J. F. McELROY.

CONTROLLER FOR DOOR MOTORS.

APPLICATION FILED JUNE 29, 1912.

1,145,911.

Patented July 13, 1915.

2 SHEETS—SHEET 1.

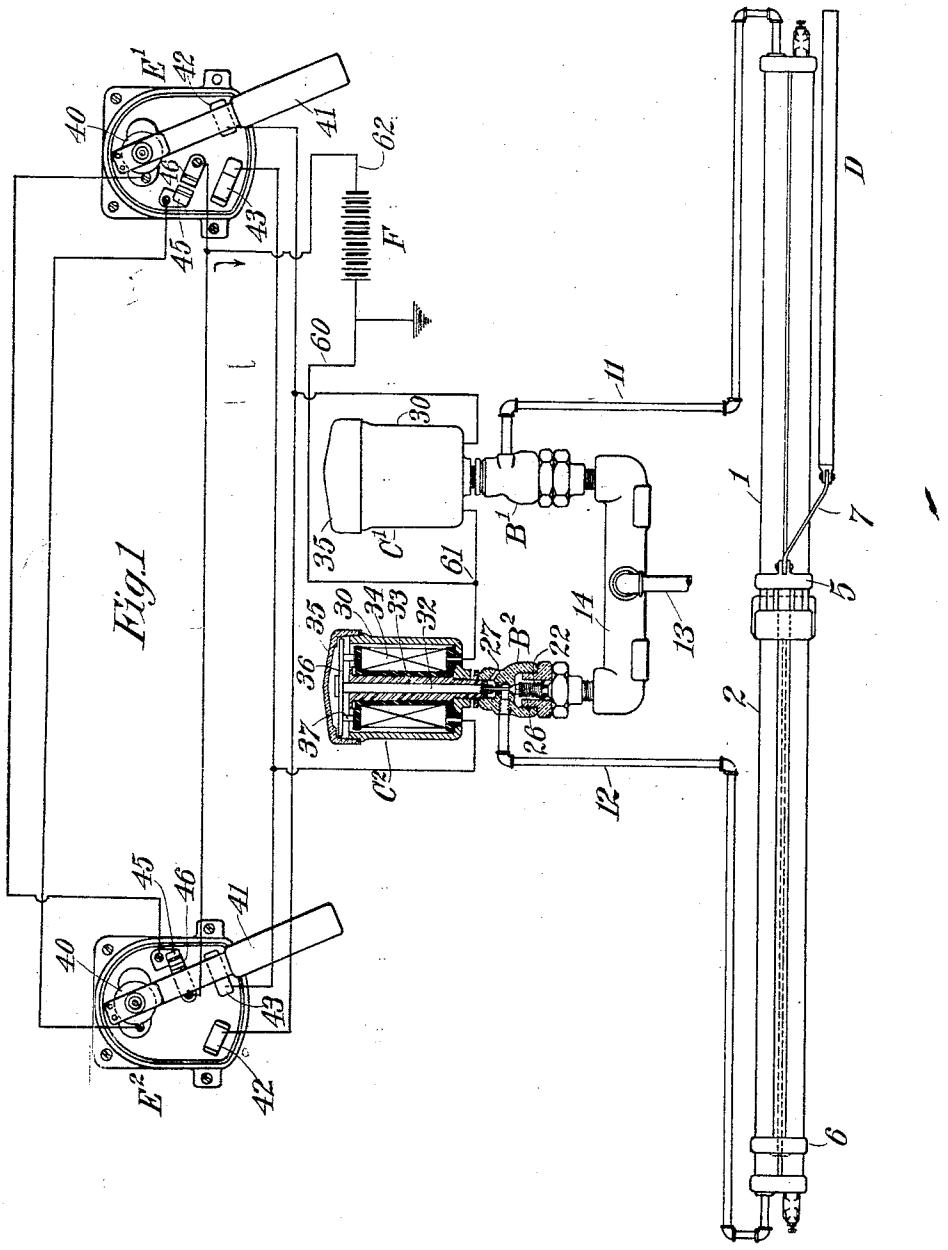


Fig. 1

WITNESSES:

L. T. Shaw

W. L. Decker.

INVENTOR

James F. McElroy

BY E. M. Bentley

ATTY

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2 SHEETS—SHEET 2.

Fig. 3

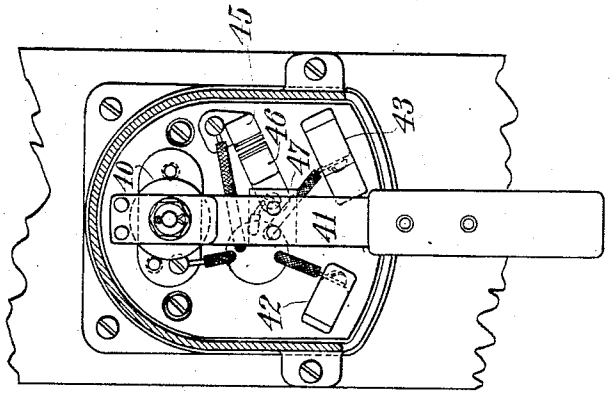


Fig. 2

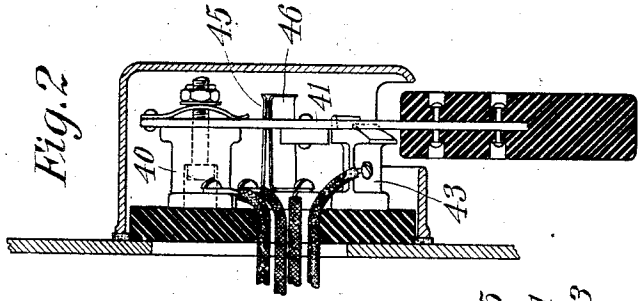


Fig. 4

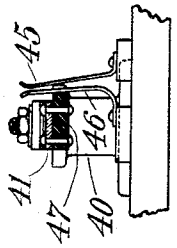
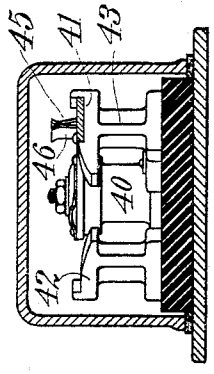


Fig. 5



WITNESSES:

L. L. Shaw

W. C. Decker.

INVENTOR

James F. McElroy

BY E. M. Bentley

ATTY

UNITED STATES PATENT OFFICE.

JAMES F. McELROY, OF ALBANY, NEW YORK, ASSIGNOR TO CONSOLIDATED CAR-HEATING COMPANY, A CORPORATION OF WEST VIRGINIA.

CONTROLLER FOR DOOR-MOTORS.

1,145,911. Specification of Letters Patent. Patented July 13, 1915.

Application filed June 29, 1912. Serial No. 706,780.

To all whom it may concern:

Be it known that I, JAMES F. McELROY, a citizen of the United States, residing at Albany, county of Albany, State of New York, have invented certain new and useful Improvements in Controllers for Door-Motors, the following being a full, clear, and exact disclosure of the one form of my invention which I at present deem preferable.

For a detailed description of the present form of my invention, reference may be had to the following specification and to the accompanying drawings, which illustrate my invention, wherein—

Figure 1 is a diagrammatic illustration of my invention; Fig. 2 is a vertical section of my controlling switch, and Fig. 3 is a front elevation thereof; Fig. 4 shows the supplementary contacts of the switch, and Fig. 5 is a transverse section of the switch.

My invention relates to the control of pneumatic door motors by electromagnetic devices and, more specifically, involves devices for controlling the motor from two distinct points, such as the two ends of a car when the apparatus is employed for operating car doors. The motor thus controlled is a double acting, reciprocating motor, and for each end thereof there is a separate spring-closed admission port. Distinct electromagnets are provided for opening these admission ports against the force of the spring, tending to close them, these magnets being of closed-circuit construction adapted to remain indefinitely on closed circuit without being injured by heat and thereby capable of maintaining the air pressure on the motor so long as the door is in either of its extreme positions. These two magnets are controlled by two switches placed at different distant points of control, each switch receiving its current through contacts controlled by the opposite switch, whereby when either switch is in its door-closing position the other switch may be used to either close or open the door.

Referring to Fig. 1, the door to be operated is indicated at D and is connected by link 7 to the connected crossheads 5 and 6 of a well known form of door motor (shown in detail in my Patent No. 1,002,596, dated September 5, 1911) wherein the admission of air pressure to the right hand end of cylinder 1 will move the said door and crossheads to the left to open the door, while the admission of air pressure to the left hand end of cylinder 2 will move the said door and crossheads to the right to close the door, the opposite end in each case being, of course, open to the atmosphere. The pipes 11 and 12 leading to the respective cylinders are controlled by magnetic valves B^1 and B^2 of which the latter is shown in detail together with its magnet C^2. The other is a duplicate of the one so illustrated. In brief, the energizing of magnet C^2 will force down a rod 32 passing through the magnet core 33, which rod embraces the end of the stem of puppet valve 26 and acts to depress the valve against the force of its seating spring 22, thereby opening the admission port and allowing air to flow from supply pipe 13 through branch 14 and through the admission port which is thus opened into pipe 12 and cylinder 2. At the same time the lower end of rod 32 closes the outlet port leading to exhaust duct 27. The deënergizing of the magnet produces the reverse conditions, shutting the admission port and opening the exhaust port. The valve B^1 is a duplicate of B^2 and is worked in the same manner by magnet C^1. Each magnet has its coil 34 pocketed between core 33 and magnetic shell 30, said shell being surmounted by a screw cap 35 within which is the armature disk 36 that bridges from core to shell but is normally held away therefrom by a spring 37. This form of magnet will operate to open the valve and maintain it open with a minute amount of current and is therefore adapted to remain indefinitely on closed circuit without injury so as to maintain the air pressure on the door so long as the door remains in its closed position.

E^1 and E^2 are two switches placed at separate points of control, such as the two ends of a car, assuming the door D to be a car door. Each switch contains an operating switch blade or lever 41 pivoted on its base to a metal block 40. The blade 41 plays between two fixed contacts 42 and 43 and when engaging contact 43 it also forces together two contact springs 45 and 46 (see also Figs. 3 and 4) by means of an insulating block 47 riveted to blade 41. When the blade is moved away from contact 43, the springs 45 and 46 tend to separate from each other and break the circuit in which they are included. As appears in Figs. 2 and 5, the contact 43 is provided on its upper contact surface

with a notch or recess into which the blade 41 springs and seats itself and is thereby locked to the contact and can only be removed therefrom by being lifted up out of the notch preparatory to moving it to the left away from the contact 43.

One wire 60 leading from the terminal of the battery or source of current F branches at 61 to the two magnets C^1 and C^2 respectively, as shown in Fig. 1, and the respective branches terminate, one at the contacts 42 and the other at contacts 43 on both switches. The opposite battery terminal is connected by wire 62 to both contacts 46, and contacts 43 are connected to each other. Hence either one of the switch blades 41 can deliver any current which it receives to either magnet, but each of the said blades 41 can only receive such current through the contacts 45, 46 of the opposite switch, and, moreover, can only receive such current when the said contacts 45 and 46 are closed by the presence of the corresponding switch blade 41 on its contact 43, since each spring 46 is connected to the opposite terminal of the battery F. Therefore, so long as blade 41 of switch E^2, for example, is in the position shown in Fig. 1, *i. e.* on contact 43, the switch E^1 can be used to energize either one of the magnets C^1 and C^2 as may be desired. Thus if the door D is open, as shown in Fig. 1, the turning of the blade of switch E^1 to contact 43 will close the circuit of magnet C^2 thereby operating valve B^2 to admit air pressure to the cylinder 2 for closing the door. When the blade of switch E^1 is in engagement with the contact 43, the circuit is as follows:—from the battery, through magnet C^2, to contact 43 and blade of switch E^1, the contacts 45—46 and blade of switch E^2, thence to the battery. By repeatedly touching the blade against contact 43, the door may be advanced toward closing position step-by-step. So long, however, as the door is to remain closed the magnet C^2 must remain on closed-circuit to hold open the admission port and keep closed the exhaust port 27 of cylinder 2. Such control of the door by switch E^1 would not be possible unless the switch E^2 has its blade on contact 43 and its contacts 45 and 46 thereby closed, but that will be the natural condition of switch E^2 at the time it is desired to operate switch E^1, *i. e.* the closed door condition. When it is desired to open the door, the switch blade 41 of switch E^1 is moved to the position shown in Fig. 1 of the drawings, in which position the circuit will be from battery F to magnet C^1, to contact 43 of switch E^1, to switch blade 41, to contact 40, to contacts 45 and 46 of switch E^2, to the battery F. It will be understood that in Fig. 1, the switches E^1 and E^2 are on the opposite ends of the same car, and the blade 41 of each switch is normally in position to close the circuit at contacts 45 and 46 when the other switch is to be operated. The circuits for switch E^1 are duplicated for switch E^2. By this arrangement a motorman standing, as is the custom, in elevated or subway cars, at the meeting point of two adjacent car platforms, can work the doors of both cars, employing the front switch of the rear car and the rear switch of the forward car, either to open or to close the doors. It will be understood, of course, that more than one door motor can be supplied from pipes 11 and 12.

What I claim as new and desire to secure by Letters Patent is:

1. The combination with a door motor of electromagnetic control valves for said motor and two controlling switches therefor located at separate points of control, one switch being normally in a predetermined position and the other being adapted to be manipulated to serve to both open and close the door.

2. The combination with a door motor having electromagnetically controlled ports for each direction of door movement, of two electromagnets and two controlling switches therefor located at separate points of control, one switch being normally in a predetermined position and the other being adapted to be manipulated to both open and close the door.

3. The combination with a door motor having electromagnetically controlled ports for each direction of door movement, two electromagnets operating on closed circuit to open the respective admission ports, and two switches located at separate points of control, one switch being normally in a predetermined position and the other being adapted to be manipulated to both open and close the door.

4. The combination with a door motor having electromagnetically controlled valves, of two electromagnets for the opening and closing movements respectively connected in multiple and two switches at separate control points, one switch being normally in a predetermined position and the other switch being adapted to be manipulated to both open and close the door.

5. The combination with a door motor including an operating cylinder and piston of an electromagnetic control valve therefor and two operating switches for said valve connected thereto in multiple, one switch being normally in a predetermined position and the other being adapted to be manipulated to operate the door, and each provided with a supplementary contact controlling the current flow to the opposite switch.

6. The combination with a door motor including an operating cylinder and piston, of an electromagnetic control valve therefor, two switches controlling said valve, one switch being normally in a predetermined

position and the other switch being adapted to be manipulated, an electric connection between one terminal of the valve magnet and a contact on each of the respective switches, and an electric connection between the other terminal of the said magnet and each switch passing through contacts controlled by the opposite switch.

7. The combination with a door motor including an operating cylinder and piston, of an electromagnetic valve therefor, and two distinct switches controlling the magnet of said valve, one switch being normally in a predetermined position and the other being adapted to be manipulated by means of which the circuit of the magnet may be either opened or closed through contacts controlled by the opposite switch.

8. The combination with a door motor, of control valves therefor with the exhaust port normally open by spring pressure, two electromagnets serving when energized to close said exhaust port against the spring pressure tending to open it and two separately located switches, one switch being normally in a predetermined position and the other being adapted to be manipulated to energize one of the magnets separately from the other.

9. The combination with a door motor, of two separate control valves therefor each having an exhaust port held normally open by spring pressure and an admission port held normally closed by spring pressure, two closed-circuit magnets one for each of said control-valves and two separately located switches, one switch being normally in a predetermined position and the other being adapted to be manipulated to energize one of the magnets separately from the other.

In witness whereof I have hereunto set my hand, before two subscribing witnesses, this 27th day of June, 1912.

JAMES F. McELROY.

Witnesses:

HERBERT A. CAULKINS,

CLARENCE PALMER.