base 41 is located and the lag bolt 42 used to hold the bracket in position. Thereafter the extrusion is inserted and bolted in place with brackets 35 installed to provide the correct height. The bolt 44 is then applied and the overhead construction is completed. The bracket 33 is attached to the garage door and the tie 31 fastened with the runner 25 located as near to the bracket 40 as practical. The motor is then mounted a measured distance radially from the bolt 42 and the flexible shaft is attached by set screw 123 to the drive member 55. The radio 102 is then mounted and plugged into the motor and the lead-in cord 112 taken to a convenience wall outlet and plugged in. The device is ready for operation. If the owner desires or has special problems with his particular door, the adjustment of the cam faces 70 and 71 with respect to the button 72 can be made according to simple instructions and the door is in operation as desired by the owner himself in accordance with the adjustments made by the owner.

Another method of installation makes it possible for the device embodying the invention being usable with every type of lift door and building conditions. In Fig. 11 where the ceiling clearance is practically nothing, the installation is turned end for end and the otherwise free end of the extrusion is mounted on the lintel by a bracket 140 with a boss 141 received in the end of the extrusion. The motor is then mounted on the ceiling by a drop beam 142 arrangement.

Having thus described the invention and two of its embodiments, it will be apparent how the objects stated are attained and how various and further changes can be made without departing from the spirit of the invention, the scope of which is commensurate with the appended claims.

What is claimed is:

1. An automatic door operator comprising an elon-

gated tubular support having a longitudinally extending slot through one wall of the tubular support, a worm shaft journaled in said tubular support for relative axial movement therebetween, resilient means urging said shaft and support to maintain a predetermined relative axial position, a motor for rotating said shaft in alternate directions of rotation between stops, follower means slidably mounted upon said support including a rack in mesh with said shaft through said slot to place an axial thrust load upon said shaft absorbed by said resilient means, and means for controlling said motor including a relay having two normally open switches one in circuit with the motor, the other in a second circuit which includes the coil of the relay, a switch in a third circuit in parallel with the second circuit for energizing the coil of the relay and including a thermal overload cut out actuated only when said switch in the third circuit is closed, a normally closed switch in series with said other switch in said second circuit for stopping said motor whenever said shaft and support move predetermined distances with respect to each other from said predetermined position in opposite directions.

2. An automatic door operator comprising a tubular support member having a slot along the bottom side and a hanger flange along the top side, a bracket supporting one end of the tubular member, a ball bearing with the outer race slidably mounted with respect to said tubular member in said bracket, a worm shaft carried by the inner race of said ball bearing and journaled in said tubular member for relative axial movement with respect to said tubular member, resilient elements on opposite sides of said ball bearing in said bracket urging said bearing and shaft to a predetermined axial position, a follower slidable on said tubular member and meshing in driven relationship with said shaft through said slot, a motor for rotating said shaft in a predetermined direction of rotation, means for connecting said follower to a door to be operated, and switch means carried by bracket for stopping said motor, a switch bar slidably mounted on the bracket engaging said bearing to be controlled by movement of said bearing axially against said resilient means, and means carried by said switch bar for engaging said switch means when said switch bar is carried by said bearing a predetermined distance.

3. In combination a support defining a cylindrical wall and having a slot along one side a shaft having a helical thread therein journaled in the support upon the cylindrical wall for relative axial movement, a follower slidable on said support including a rack gear meshing with the shaft through said slot, a reversible electric motor driving said shaft, means for reversing said motor each time the motor stops, means for starting the motor including a relay having a self-energizing switch, means for closing said switch, normally closed switch means connected in series with said self-energizing switch, and means operated by axial movement of said shaft for opening said normally closed switch means to de-energize said relay.

4. In a door operating mechanism the combination of an electric motor, a control circuit for the motor, a housing having a cylindrical counter-bore therein, stop washers disposed loosely in the counterbore, a frictionless bearing slidably mounted for longitudinal movement in said counterbore between the stop washers, compression springs disposed between the stop washers and frictionless bearing to hold it equidistance from the stop washers, resilient O-rings disposed on opposite sides of the bearing to engage the wall of the counterbore and subjected to compression of said springs to compress the O-rings outwardly to engage the wall of the counterbore, a worm shaft rotated by said motor secured to said frictionless bearing, follower means meshed in drive relationship with said shaft for moving said door, and means operable by relative axial movement of the shaft for stopping said motor including a switch in said control circuit and a

follower carried by said shaft shiftable therewith to engage said switch at predetermined limits of movement.

5. A door operating mechanism comprising an electric motor, means for reversing the direction of rotation of the motor each time it stops, a worm shaft connected with said motor mounted for relative axial movement, a follower driven by said shaft, means connecting said follower to a door, a relatively frictionless bearing having an inner race fixedly secured to said shaft and an outer annular race having said inner race rotatably mounted therein, a helical spring coaxially mounted on said shaft on each side of said bearing and held in abutting engagement with said outer race at one end, switch means including a movable switch actuating element engaged by said bearing operable by said relative axial movement of said shaft and consequent movement of said bearing for stopping the motor, said helical spring having a housing providing a stop at each end for engaging the ends of said spring opposite said first-named ends and an O-ring compressed by said helical springs to expand against said housing in frictional engagement therewith for snubbing axial vibration in said worm shaft.

6. An automatic door operator comprising an elongated tubular support having a longitudinally extending slot through one wall of the tubular support, a worm shaft journaled in said tubular support for relative axial movement therein, resilient means urging said shaft and support to maintain a predetermined relative axial position, a member carried by said shaft and movable thereby with respect to said support, a motor for rotating said shaft in alternate directions of rotation, means for stopping said motor whenever said shaft and member move with respect to said support from said predetermined position in opposite directions including a circuit having a relay with a self-energizing switch means for closing said switch, a second switch in series with the coil of the relay, a safety switch in series with the self-energizing switch and the coil of said relay, said second switch being actuated by said member to de-energize said relay to stop said motor when said member moves a predetermined distance with respect to said support, follower means slidably mounted upon said support including a rack in mesh with said shaft through said slot, and means for connecting said follower means to a door to be operated.

7. An automatic door operator comprising an elongated tubular support having a longitudinally extending slot through one wall of the tubular support, a worm shaft journaled in said tubular support for relative axial movement therein, resilient means urging said shaft and support to maintain a predetermined relative axial position, a motor for rotating said shaft in alternate directions of rotation at full motor speed including a direct drive element interconnecting said motor and shaft, means for stopping said motor whenever said shaft and support move predetermined distances with respect to each other from said predetermined position in either direction including a relay for operating the motor, circuit means for energizing said relay to start the motor having a safety switch and a second switch for de-energizing said relay, means carried by said shaft for actuating said second switch for deenergizing the relay when said shaft moves a predetermined distance with respect to said support, follower means slidably mounted upon said support in mesh with said shaft through said slot, and means for connecting said follower means to a door to be operated.

8. An automatic door operator comprising a tubular support member defining a cylindrical wall and having a slot along one side, a bearing member slidably mounted with respect to said tubular member, a worm shaft carried by said bearing and journaled in said tubular member upon said wall for relative axial movement with respect to said tubular member, resilient means urging said bearing to a predetermined position, a follower slidable on said tubular member and meshing with said shaft

through said slot, a reversible motor for rotating said shaft, means for reversing the motor each time it stops, means for connecting said follower to a door to be operated, and switch means for controlling said motor actuated by movement of said bearing axially against said resilient means a predetermined distance including means for starting the motor including a relay having a self-energizing switch, means for closing said switch, normally closed switch means connected in series with said self-energizing switch, and means operated by axial movement of said shaft for opening said normally closed switch means to deenergize said relay.

9. In a door operating mechanism the combination of a self-reversing electric motor, a worm shaft connected with said motor and rotated at motor speed, a support member having a wall defining a surface of revolution journaled said shaft for a major portion of the length of the shaft upon said surface of revolution for relative axial movement in said wall, a slot in said wall along one side exposing said shaft, a follower engaging in mesh with said shaft through said slot and travelling on said support member, means connecting said follower with the door to place an axial load upon the worm shaft,

and means operable from the said shaft for cutting off the power from the motor when the effort to move the door exceeds a predetermined amount, said last-mentioned means including a resilient element resiliently supporting said shaft in a predetermined axial position to cushion axial movement of said shaft under said load, a switch rod slidably mounted on said support and moved by relative axial movement of the worm shaft, an adjustable cam on said rod and a switch carried by said support member engaged by said cam to de-energize said motor.

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