

Oct. 27, 1931.

R. D. CONKLIN
MECHANISM FOR REVERSING MOTIVE DEVICES FOR
OPERATING DOORS AND THE LIKE
Filed June 7, 1929

1,828,860

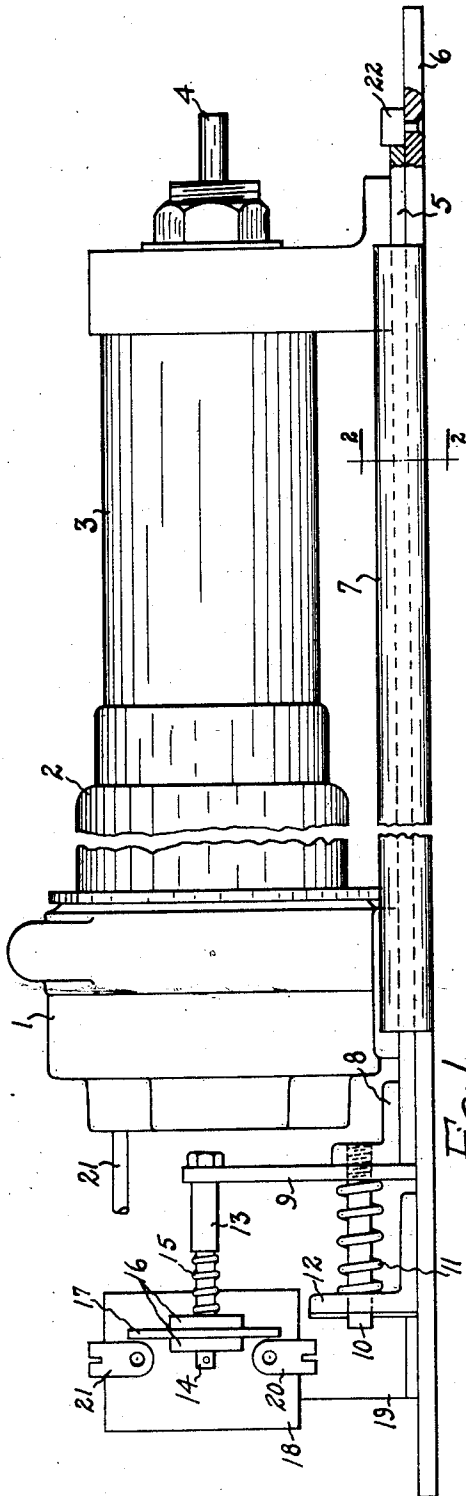


Fig. 1.

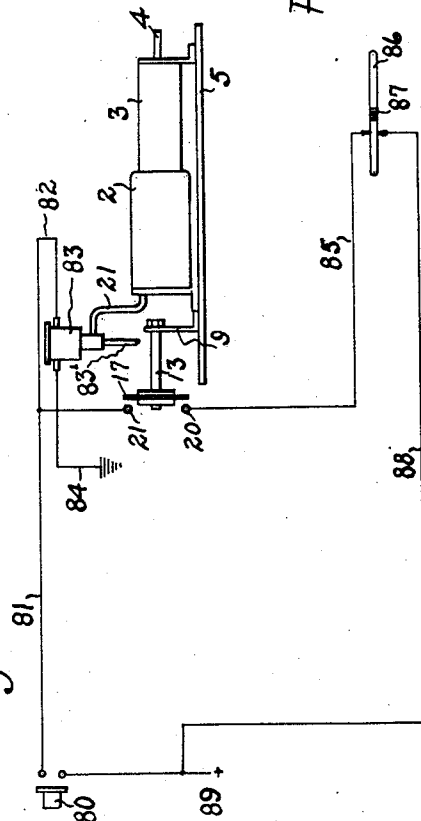


Fig. 3.

INVENTOR
Roscoe D. Conklin
BY *Darby & Darby*
ATTORNEYS.

UNITED STATES PATENT OFFICE

ROSCOE D. CONKLIN, OF RAHWAY, NEW JERSEY, ASSIGNOR TO NATIONAL PNEUMATIC COMPANY, OF NEW YORK, N. Y., A CORPORATION OF WEST VIRGINIA

MECHANISM FOR REVERSING MOTIVE DEVICES FOR OPERATING DOORS AND THE LIKE

Application filed June 7, 1929. Serial No. 369,205.

This invention relates in general to apparatus for use in conjunction with motive devices for operating doors, gates and the like by means of which the motive devices and the doors are reversed in direction of movement when they strike an object in their path.

One of the objects of this invention is the provision of relatively simple mechanism of the above nature for use in connection with movable doors and their operating mechanism which is simple and rugged in construction and adapted to easy and rapid manufacture and easy repair and replacement.

A further object of this invention is the provision of reversing mechanism for use in connection with all types of door operating motors, such as the pneumatic and electrical types.

A further object of the invention is the provision of a switch cooperating with the connecting mechanism between the motive device and the door which is arranged to be closed upon the door striking an obstruction to effect a reversal in movement of the operating mechanism.

These and other objects as will appear from the following disclosure are successfully attained by means of this invention.

This invention resides substantially in the combination, construction, arrangement and relative location of parts, all as will be set forth in detail in the following specification.

Referring to the drawings which have been given in an illustrative sense—

Figure 1 is a side elevational view of one form of device for accomplishing the purposes of this invention;

Fig. 2 is a cross-sectional view taken on the line 2—2 of Fig. 1;

Fig. 3 is a diagrammatic association of the elements comprising this invention.

The most generally known and used form of reversing mechanism for power operated doors, gates and the like employs a flexible or collapsible shoe on the forward edge of the moving door which is deformed or collapsed when the door strikes an object so as to close a switch or similar controlling device connected to the motive device for op-

erating the door to effect a reversal in movement thereof. The present invention has to do with several forms of devices by means of which similar results are secured without the necessity of employing a flexible or collapsible shoe on the forward edge of the door. To fully understand the structure of this invention reference will now be made to the drawings.

Referring to Fig. 1, the form of device disclosed therein comprises a pneumatic motor, shown generally at 1, of the differential type. At this point it might be emphasized that the principles of this invention are not restricted to the form of motive device, whether it be pneumatic or electric, and the disclosure in the drawings is only given to illustrate the principles of the invention. The pneumatic motor 1 is shown comprising a large and a small cylinder 2 and 3 and the piston rod 4 extending beyond the end of the smaller cylinder. The pneumatic motor 1 is mounted on a base plate 5 which in turn is supported by a supporting plate 6 extending through a portion of the length thereof on each side, the flanges 7 comprising a vertical and horizontal portion. The flanges enclose the edges of the base plate 5 in a manner so that the base plate and motor supported thereon may slide longitudinally of the supporting plate 6 guided by the flanges 7. Supported on one end of the base plate 5 is a bracket 8 to which is secured the vertical arm 9 and the horizontal pin 10. The free end of the pin 10 extends through the bracket 12 secured to the supporting plate 6. The pin 10 is encircled by means of a heavy spring 11 which lies between the bracket 12 and the arm 9. Secured to the upper end of arm 9 is a pin 13 having a reduced portion 14 on which is slidably mounted a contact disc 17 supported between the insulating members 16 and by means of which the disc is insulated from the portion 14. A spring 15 is mounted between one insulating member 16 and a shoulder on pin 13. The contact disc 17 and insulating member 16 are arranged to slidably move as a unit on the reduced portion 14 against the action of the spring 15. Supported on a bracket 19 is a block of insulating material

18 which in turn supports the fixed contacts 20 which are arranged to be bridged by the contact disc 17. The piston rod 4 is, of course, intended to be connected by any suitable connecting link to the doors and the like to be operated by the motive device. The supporting plate 6 is provided with a stop pin 22 against which the base plate 5 is forced by means of the heavy spring 11 reacting on the fixed bracket 12. The pipe 21 is provided for supplying fluid pressure to the larger cylinder 2 of the motor 1. The operation of the device will be described later in connection with Fig. 3.

The diagrammatic showing in Fig. 3 illustrates the association of the elements of this invention. A wire 89 extends in the positive side of the current source to the push button switch 80. One terminal of this switch is connected by wires 81 and 82 to one terminal of the electro-magnetically operated fluid pressure valve 83. This fluid pressure valve is of a well known type extensively used in this art and when energized operates to permit the admission of fluid pressure through the pipe 83' and pipe 21 into the larger cylinder of the motive device 1. The other terminal of the winding of this valve is grounded as at 84. Wire 81 also connects to one contact 20 and the other contact 20 is connected to wire 85. At 86 is shown diagrammatically a switch adapted to be mounted in the path of the door so as to be moved into the position shown in the figure just as the door closes so that the conducting strip 87 thereon moves out between the fixed contacts; one of which is connected to wire 85. The other fixed contact is connected by wire 88 to wire 89.

For sake of clarity, although it is well known in the art, it may be pointed out that the differential type of motor as shown here is always supplied in the smaller cylinder with fluid pressure. When fluid pressure is supplied to the larger cylinder the force exerted in the smaller cylinder is overcome and the motor operates to open the doors. To supply this fluid pressure to the larger cylinder the magnet valve 83 when energized connects the larger cylinder to the fluid pressure source through itself and the pipes 21 and 84. Thus to fully open the doors switch 80 must be held closed and kept closed in order to maintain the doors opened. As soon as switch 80 is opened magnet valve 83 becomes deenergized and permits the fluid pressure in the larger cylinder to exhaust to the atmosphere through the valve. The force exerted in the smaller cylinder then acts to close the doors. With this general discussion it is believed that the operation of the device, as now described, will be more fully understood.

In the arrangement shown in Fig. 1 when fluid pressure is supplied to the larger cylinder through the pipe 21 piston rod 4 begins

to move to the right and carries with it the door which is connected thereto. The strength of spring 11 is such that it is able to resist all the normal reactions caused by the operation of the door and hence the motor 1, which is slidably supported on the supporting plate 6, does not move. As soon, however, as the door strikes an obstruction the motor tending to move the door on, being unsuccessful will move to the left in Fig. 1 sliding on the supporting plate 6 and compressing spring 11.

The motor will continue to move carrying the arm 9 with it until the lower end of the arm strikes the fixed bracket 12. By this time contact disc 17 will have bridged the fixed contacts 20. As soon as the obstruction is removed spring 11 is strong enough to force the motor back so that the plate 5 strikes the stop 22 and the door continues to close until fully closed. The motor will, of course, continue to exert a force so that the motor will again move to the left until stopped compressing spring 11. Contacts 20 will again be bridged but produce no reversing action since just as the door completes its closing stroke and before contact 17 bridges contacts 20 the switch 86 (Fig. 3) will have been moved by the door so that contact 87 moves out from between the fixed contacts breaking the circuit which includes the contacts 20. This operation will be described a little more in detail in connection with Fig. 3. To open the doors switch 80 is closed. Current then flows through wire 89; switch 80; wire 81, wire 82 through the magnet valve and wire 84 to ground. The magnet valve is energized to permit the delivery of fluid pressure to the larger cylinder of the motor 1. The door then begins to open and continues to open to fully opened position and remains opened as long as switch 80 is closed. As soon as switch 80 is opened the larger cylinder of motor 1 opens to exhaust and the door begins to close. Should it strike an obstruction contact disc 17 will bridge contacts 20 as described above and current will flow through wire 89; wire 88; contact 87; wire 85; contact 20; contact disc 17; contact 20; wire 81; wire 82; magnet valve 83, and to ground at 84. The door will then begin to open and continue to open until the obstruction is removed. It might be pointed out here that switch 86, of course, moves as soon as the door begins to open to a position where contact 87 bridges the fixed contacts.

From the foregoing disclosure it will be apparent that I have disclosed an exceedingly simple and yet rugged and efficient mechanism for carrying out the principles of this invention which employs certain principles of construction and operation. I am, of course, aware that these principles may be embodied in other forms of the device and I do not, therefore, desire to be strictly

limited to the disclosure as given for purposes of illustration but rather to the scope of the invention as it is defined below.

What I seek to secure by United States Letters Patent is:

1. In an apparatus for operating doors and the like, the combination comprising a motive device, means for slidably supporting the motor, and means including a control member adapted to be closed when the door connected to the motor strikes an obstruction and causes the motor to slide on its supporting means.

2. In an apparatus for operating doors and the like, the combination comprising a motive device, means for slidably supporting the motor, a pair of fixed contacts, means for bridging the contacts supported by said motor for movement therewith, and means for resisting relative movement between the motor and its supporting means, said motor being adapted to slide on its supporting means when the force exerted thereby exceeds a predetermined value.

3. In an apparatus for operating doors and the like, the combination comprising a fluid pressure motor adapted to be connected to the door to be operated, a support on which the motor is movably mounted, an electro-magnetic valve for controlling the supply and exhaust of fluid pressure to said motor, circuits for said electro-magnetic valve including a manual switch, a door switch, and a switch adapted to be closed when the resistance to the movement of the motor causes it to move on its support whereby the magnetic valve is operated to reverse the direction of movement of the motor.

4. In an apparatus for operating doors and the like, the combination comprising a fluid pressure motor adapted to be connected to the door to be operated, a support on which the motor is movably mounted, an electro-magnetic valve for controlling the supply and exhaust of fluid pressure to said motor, circuits for said electro-magnetic valve including a manual switch, a door switch, and a switch adapted to be closed when the resistance to the operation of the motor causes it to move on its support whereby the magnetic valve is operated to reverse the direction of movement of the motor, said door switch being opened by the door at the end of its stroke.

5. In an apparatus for operating doors and the like, the combination comprising a support, a motive device slidably mounted on the support, a switch mechanically connected to the motive device and having a movable part cooperating with a relatively fixed part so that when the motive device slides on its support the switch is closed, means for controlling a supply of energy to said motive device, a manual switch and circuits, including said motive device, a switch connected to the motive device and said manual switch,

whereby the motive device is operated in one direction when the manual switch is closed and operated in the opposite direction when the movement of the motive device encounters a reacting force which causes it to slide on its support to close the switch connected to the motive device.

In testimony whereof I have hereunto set my hand on this 5th day of June A. D. 1929.

ROSCOE D. CONKLIN.

70

75

80

85

90

95

100

105

110

115

120

125

130