

July 31, 1956

K. F. REAMEY

2,756,990

DOOR OPERATING DEVICE

Original Filed April 12, 1952

3 Sheets-Sheet 1

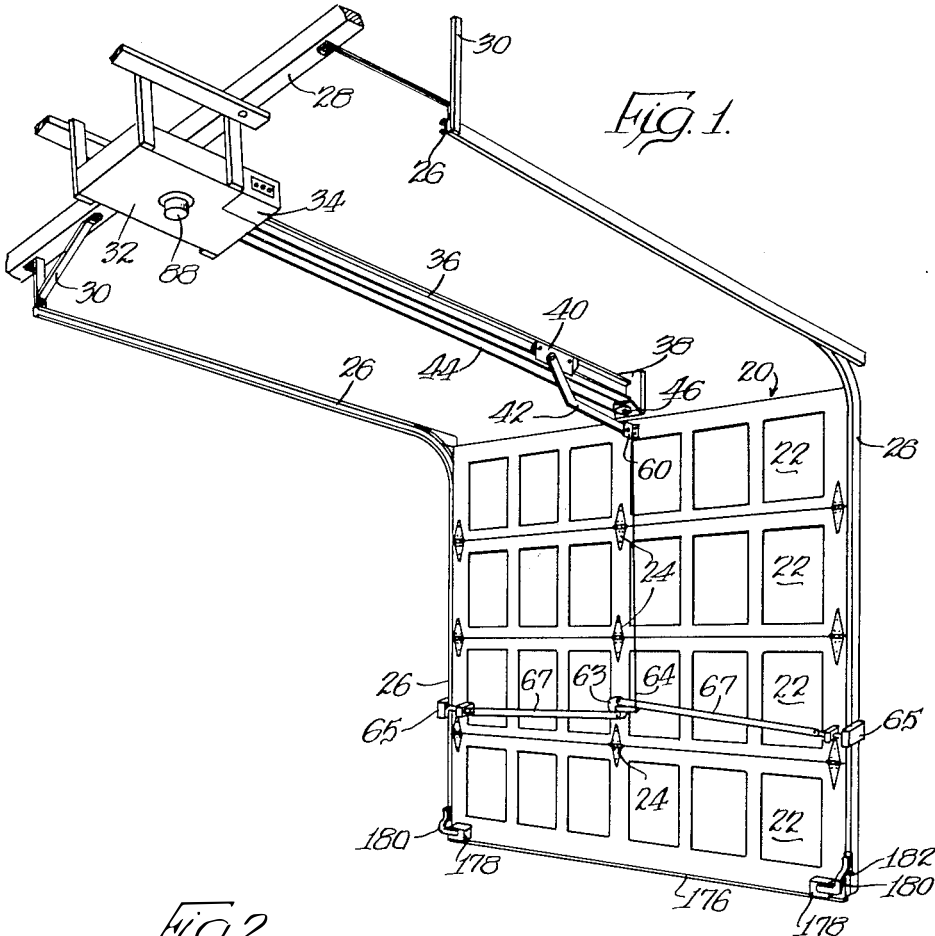
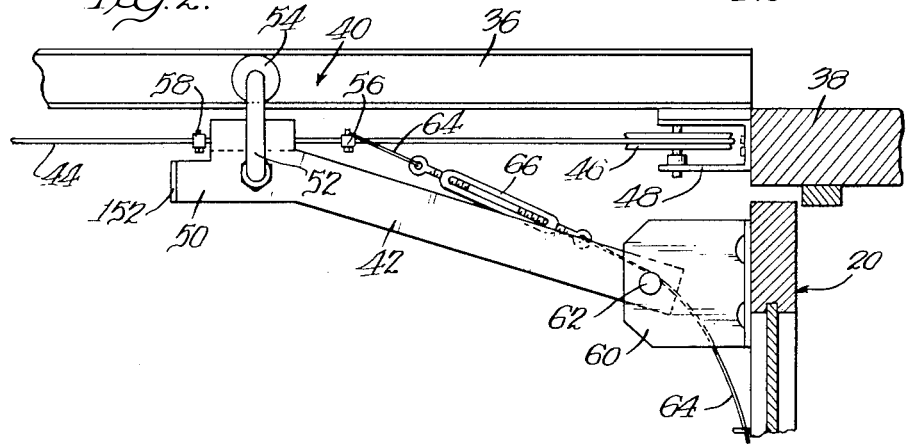


Fig. 2.



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3 Sheets-Sheet 2

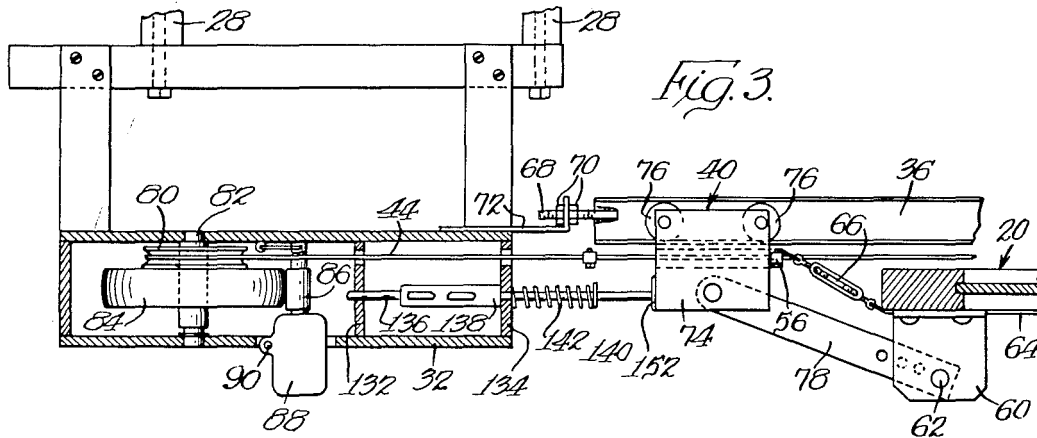


Fig. 3.

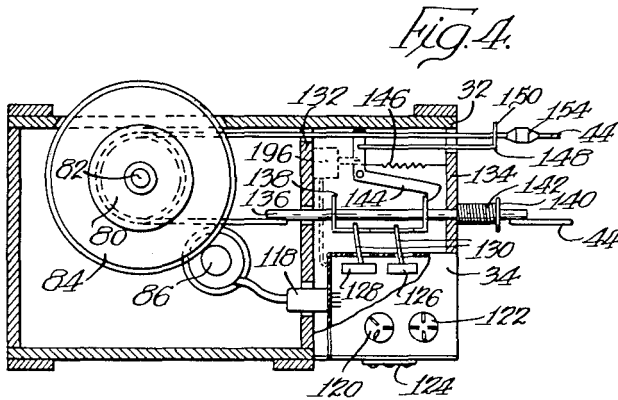


Fig. 4.

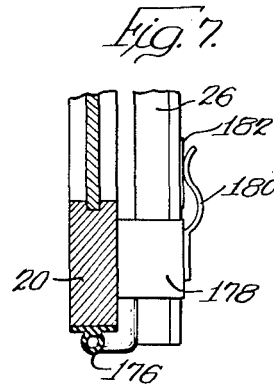


Fig. 7.

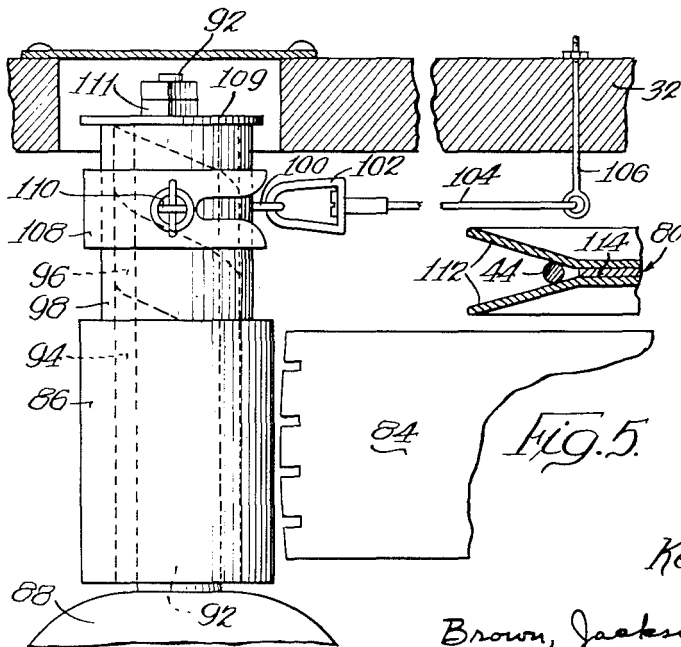


Fig. 5.

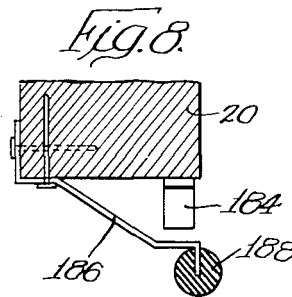


Fig. 8.

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DOOR OPERATING DEVICE

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Original application April 12, 1952, Serial No. 282,055, now Patent No. 2,703,235, dated March 1, 1955. Divided and this application January 18, 1955, Serial No. 482,468

12 Claims. (Cl. 268—59)

The present invention relates to improved door operating devices and, particularly, to electric motor driven devices for automatically opening and closing doors of the overhead type commonly employed in garages.

The present application is a division of my copending application Serial No. 282,055, filed April 12, 1952 which matured as Patent No. 2,703,235 issued March 1, 1955.

It is an object of the present invention to provide an improved door operating device of the character referred to that is extremely economical in manufacture and assembly so that the same may be made commercially available for use in private garages as well as commercial garages.

In accordance with the present invention, I provide an improved door operating device comprising, briefly, a reversible electric motor adapted for operative driving connection to a continuous cable, novel circuit means for controlling operation of the motor, and a track guided carriage adapted to be connected to the door and adapted to be moved by the cable upon actuation of the cable to open and close the door.

The novel circuit means of the present invention is substantially completely enclosed in a casing and provided with conventional electric connectors for connection to a suitable source of electrical supply. The circuit means includes a switch disposed in the casing and adapted for actuation upon actuation of the cable to serve as a limit switch for stopping operation of the motor as the door approaches either limit of its movement. In one embodiment thereof, the circuit means includes a relay for automatically ceasing operation of the motor should the door encounter an obstacle. In another embodiment, means are provided for reversing the direction of rotation of the motor to retract the door should same encounter an obstacle while being closed. In all embodiments, suitable means may be provided externally of the garage for contact by the vehicle to effect automatic operation of the device of the present invention. All of the circuit means lend themselves to installations of use wherein a plurality of operating devices may be actuated electrically from external means adapted to be contacted by various vehicles. In a further embodiment, I provide current flow blocking means, preferably in the form of a germanium crystal, for controlling selective operation of a plurality of devices from a common vehicle contactor means. In all embodiments thereof, the circuit means of the present invention may include a light for the interior of the garage adapted to be energized during opening and closing movement of the garage door and whenever the garage door is open, but automatically shut off when the garage door is closed.

Other objects and advantages of the present invention will become apparent in the following detailed description of preferred embodiments of the invention, wherein reference is made to the accompanying drawings, in which:

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Figure 2 is a side elevation of the door operating device at the door end thereof with the door in closed position, the view showing one embodiment of the track carriage of the present invention;

Figure 3 is a side view, partly in section and partly in elevation, at the operator end of the door operating device of the present invention with the door in open position, the view showing a second embodiment of the track carriage;

Figure 4 is a top view, partly in section and partly in plan, of the operator housing and circuit means casing;

Figure 5 is a partial side view, on an enlarged scale, of the motor drive shaft, the clutch means, the friction wheel and the cable pulley of the present invention;

Figure 6 is a wiring diagram of one embodiment of the circuit means of the present invention;

Figure 7 is a partial vertical section of a door carrying means for effecting reversal of the motor when the door contacts an obstacle;

Figure 8 is a view similar to Figure 7 of a second embodiment of the switch means for effecting reversal of the motor when the door contacts an obstacle;

Figure 9 is a wiring diagram of the circuit means within which switches such as those shown in Figures 7 and 8 are included, the diagram including external devices adapted to be contacted by a vehicle to effect actuation of the door operating device;

Figure 10 is a front view, partly in section and partly in elevation, of externally located contact means adapted to be engaged by vehicle carried means to comprise a switch for use in the circuit of Figure 9; and

Figure 11 is a portion of the wiring diagram of a circuit including separate current blocking and relay means, which means are adapted to be included in the circuit of either Figure 6 or Figure 9.

Referring now to the drawings, and particularly to Figure 1, a conventional type of overhead garage door is indicated at 20. The door 20 may be either of the sectional type or of the one piece type as desired, the operating device of the present invention being equally adapted for use with either type of door. As shown, the door 20 comprises a plurality of sections 22 hingedly connected together by means of conventional hinges 24. At the sides thereof, the door 20 may be provided with conventional rollers or the like adapted to run in suitable tracks 26 for guiding movement of the door. The tracks 26 may be suitably supported from the rafters 28 of the garage by bracket means 30 or the like. The housing for the door operating device of the present invention is indicated at 32 and mounted therein at one corner thereof is a casing 34 for the major components of the circuit means of the present invention. The housing 32 may be supported from the rafters 28 of the garage in any suitable manner. Extending forwardly from the housing 32 is a track 36, generally similar to the tracks 26, which is disposed in generally spaced parallel relation with respect to the door when the door is in its up position and, preferably, generally centrally of the door. At the end thereof adjacent the door 20, the track 36 may be secured to the garage structure by a support 38. A carriage 40, including suitable rollers supported by the track 36, is adapted for movement longitudinally of the track in a conventional manner. The carriage 40 includes an arm 42 extending between the carriage and the upper edge of the door. The arm 42 is preferably rigid, but is pivotally connected to at least the door so as to provide a flexible connection between the carriage 40 and the door. To effect reciprocation of the carriage 40 along the track 36, a cable 44 is provided, the cable being continuous and

driving connection is established between the cable 44 and the movable carriage 40 will be described in detail hereinafter.

Referring now to Figure 2, the pulley 45 at the forward end of the track 36 is shown as suitably journaled in a U-shaped bracket 43 adapted to be secured to the lower surface of the track 36. The bracket 43 may, as shown, be suitably secured to a portion of the garage structure, the support 38, to support the door end of the operating device of the present invention. The carriage 40 comprises a frame 50 which may be formed integrally with the arm 42. The frame 40 includes an axle 52 extending upwardly thereof and rotatably supporting a wheel 54 received within the track 36. The track 36 may suitably be generally C-shaped in cross section so as to retain the wheel 54 therein against lateral displacement. The frame 50 includes a sleeve portion or the like through which one run of the cable 44 freely passes. The cable 44 is provided at spaced points on opposite sides of the carriage 50 with a pair of stops 56 and 58 which may be suitably adjustably secured to the cable 54. The stops 56 and 58 are of such size as will not pass through the sleeve portion of the frame 50 and thereby engage the frame 50 to move the movable carriage along the track 36 when the cable 44 is actuated. At the forward end thereof, the arm 42 is pivoted to a bracket 60 suitably secured adjacent the top of the door 20. The pivotal connection between the bracket 60 and the arm 42 is accomplished by a suitable pivot pin 62. A cable 64, which is reeved over the pivot pin 62, is connected at its upper end to the stop 56 and at its lower end may be suitably connected to the latching means for the door 20. As shown in Figure 1, the cable 64 may be connected directly to the operating handle 63 of a conventional latching means which includes a latch 65 at each side of the door and operating bars, straps, or wires 67 extending between the handle 63 and the latches 65. As will be obvious, the latching means is constructed to effect unlatching upon upward movement of the handle 63, the apparatus including spring means for biasing the handle 63, connectors 67, and latches 65 to latching position upon release of the handle. The cable 64 preferably includes a turn buckle 66 to adjust the cable 64 to provide for proper actuation of the latch means of the door 20.

In use, when the door is moved to its closed position, the stop 58 on the cable 54 is disposed in engagement with the sleeve portion of the frame 50. Accordingly, lost motion is provided between the top 56 and the frame 50 before the frame 50 will be picked up and moved by the cable. During movement of the cable 44 to take up the lost motion between the carriage and the stop 56, the stop 56 is moved to effect actuation of the cable 64 and, thus, of the latching means for the door. Specifically, the handle 63 is moved upwardly to release the latches 65 so that the door is unlatched or unlocked before any movement is imparted thereto as a result of movement of the carriage 50 along the track 36. Upon return movement of the door, the latches will be released to provide a spring effected locking of the door in the usual manner when the door is moved to its closed position. Accordingly, my invention presents one substantial advantage in providing means for automatically unlatching or unlatching the door prior to movement thereof and for automatically conditioning the door latch means for reengagement when the door is closed so that the garage door may always be locked when closed without requiring special actuation manually. Furthermore, the attachment of the cable 64 to the door latching means in no way interferes with or hampers the ability manually to latch and unlatch, lock and unlock the door in a normal or conventional manner.

Referring now to Figure 3, the operator end of the

The track 36 is adjustably connected to the housing 32 by means of a bolt 68 secured to the track 36 and adjustable by means of a pair of nuts 70 with respect to a bracket 72 carried by the housing 32. Upon adjustment of the nuts 70, the tension of the cable 44 may be varied as will become more clearly apparent as the description proceeds. The carriage shown in Figure 3 differs from the carriage shown in Figure 2 in that the same comprises a frame 74 carrying a pair of wheels 76 disposed within and guided by the track 36. The frame 74 is provided with a sleeve portion or a bore freely accommodating passage therethrough of the cable 44. As described with respect to Figure 2, the stops 56 and 58 are adjustably mounted on the cable 44 to pick up and move the frame 74 in response to actuation of the cable. An arm 78 is pivotally connected to the carriage 74 at one end and at its opposite end is pivotally connected to the bracket 60 by means of the pivot pin 62. To accommodate various types of doors and various mountings of the track 36 with respect to the door, the arm 78 is provided with a plurality of apertures therethrough adapted to accommodate passage of the pivot pin 62 so that the arm 78 may be pivotally connected in the bracket 60 in adjusted position. The arm 78 of the embodiment of the carriage shown in Figure 3 is pivoted at its opposite ends to the carriage 74 and to the bracket 60 so as to provide for variations in the distance between the track 36 and the door 20 as the door is moved. For example, in some installations, the top edge of the door will be disposed a considerable distance below the track 36 when the door is in its closed position, but when the door is in its open position the upper surface of the door 20 will be disposed immediately adjacent the lower surface of the track 36. To accommodate these variations in the distance between the track and the door, the arm 78 is pivoted at both ends so that the same will insure operative association between the carriage and the door without any possibility of distortion or stress being imparted either to the door or to the door operating device of the present invention.

As is shown in Figures 3 and 4, both runs of the cable 44 extend through the walls of the housing 34 and within the housing 34, the cable 44 is reeved over a pulley 80 mounted on a shaft 82 which is journaled in the top and bottom walls of the housing 32. The shaft 82 also carries a friction wheel 84 adapted to be engaged on the peripheral surface thereof by a friction sleeve 86 carried by the drive shaft of an electric motor 88. The motor 88 is disposed on a vertical axis with the bottom portion thereof protruding through the bottom wall of the housing 32. Intermediate its ends, the motor 88 is pivotally mounted, as at 90, to the housing 32 in such manner that the weight of the motor normally biases or moves the friction sleeve 86 away from the friction wheel 84. Thus, when not energized, the friction sleeve 86 is disposed out of engagement with the friction wheel 84 so that the door 20 may be manually moved without undue friction. As will be apparent, the only resistance to manual actuation of the door 20 would be that provided by the motor 88, so that by disposing the motor normally out of engagement with the remainder of the apparatus, the door may be manually actuated with ease.

Referring now to Figure 5, wherein the friction wheel 84 and friction sleeve 86 and associated apparatus are shown in greater detail, the motor 88 includes an axial drive shaft 92 extending upwardly toward the upper wall of the housing 32. A first sleeve 94 is secured to the shaft 92 and extends substantially throughout the full length of the shaft 92. The sleeve 94, as stated, is secured to the shaft 92 for conjoint rotation therewith. The sleeve may be formed of various types of material as desired, but is preferably formed of wood for purposes which will become more apparent hereinafter.

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