July 7, 1936. B. T. SEBIRE 2,046,431

ELECTRIC DOOR CLOSER

Filed June 2, 1933 3 Sheets-Sheet 1

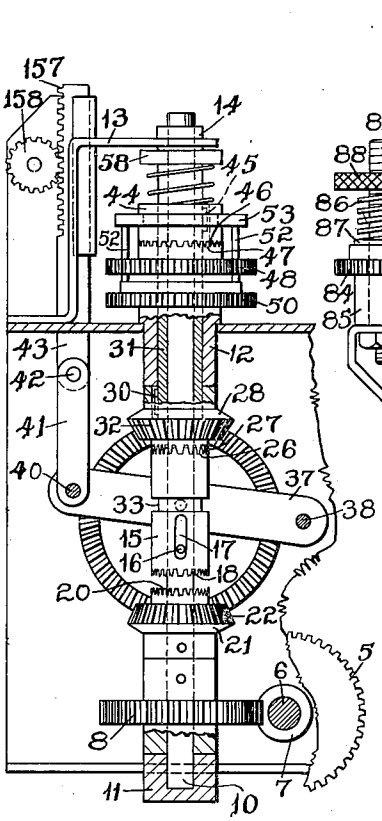


Fig. 2

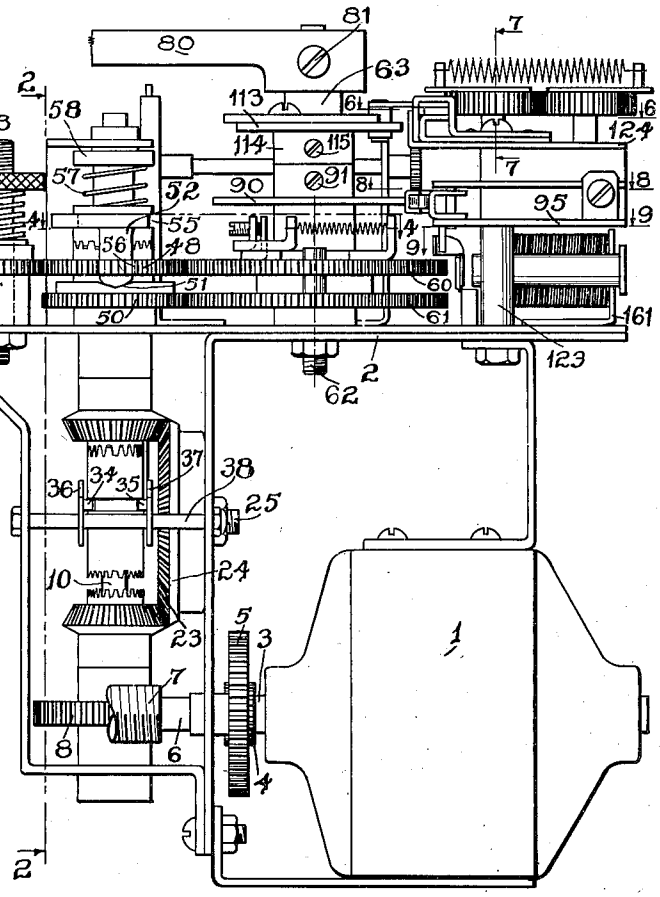


Fig. 1

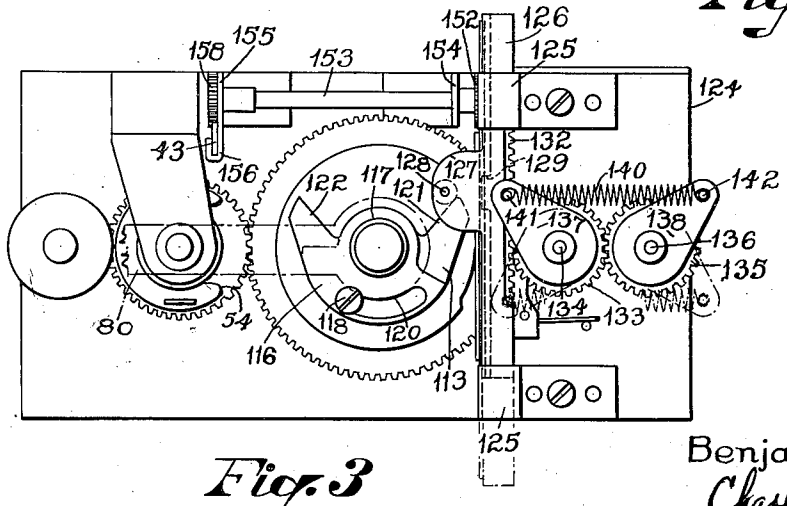


Fig. 3

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ELECTRIC DOOR CLOSER

Filed June 2, 1933 3 Sheets-Sheet 2

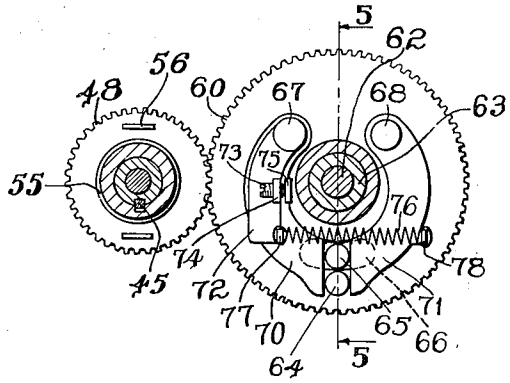


Fig. 4

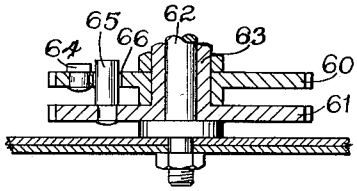


Fig. 5

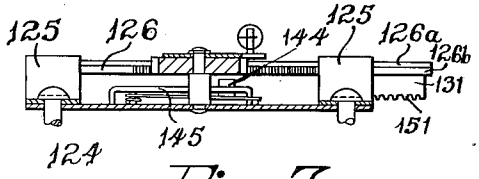


Fig. 7

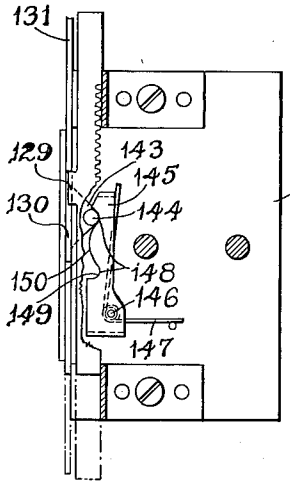


Fig. 6

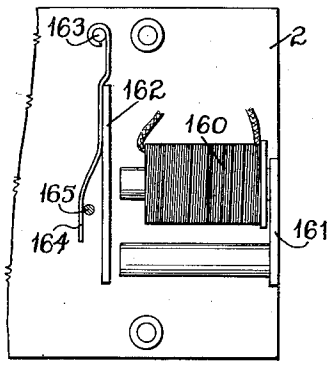


Fig. 9

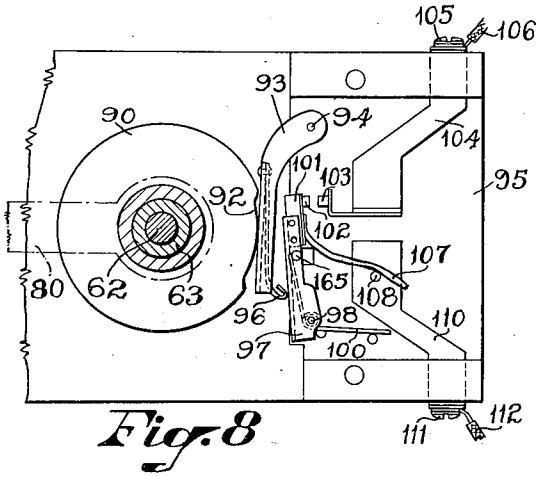


Fig. 8

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ELECTRIC DOOR CLOSER

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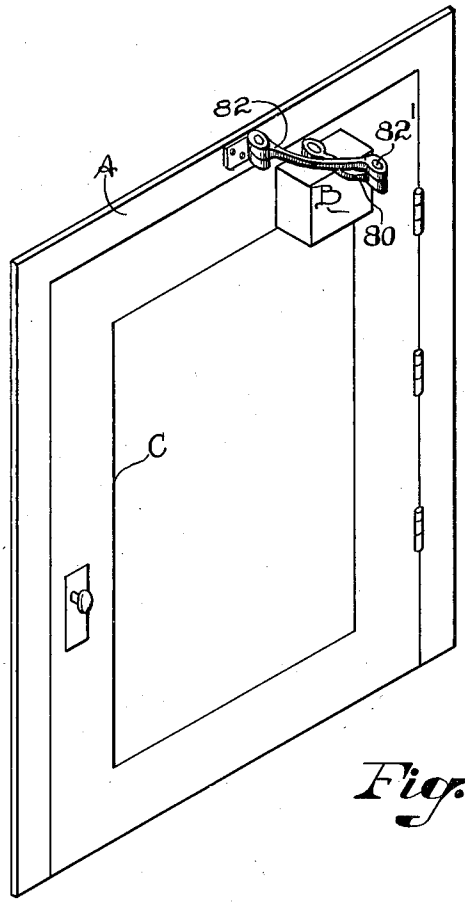


Fig. 11

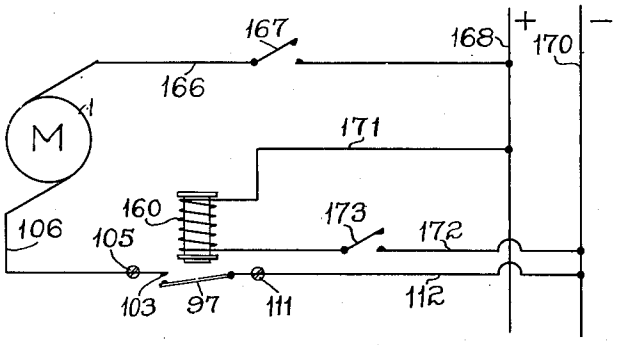


Fig. 10

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Patented July 7, 1936 2,046,431

UNITED STATES PATENT OFFICE

2,046,431

ELECTRIC DOOR CLOSER

Benjamin T. Sebire, Ashland, Mass., assignor of fifty-one one-hundredths to Charles E. Marshall, Hopkinton, Mass.

Application June 2, 1933, Serial No. 674,079

6 Claims. (Cl. 268—65)

The present invention relates to an electrical door actuating mechanism and particularly to a mechanism by which the door may be automatically opened and closed.

In the use of an electric motor for actuating a door, the provision of an automatic clutch mechanism which permits the door to be opened or shut or held in any desired position independently of the motor is desirable, and the principal object of the present invention is, accordingly, to provide, in an electrical door closer, a suitable clutch structure so that the door may be opened more rapidly than actuated by the motor or may be held in any position without interfering with the rotation of the motor.

The present invention also provides structure by which the motor is brought to rest when the door reaches closed position, and mechanism by which the direction of movement of the door actuating arm is reversed so that the door is automatically closed after having been opened. The invention also provides for opening the door from its closed position by an electrical circuit controlled by a switch remote from the actuating mechanism.

Other and further objects and advantages of the invention will appear from the following description taken in connection with the accompanying drawings in which:—

Fig. 1 is a front elevation of a door actuating mechanism embodying the invention, the casing for the mechanism having been removed.

Fig. 2 is a vertical section along the line 2—2 of Fig. 1.

Fig. 3 is a plan view of the device.

Fig. 4 is a horizontal sectional view along the line 4—4 of Fig. 1.

Fig. 5 is a vertical section on the line 5—5 of Fig. 4.

Fig. 6 is a horizontal section along the line 6—6 of Fig. 1.

Fig. 7 is a sectional view along the line 7—7 of Fig. 1.

Fig. 8 is a sectional view substantially along the line 8—8 of Fig. 1.

Fig. 9 is a sectional view substantially along the line 9—9 of Fig. 1.

Fig. 10 is a wiring diagram.

Fig. 11 is a perspective view of a door with the device attached thereto.

Like reference characters refer to like parts throughout the drawings.

Referring first to Fig. 1, a driving motor 1 is secured to the frame 2 of the device and has a shaft 3 to the end of which a gear 4 is secured. Said gear meshes with a gear 5 on the end of a shaft 6 journaled in the frame and the opposite end of said shaft carries a worm 7 (see also Fig. 2) which engages with a worm gear 8 keyed or otherwise secured against turning movement on a vertical shaft 10 journaled in bearings 11 and 12 provided by the frame. A bracket 13 secured to the frame provides a bearing 14 for the upper end of said shaft.

The shaft 10 has secured thereto a sleeve 15 which is held against rotation relative to said shaft by a pin 16 in said shaft which engages a slot 17 in the sleeve. The slot 17 permits a limited axial movement of the sleeve on the shaft and the lower end of the sleeve is provided with gear teeth 18 which engage, when the sleeve is in its lower position, with corresponding gear teeth 20 on a member 21 rotatably mounted on the shaft and supported against downward movement on said shaft by engagement with the hub of the worm gear 8. The member 21 is provided with bevel gear teeth 22 which engage with corresponding teeth 23 on a bevel gear 24 journaled on a horizontal stud 25 secured to the frame.

The sleeve 15 is provided with gear teeth 26 at the upper end thereof which correspond to the gear teeth 18 above, and which engage, when the sleeve is in its upper position shown, with corresponding gear teeth 27 on a member 28 secured by a key 30 to a sleeve 31 surrounding the shaft 10. The member 28 has bevel gear teeth 32 on the periphery thereof in engagement with the gear teeth on the bevel gear 24.

The sleeve 15 has an annular groove 33 in the outer surface thereof which is engaged by pins 34 and 35 on parallelly extending arms 36 and 37. Said arms, which extend on opposite sides of the sleeve, are journaled at one end on a horizontally extending bolt 38 secured to the frame and the opposite ends of said arms are connected to each other by a pin 40. A link 41 is pivotally mounted on the pin 40 and secured by a pin 42 at its opposite end to a vertically slidable bar 43. Vertical movement of the bar 43, which is procured by mechanism hereinafter described, positions, selectively, the gear teeth 18 in engagement with the gear teeth 20 or the teeth 26 in engagement with the gear teeth 27 by movement of the sleeve 15 into its lower or upper position respectively. The sleeve 15 constitutes a clutch member by which the direction of rotation of the sleeve 31 may be reversed.

The sleeve 31 which surrounds the shaft 10 extends upwardly from the member 28 and through the bearing 12, which engages the upper end of the member 28 for retaining said member in proper position. The sleeve 31 has an annular member 44 axially slidable on the sleeve and secured against turning movement thereon by a key 45. The lower surface of the member 44 has a plurality of cogs or teeth 46 which engage with corresponding cogs or teeth 47 on the hub of a gear 48 journaled on the sleeve. Beneath the gear 48 is journaled a gear 50 having a large diameter hub on the upper surface thereof. The under side of the gear 50 engages the upper end of the bearing 12 and is accordingly held against vertical movement on the sleeve.

The upper end of the hub of the gear 50 is provided with V-shaped notches 51 on opposite sides thereof for engagement with the ends of depending lugs 52 on a plate 53 having a semicircular recess 54 which receives the member 44. The inner edge of the plate 53 engages in an annular groove 55 provided by the member 44 to support said member and plate against relative axial movement. The lugs 52 project downwardly through openings 56, Fig. 4, in the gear 48 for engagement with the notches 51. A spring 57, which surrounds the sleeve 31 between the member 44 and a collar 58, which is secured to the upper end of the sleeve, normally holds the cogs 46 and 47 in engagement. A relative turning movement between the gears 48 and 50 will withdraw the lugs 52 from engagement with the notches 51 and thus separate the cogs 46 and 47 for a turning movement of the sleeve 31 relative to the gears.

The gears 48 and 50 engage with similar gears 60 and 61, respectively, on a vertical stud 62 secured to the frame. As shown in Fig. 5, the gear 61 has an integral sleeve 63 extending upwardly therefrom and surrounding the vertical stud 62, and the gear 60 is journaled on the sleeve 63 and has a downwardly extending hub which engages the upper surface of the gear 61 for supporting said gears in proper spaced relation. The gear 60 has a projecting pin 64 adjacent the periphery thereof, and the gear 61 has an upwardly projecting pin 65 which extends through a slot 66 in the gear 60 and is normally retained in radial alinement with the pin 64.

As shown in Fig. 4, the gear 60 has spaced upwardly projecting studs 67 and 68 on which arms 70 and 71 are positioned. Said arms extend around the sleeve 63 and are provided with parallel surfaces adjacent the free ends thereof for engagement with the pins 64 and 65 on opposite sides thereof. A second arm 72 is pivotally mounted on the stud 67 and has a set screw 73 in an upwardly projecting lug 74 which engages with a lug 75 on the arm 70. The arms 70 and 71 are urged toward each other by a spring 76, one end of which engages an upwardly extending lug 77 on the arm 72 and the other end of which engages an upwardly extending lug 78 on the arm 71. The tension of the spring determines the amount of pressure exerted by the arms 70 and 71 tending to retain the pins 64 and 65 in radial alinement. The tension of the spring 76 is adjusted for exerting a greater or less pull of the arms toward each other by turning the set screw 73, thereby shifting the relative position of the arms 72 and 70.

The sleeve 63 projects upwardly and has secured to its upper end an arm 80 secured against turning movement on the sleeve by a set screw 81. The opposite end of the arm 80 is connected by a link 82, Fig. 11, to the door frame A. The device B is attached to the door C by means of a bracket, not shown, to which the frame 2 is secured, the device, when in position, being covered by a casing 82'. Turning movement of the arm 80 in one direction (clockwise) will cause the door to open and turning movement of said arm in the opposite direction (counterclockwise) will close the door. When the arm 80 is in the position indicated in Figs. 1, 3 and 8, the door is closed and clockwise turning movement of said arm through the driving mechanism, above disclosed, will open the door.

A vertical stud 83, Fig. 1, supported by the frame has a gear 84 journaled thereon for engagement with the gear 48. A sleeve 85 of fibrous or other frictional material surrounds the stud 83 below the gear and is held against turning movement on said stud with the end of said sleeve engaging the hub of said gear. A spring 86 surrounds the stud 83 above the gear with the lower end of said spring engaging a washer 87 held against rotation on the stud by a suitable key, not shown, said washer engaging the upper end of the hub of said gear. A knurled nut 88 engages the upper end of the spring and is in threaded engagement with the upper end of the stud 83. Turning movement of the nut 88 varies the tension of the spring 72 for a greater or less braking action between the gear 84 and the frictional sleeve 85.

The gearing above described, including the gears 48 and 50 and the gears 60 and 61 meshing therewith, as well as the gear 84, which acts as a brake, constitutes an automatic clutching and declutching mechanism which will permit the arm 80 to turn independently of the motion of the vertical shaft 10 or of the sleeve 31 or member 44 rotated thereby. The rotation of the member 44, the direction of which is determined by the position of the sleeve 15, is normally transmitted directly to the gear 48 through the cooperating cogs 46 and 47. The rotation of the gear 48 procures a corresponding rotation of the gear 60 and the rotation of the latter is transmitted through the pins 64 and 65 to the gear 61 having the integral sleeve 63, above referred to, to which the arm 80 is secured. The tension of the spring 76 is normally great enough to transmit the rotation of the gear 60 to the gear 61 without permitting any relative turning movement between said gears. With the gears 60 and 61 rotating together, the gears 48 and 50 also rotate as a unit, the gear 50 being driven from the gear 61 so that the depending lugs 52 remain in the notches 51 in the gear 50 and the cogs 46 and 47 remain in engagement with each other. During the positive rotation of the member 44 from the driving motor, the gear 84 which acts as a brake is driven directly from the gear 48 and has no effect on the relative positions of the gears 48 and 50.

When the arm 80 is rotated manually at a different speed than the normal movement thereof in response to rotation of the member 44 or when the arm 80 is turned while the member 44 is stationary, the cogs 46 and 47 are automatically withdrawn from engagement with each other to permit a relative turning movement of the arm 80 relative to the driving mechanism. To procure this, the turning

movement of the arm 80 procures a corresponding turning movement of the gear 61 and a turning movement of the gear 50 which meshes therewith. The gear 48, however, is held resiliently against turning movement by the braking gear 84, the tension of the spring 86 being such that the gears 60 and 61 may be turned relative to each other against the tension of the spring 76. Since the gear 48 is held against turning movement and the gear 50 is positively rotated from the gear 61 to which the arm 80 is secured, a relative turning movement between the gears 48 and 50 takes place, thereby shifting the notches 51 out of alinement with the depending lugs 52, thereby elevating the plate 53 and accordingly raising the member 44 to separate the cogs 46 and 47. The arm 80 may then be shifted in either direction or into any position desired regardless of the movement of the member 44. When no further movement of the arm 80 occurs, the spring 76 urges the arms 70 and 71 together to re-aline the pins 64 and 65, thereby reestablishing the original relation between the gears 48 and 50 so that the depending lugs 52 again engage in the notches 51 and the member 44 is returned to the position shown under the influence of the spring 57.

The sleeve 63 has a cam 90 secured against turning movement thereon by a screw 91, the periphery of said cam, as best indicated in Fig. 8, being circular except for a small reduced portion 92 of smaller radius. The cam engages with an arm 93 pivotally mounted on a pin 94 on a plate 95 of insulating material mounted on the frame and said arm has a leaf spring 96 secured therein, the end of said spring engaging an arm 97 pivoted on a pin 98 on the plate 95. Said arm 97 is normally urged counterclockwise by a spring 100, and the end of said arm carries a block of insulation 101 in which a contact 102 is mounted. The contact 102, when the arm 97 is moved clockwise by the cam 90 acting through the arm 93, engages a stationary contact 103 supported on the plate 95 and electrically connected by a strip of conducting material 104 to a screw 105 to which a lead 106 is secured. The contact 102 is connected by a resilient connector 107 to a pin 108 which is electrically connected by a strip of conducting material 110 to a screw 111 by which the end of a lead 112 is secured to the member 110. The reduced portion of the cam 90 normally engages the arm 93 when the arm 80 is in the dot-dash line position Fig. 8, (the door then being closed), so that the contacts 102 and 103 are separated, thereby cutting off the power supply to the motor 1. A slight opening of the door, which involves a clockwise turning movement of the arm 80 as above stated, brings the full-size portion of the cam 90 into engagement with the arm 93, thereby rocking said arm and the arm 97 and bringing the contacts 102 and 103 into engagement for energizing the motor 1. As the door returns to closed position, the reduced portion 92 of the cam again moves into alinement with the arm 93 to permit the contacts 102 and 103 to separate under the action of spring 100. As indicated in Fig. 8, the end of the spring 96 engages the arm 97 adjacent the pivotal support thereof and procures a rapid movement of the arm 97 into or out of circuit closing position, thereby eliminating any arcing effect between the contacts.

For reversing the direction of movement of the arm 80 when the door is in open position and again when the door is in closed position, the sleeve 63 carries a plate 113 having its hub 114 secured against turning movement on the sleeve by a set screw 115. A second plate 116 having an opening 117 therethrough to receive the sleeve 63 overlies the plate 113 and is secured against turning movement relative thereto by a screw 118 which projects through an arcuate slot 120 in the plate 116. Movement of said plates relative to each other provides for adjustment of the angular spacing between a radial lug 121 on the plate 113 and a radial lug 122 on the plate 116; said angular spacing between said lugs determines the extent of movement of the door.

As indicated in Figs. 1, 3 and 7, the frame 2 has upwardly extending pins 123 which support the insulating plate 95, above referred to, in spaced relation to the frame, and also support, in spaced relation to the plate 95, a plate 124, the latter providing spaced guiding brackets 125 in which a bar 126, comprising a pair of flat strips 126*a* and 126*b* secured together, is horizontally slidable. Said bar has a projecting lug 127 carrying a downwardly projecting pin 128 which is in alinement with the radial lugs 121 and 122. The bar 126 also has a small projection 129 on the under strip 126*b* which engages an elongated recess 130 in a horizontally slidable flat bar 131, the latter being supported on edge by the brackets 125. The bar 126 is provided with rack teeth 132 on one edge thereof which engage with a gear 133 journaled on a stud 134 on the plate 124. The gear 133 is in mesh with a gear 135 on a stud 136 also mounted on the plate 124. Each of the gears 133 and 135 has arms 137 and 138 respectively, secured thereto, and the ends of said arms are connected together by a spring 140, the opposite ends of which engage pins 141 and 142 on the arms 137 and 138 respectively. The spring 140 tends to retain the arms, and accordingly the gears, either in the position shown, or, upon movement of the bar 126 forwardly, Fig. 3, in response to engagement of the pin 128 with the lug 122 during clockwise turning movement of the sleeve 63, to shift the bar 126 after the latter reaches its mid position with the axis of the spring 140 in alinement with the axes of the studs 134 and 136 into the dot-dash line position of Fig. 3. The gears 133 and 135 actuated by the spring 140 constitute a quick throw mechanism which is operable to shift the bar 126 in either direction after the latter is moved to its mid position by the radial lugs 121 or 122.

Referring now to Fig. 6, the bar 131 has a projecting lug 143 which carries a vertically extending pin 144 (see also Fig. 7), the latter engaging a latch 145 pivotally mounted on a pin 146 on the plate 124. A spring 147 normally urges the latch 145 counterclockwise into positive engagement with the pin 144, and said latch is provided with spaced recesses 148 and 149 connected by an arcuate surface 150. Said recesses resiliently retain the bar 131 either in the position shown in Fig. 6 or in the opposite end position indicated in dot-dash lines in which position the pin 144 engages the opposite recess 149.

The lower edge of the bar 131 is provided with rack teeth 151 which engage with a gear 152, Fig. 3, on one end of a shaft 153, journaled in brackets 154 and 155 on the frame. The bracket 155 has a guideway 156 which receives the vertically slidable bar 43 above referred to, and the

latter is provided with rack teeth 157 for engagement with a gear 158 on the end of the shaft 153. Shifting movement of the bar 126 in response to engagement between the pin 128 and either of the lugs 121 or 122 procures a corresponding shifting of the bar 131 which, through the medium of the shaft 153, procures a corresponding vertical movement of the bar 43, thereby shifting the sleeve or clutch member 15 on the shaft 10.

As above stated, the motor 1 is energized as soon as the door is slightly open by the turning of the cam 90. The structure shown also provides for energizing the motor while the door is completely closed, thereby opening the door from the closed position without the necessity for a partial manual opening of the door. This feature is particularly useful in connection with apartment house doors having an electrically controlled latch by which the door is unlocked from a position remote from the door.

Referring now to Fig. 9, the frame 2 supports a solenoid 160 mounted on a bracket 161, Fig. 1. The solenoid is positioned beneath the plate 95 and actuates an armature 162 pivoted on a pin 163 on the frame. The armature has a resilient finger 164 extending therefrom and engaging a depending pin 165 secured, as shown in Fig. 1, to the arm 97. Energization of the solenoid procures attraction of the armature 162 and a corresponding clockwise movement of the arm 97 to bring the contacts 102 and 103 into engagement, thereby closing the electrical circuit through the driving motor 1. The solenoid 160 may readily be connected, as will be apparent, in the same circuit that releases the latch of the door so that said door is automatically opened when the latch is released.

One type of electrical circuit for actuation of the door closer is shown in Fig. 10. Referring to this figure, the motor 1 is connected by a lead 166 through a manually controlled switch 167 to a supply lead 168. The other terminal of the motor 1 is connected by the lead 106, above referred to, to the screw 105 which is electrically connected to the contact 103. The movable contact on the arm 97 is connected through the screw 111 and the lead 112 to a supply wire 170. The solenoid 160 for actuating the arm 97 has one terminal connected by a lead 171 to the supply wire 168, and the other terminal connected by a lead 172 through a manually controlled switch 173 to the supply wire 170. If desired, the solenoid which controls the latch on the door may be in series with the solenoid 160 to provide for releasing the latch on the door at the same time that the solenoid 160 is energized.

In the operation of the device, with the door C, Fig. 11, to which the device is connected, closed, the arm 80 being then in the position indicated in Figs. 3 and 8, the door is slightly opened manually, thereby swinging the arm 80 clockwise. This movement turns the cam 90 clockwise and the full-size portion of said cam rocks the arm 97 clockwise to bring the contacts 102 and 103 into engagement and close the circuit through the driving motor. The rotation of the motor then procures, through the clutch or sleeve 15, the latter being in the position shown, a continued clockwise turning movement of the sleeve 63, thereby swinging the arm 80 and accordingly completely opening the door. As the arm 80 continues to swing clockwise, the lug 122 engages the pin 128 and procures a forward movement of the bar 126. This movement of the bar 126 turns the gear 133 counterclockwise and the gear 135 clockwise until the axis of the spring 140 is in alinement with the studs 134 and 136 at which time the lug 129 on the bar 126 engages the forward end of the recess 130 in the bar 131. A slight further movement of the bar 126 forwardly by the lug 122 carries the spring 140 beyond its position in alinement with the studs 134 and 136, and the tension of said spring then carries the bar 126 quickly into the forward position, shown in dot-dash lines, carrying the bar 131 forward therewith.

Forward movement of the bar 131 withdraws the pin 144 from the recess 148 with which said pin is in engagement and carries said pin forwardly along the surface 150 into engagement with the other recess 149, the bar 131 then being in its forward position shown in dot-dash lines, Fig. 6. Forward movement of the bar 131 procures a clockwise turning movement (Fig. 3) of the shaft 153 and a corresponding downward movement of the bar 43. As above stated, downward movement of the bar 43 shifts the sleeve 15 downwardly to withdraw the teeth 26 out of engagement with the teeth 27 and to position the teeth 18 and 20 in engagement, thereby reversing the direction of rotation of the sleeve 63. The action of the spring 140, which tends to shift the bar 126 from its mid position into either end position and the action of the latch 145, which, by engagement between the arcuate surface 150 and the pin 144, tends to shift the bar 131 from mid position into either end position, assure positive shifting movement of the sleeve 15 from one end position to the other.

The sleeve 15 having been shifted downwardly to position the teeth 18 and 20 in engagement, the sleeve 63 is then rotated counterclockwise, carrying the arm 80 counterclockwise for closing of the door. As the arm 80 reaches the position shown in Figs. 3 and 8, the door then being closed, the reduced portion 92 of the cam 90 is moved into engagement with the arm 93 to release the arm 97 and permit the contacts 102 and 103 to be separated for cutting off the supply of power to the motor.

As the arm 80 approaches the position of Figs. 3 and 8 during the counterclockwise closing movement, the lug 121 engages the pin 128, the bar 126 at this time being in the dot-dash line position shown and procures a rearward shifting movement of the bar 126. As the latter reaches its mid position, the lug 129 engages the rearward end of the recess 130 to procure a movement of the bar 131 with the bar 126 during the rest of its rearward movement. From the mid position of the bar 126, the spring 140 actuates said bar into the full line position of Fig. 3 and carries the bar 131 therewith into the full line position of Fig. 6, thereby shifting the sleeve 15 upwardly to bring the gear teeth 26 and 27 again into engagement for a subsequent clockwise turning movement of the arm 80, when desired, for automatic opening of the door.

In complete automatic opening of the door without the necessity for a slight manual opening thereof, the switch 173 which controls the solenoid 160 is closed, energizing said solenoid and causing attraction of the armature 162, thereby bringing the contacts 102 and 103 into engagement for energizing the motor. Since the door latch is released at this time by any suit-

able well-known mechanism, the rotation of the motor 1 procures an opening of the door and a subsequent closing thereof in the manner above set out. As soon as the door starts to open, the cam 90 holds the contacts 102 and 103 in engagement so that the door will continue its automatic opening and subsequent closing, even if the switch 173 is opened.

In order to have the door stay open in any adjusted position, the switch 167, by which the supply of power to the motor is manually controlled, is opened, thereby stopping the rotation of the motor 1. Since the gearing described cannot be actuated by a turning movement of the arm 80, the latter is held stationary and no unintended movement of the door occurs regardless of the position of the door at the time.

When the switch 167 is open, so that the motor 1 is not rotating, the door on which the device is mounted may still be opened and closed manually. As above pointed out, when the arm 80 is rotated manually as by opening or closing of the door with the member 44 stationary, the turning movement of the arm 80 procures a corresponding turning movement of the gear 61 and the gear 50 which meshes therewith. Since the gear 48 is held against turning movement by the braking gear 84, a relative turning movement between the gears 48 and 50 takes place, thereby shifting the notches 51 out of alinement with the depending lugs 52 for elevating the member 44 to separate the cogs 46 and 47. The tension of the spring 86 is sufficiently great to overcome the tension of the spring 76 and permit the gears 60 and 61 to turn relative to each other. After the door is shifted to the desired position, this being permitted by reason of the separation of the cogs 46 and 47, the spring 76 returns the pins 64 and 65 into radial alinement, thereby reestablishing the original relation between the gears 48 and 50 so that the cogs 46 and 47 are again in engagement for a positive driving of the arm 80 from the motor 1.

While the motor is rotating and the door is held against movement temporarily, the cogs 46 and 47 are again withdrawn from engagement with each other to permit the motor to rotate without moving the door. The door is necessarily held against movement with a sufficient pressure so that the torque on the arm 80 is great enough to overcome the tension of the spring 76 to permit a relative rotation between the gears 60 and 61 and a corresponding relative turning movement between the gears 48 and 50 which, as above stated, elevates the member 44 and separates the cogs 46 and 47. The motor 1 may then rotate with a corresponding rotation of the member 44 without transmitting any rotation to the arm 80 until the pressure on the door is released and the action of the spring 76 again returns the gears 48 and 50 to their original position to permit the member 44 to return to the position shown with the cogs 46 and 47 in engagement. The operation of the automatic clutching mechanism, above described, is the same when the door is manually opened or closed at a greater rate than the automatic rate of movement of said door by said motor. In this case, the increased torque on the arm 80, as a result of the manual turning movement of the door, is transmitted to the gear 50 which is turned relative to the gear 48, the torque on the arm 80 being sufficient to overcome the tension of the spring 76 so that the member 44 is again elevated for separating the cogs 46 and 47.

The automatic clutching and declutching mechanism accordingly provides for breaking the positive driving engagement between the driving member 44 and the driven arm 80 when the torque on said arm is increased to a predetermined amount greater than the torque on the driving member 44 and said mechanism automatically reestablishes the driving connection between the member 44 and the arm 80 when the torque on said arm is decreased to the proper amount.

It will be apparent that by an adjustment of the lugs 121 and 122 and the position of the cam 90 relative to the arm 80, the device may be adapted universally for opening and closing a door either inwardly or outwardly relative to the device; that is, the device may be positioned on either side of the door regardless of which direction the door opens.

The switch 173 which procures automatic opening of the door from closed position may, as will be apparent, be actuated either by sound-responsive means or light-responsive means. This arrangement is particularly applicable to garage doors so that the doors will be opened automatically by sounding of the horn on the automobile or by the influence of the headlights of the automobile on the light-responsive means, the latter being energized or activated by the lights for closing the switch 173 through any suitable mechanism such as a relay device and thus automatically opening the door.

I claim,

1. In an electrical door-actuating device, a driving motor, a driven member arranged to be connected to a door for actuation thereof, mechanism for connecting said member to said motor, means independent of the motor operation and responsive to a slight swinging movement of said member for closing a circuit through the driving motor, said means maintaining the circuit closed until the member returns to original position, and means responsive to swinging movement of said member for reversing the direction thereof.

2. In a door actuating device for swinging a door relative to the door frame thereof, said device being positioned on one of said parts, said device comprising a driving motor, a driven member adapted to be connected to the other of said parts and operating through movement thereof for opening and closing said door, a reversing mechanism providing a connection between the driving motor and the driven member and actuated in response to movement of the driven member when the latter reaches a predetermined position, and means independent of the motor operation and responsive to a slight turning movement of said member for closing a circuit through the driving motor, said means maintaining the circuit closed while the door is in open position and providing for opening of said circuit when the door reaches its closed position.

3. In a door actuating device for swinging a door relative to the door frame thereof, said device being positioned on one of said parts, said device comprising a driving motor, a driven member adapted to be connected to the other of said parts and operating through movement thereof for opening and closing said door, the circuit through said driving motor being normally open, a reversing mechanism providing a

connection between the driving motor and the driven member and actuated in response to movement of the driven member when the latter reaches a predetermined position, and means independent of the motor operation and responsive to a turning movement of said member resulting from a slight opening of the door from closed position for closing the circuit through the driving motor, the latter procuring turning movement of the member for automatically opening and closing said door.

4. In a door actuating device for swinging a door relative to the door frame thereof, said device being positioned on one of said parts, said device comprising a driving motor, a driven member adapted to be connected to the other of said parts and operating through movement thereof for opening and closing said door, the circuit through said driving motor being normally open, means independent of the motor operation and responsive to a turning movement of said member resulting from a slight opening of the door from closed position for closing the circuit through the driving motor, the latter procuring turning movement of the member for automatically opening and closing said door, and means responsive to turning movement of said member for reversing the direction of movement thereof when the door reaches its full open position.

5. In a door actuating device for swinging a door relative to the frame thereof, said device being positioned on one of said parts, said device comprising a driving motor, a driven member adapted to be connected to the other of said parts and operating through movement thereof for opening and closing said door, mechanism including a reversing clutch for actuating said member, means responsive to movement of said member at opposite ends of the swinging move ment of the door for shifting said clutch, and means responsive to movement of said member and positioned between said member and the reversing clutch for closing a circuit through the driving motor, said means operating independently of the operation of said motor.

6. In a door actuating device for swinging a door relative to the frame thereof, said device being positioned on one of said parts, said device comprising a driving motor, a driven member adapted to be connected to the other of said parts and operating through movement thereof for opening and closing said door, mechanism including a reversing clutch for actuating said member, means responsive to movement of said member at opposite ends of the swinging movement of the door for shifting said clutch, an automatic clutch positioned between said reversing clutch and the driven member to provide for movement of said member independently of the rotation of the motor, and means located between said automatic clutch and the driven member and responsive to movement of said driven member for closing a circuit through the motor when the door controlled by said device is slightly opened.

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