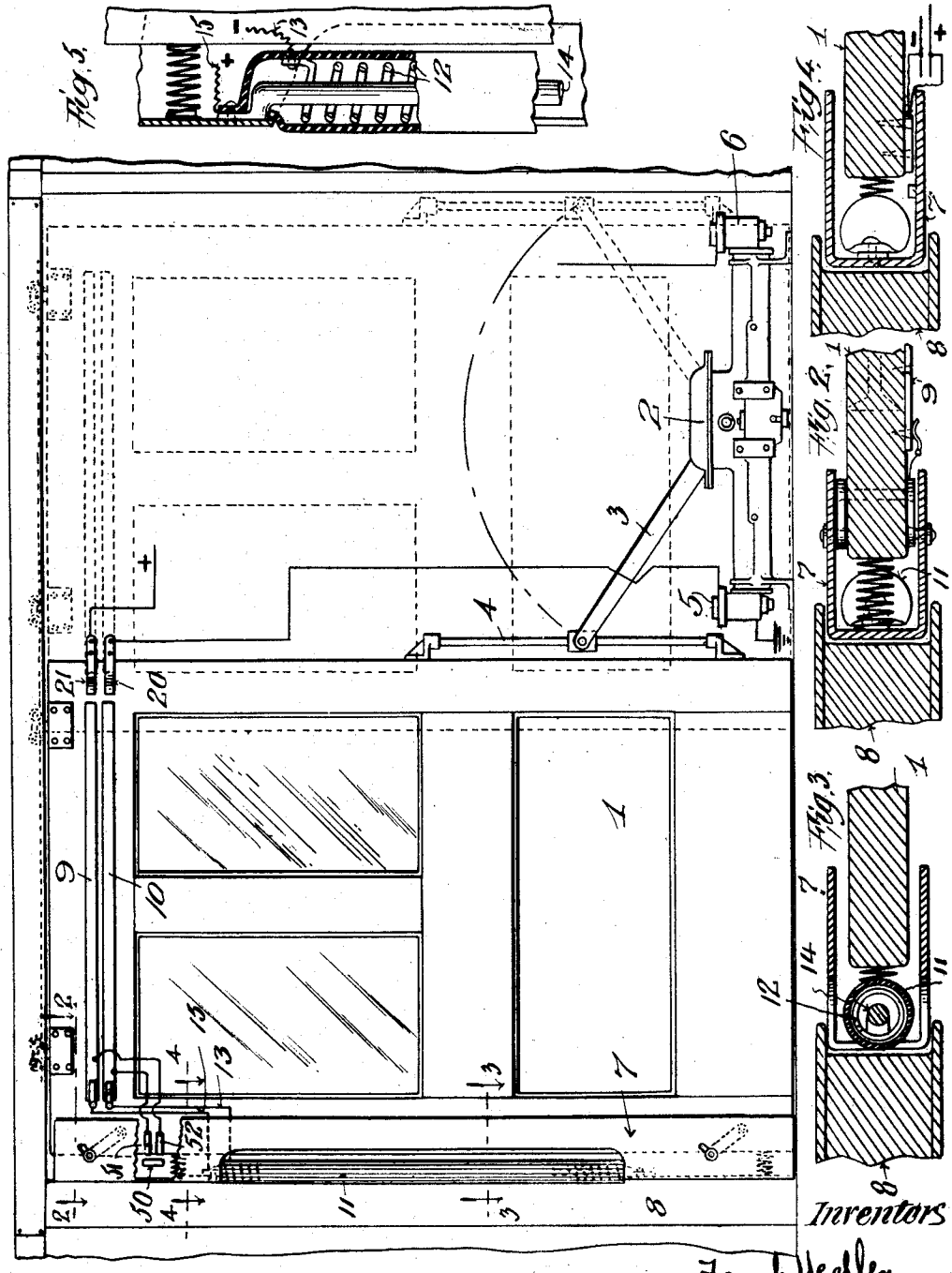
July 5, 1927. 1,634,665

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CONTROL MECHANISM FOR MOTOR ACTUATED DOORS

Filed April 11, 1921



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Patented July 5, 1927. 1,634,665

UNITED STATES PATENT OFFICE.

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CONTROL MECHANISM FOR MOTOR-ACTUATED DOORS.

Application filed April 11, 1921. Serial No. 460,577.

This invention relates to control mechanism for motor actuated doors such as are employed on street cars and the like.

The object of the invention is to provide means which are simple in construction and efficient in operation for electrically controlling a door operating motor by and when the door in its closing movement meets an obstruction.

A further object of the invention is to provide means which are electrically controlled upon the door meeting an obstruction during its closing movement for reversing the movement of the motor.

Further objects of the invention will appear more fully hereinafter.

The invention consists substantially in the construction, combination, location and relative arrangement of parts, all as will be more fully hereinafter set forth, as shown by the accompanying drawing, and finally pointed out in the appended claims.

Referring to the drawings:

Fig. 1 is a diagrammatic view in side elevation, parts broken out, of a door and its actuating motor, and showing the motor control arrangement embodying our invention;

Fig. 2 is a sectional view taken on the line 2, 2, Fig. 1, looking in the direction of the arrows;

Fig. 3 is a sectional view taken on the line 3, 3, Fig. 1, looking in the direction of the arrows;

Fig. 4 is a view taken on the line 4, 4, Fig. 1, looking in the direction of the arrows;

Fig. 5 is a sectional view of the contacting mechanism controlled by the door meeting an obstruction in its closing movement, and embodying our invention.

The same part is designated by the same reference character wherever it occurs throughout the several views.

In accordance with our invention we propose to provide means for use in connection with electrically controlled door operating motors of the fluid pressure or other type, and particularly such motors, the opening and closing movements of which are controlled by magnet valves, whereby when the door in its closing movement encounters an obstruction the circuit of the magnet valve controlling the opening movement of the door motor will be completed, thereby causing the arrest or else effecting a reversal of the movement of the door upon meeting the obstruction. We also propose to arrange the various parts so that when the door has reached the limit of its closing movement, the circuit of the magnet valve is opened.

Referring to the drawings,—

We show diagrammatically in Fig. 1 a door and its operating motor such as is commonly employed in the street car art, the door indicated at 1, and the motor, indicated generally at 2, is connected by means of the rocking arm 3 to the rod 4 of the door 1. The motor 2 is controlled in the usual manner by means of magnet valve 5, which magnet valve 5 controls the opening movement of the door. A similar magnet valve 6 is employed which controls the closing movement of the door; the normal means for controlling the magnet valves 5 and 6 are not shown, as same form no part of the present invention, and are well known and in use in the art at the present time. The door 1 is shown to be of the collapsible shoe type, that is, it has mounted at its forward edge, for collapsible movement relative thereto, a shoe 7, which construction is well known in the art and has been in use for some time. The edge of the shoe 7 in the completion of the closing movement of the door contacts with the front edge of the door jamb 8 in the usual manner. At the top of the door we secure two conductor strips 9 and 10 insulated from each other. The collapsible shoe 7 has mounted therein throughout its entire length, or a portion thereof, as shown in Fig. 1, a flexible member indicated at 11, the particular construction of which may be varied in many different ways. This flexible member 11 encloses two separated contacts which are adapted to be closed upon each other when the door, in its closing movement, meets an obstruction which effects the collapsing of the shoe 7. For the purpose of illustration I have shown the member 11 in the form of a tube of flexible non-conducting material, for example, heavy rubber, canvas or the like, extending longitudinally through which is a conducting member in the form of a laterally flexible, spirally coiled spring 12, the end of which is permanently connected by means of wire 13 to the conducting strip 10. Passing longitudinally through the center of the tubular member 12 is a conducting rod or wire 14 normally out of contact with the coil spring conductor 12. The end

of the conducting rod 14 is permanently connected by means of wire 15 to the conducting strip 9. Stationarily mounted relative to the door and its movements are a pair of contactors 20 and 21, adapted to come in contact with the strips 10 and 9, respectively, when the door is in any position other than its completely closed position. Contactor 21 is connected in any suitable manner with a source of current which may be the power rail, storage battery, or any other current source, and the contactor 20 is connected through the opening magnet 5 to ground. The operation of the device, it is believed from the foregoing will be apparent. Assume the door to be in its full open position, in which case contactors 21 and 20 are in electrical connection with the strips 9 and 10. The conducting rod 14, however, is out of contact with the coil spring conductor 12, whereby the circuit from the contactor 21 to contactor 20 is open and remains open. Should the door in its closing movement meet an obstruction, say, for example, the body of a passenger either boarding or alighting from the car, the flexible member 11 is deflected laterally, whereupon electrical connection is established between the coil spring conductor 12 and conducting rod 14 to establish circuit from the contactor 21, strip 9, wire 15, rod 14, coil spring 12, wire 13, strip 10, contactor 20, magnet valve 5, to ground, thereby energizing the opening magnet of motor 2, causing same to actuate the door motor to open the door. It will be apparent that as soon as pressure against the flexible member 11 is removed, and the circuit broken between the conductors 14 and 12, that the closing magnet will again cause the door to resume its closing movement.

Many modifications will readily occur to those skilled in the art without departing from the spirit and scope of our invention as defined in the claims, for example, while in some cases it may be found to be sufficient to employ the yieldable member 11 disposed to extend vertically at the front edge of the door, and containing the contact members 12, 14, it is evident that other means may equally well be employed for accomplishing the same purpose. For example, a conducting member 50 may be carried by the collapsible shoe in such a manner that the same will bridge the circuit between normally separated contacts 51 and 52, which contacts are respectively connected to the strips 9 and 10, whereby when the shoe is collapsed, circuit connection is established between strips 9 and 10 as above described. It also may sometimes be desirable to use the members 50, 51 and 52 in addition to member 11 to insure that whenever the shoe is collapsed for any reason, the door motor will be caused to reverse.

It will also be apparent that by suitably positioning contactors 21 and 20 relative to the length of the strips 9 and 10 on the car door, and, as illustrated, the contactors 21 and 20 may be positioned so that the strips 9 and 10 are out of electrical contact therewith when the door has completed its closing movement. In this relation the collapsing of the shoe or the lateral displacement of the conductor 12, by accident, or otherwise, fails to effect a closure of the circuit through magnet valve 5 as above described, leaving such valve free to be energized by control of the platform guard, or other attendant, in the usual manner.

In practice, the contact arrangement shown wherein one of the terminals of the magnet valve circuit is composed of a spirally coiled spring, and the other terminal consists of a conductor rod or wire which extends longitudinally through the spirally coiled terminal, forms an exceedingly simple, efficient and sensitive control for the magnet valve circuit. The conductors 12, 14, are preferably maintained under lengthwise tension, sufficient to prevent the ordinary vibrations of a car in use from causing the said terminals to swing into contact with each other, but which permits the coil spring terminal 12, under the influence of pressure due to encountering an obstruction in the path of the closing movement of the door, to easily and readily yield laterally and relatively to the conductor member 14, so as to contact with the latter, thereby completing the circuit therethrough of the magnet valve 5.

Of course, it is to be understood that a circuit closing device for the motor control circuit, embodying the principles of our invention, may be employed with various circuit arrangements other than that above described. We do not desire, therefore, to be limited or restricted in respect to the use of the circuit closing arrangement with any particular circuit arrangement.

Having now set forth the objects and nature of our invention, what we claim as new and useful, and of our own invention, and desire to secure by Letters Patents, is:

1. A circuit controlled apparatus for door operating motors, including circuit terminals carried at the front edge of the door and extending the substantial height thereof and insulated from each other against contact from vibration and arranged to be manually actuated into engagement so as to establish electric contact therebetween when the door, in closing, encounters an obstruction.

2. A circuit control apparatus for door operating motors, including a coil spring circuit terminal carried at the front edge of the door, a collapsible member covering said terminal and extending substantially the length of the door, and a rod or wire terminal extending longitudinally through said

coil spring, said terminals being separated so as to remain out of contact when vibrating in use.

3. A circuit control apparatus for door operating motors, including a coil spring circuit terminal in engagement with and carried in a collapsible edge of the door, a rod terminal extending longitudinally through said spring and being normally out of electrical contact with said spring.

4. A circuit control apparatus for door operating motors, including a coil spring circuit terminal carried at the front edge of the door, and a rod or wire terminal extending longitudinally through, but insulated from, said coil spring, and a flexible enclosing covering for said terminals in engagement with said coil spring terminal damping vibration thereof.

In testimony whereof we have hereunto set our hands on this 4th day of April A. D., 1921.

FRANK HEDLEY.
J. S. DOYLE.