J. F. McELROY.

FLUID MOTOR AND RETARDING DEVICE THEREFOR.

APPLICATION FILED FEB. 15, 1909.

1,120,833.

Patented Dec. 15, 1914.

2 SHEETS—SHEET 1.

Fig. 2

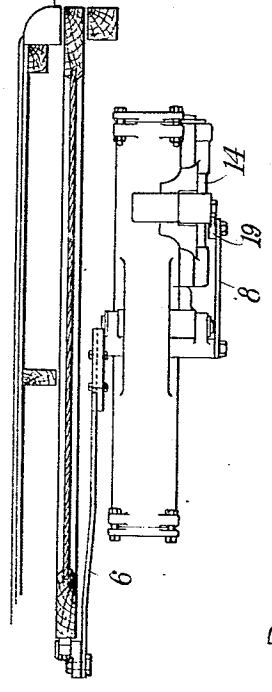
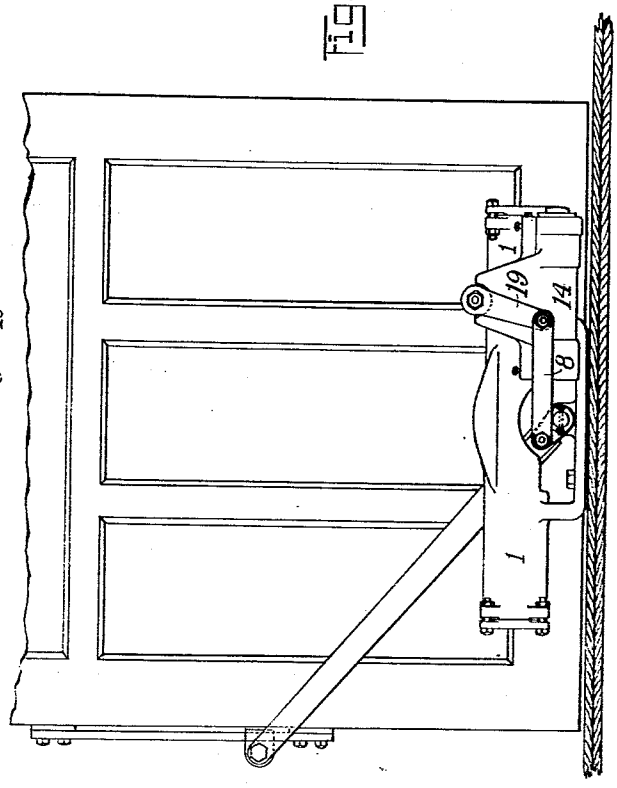


Fig. 1



Witnesses

Thomas J. Hogarth

Edw. W. Vaill Jr.

Inventor

James F. McElroy

by

Britto Sheffield Bentley & Britto

Attys

J. F. McELROY.

FLUID MOTOR AND RETARDING DEVICE THEREFOR.

APPLICATION FILED FEB. 15, 1909.

1,120,833.

Patented Dec. 15, 1914.

2 SHEETS—SHEET 2.

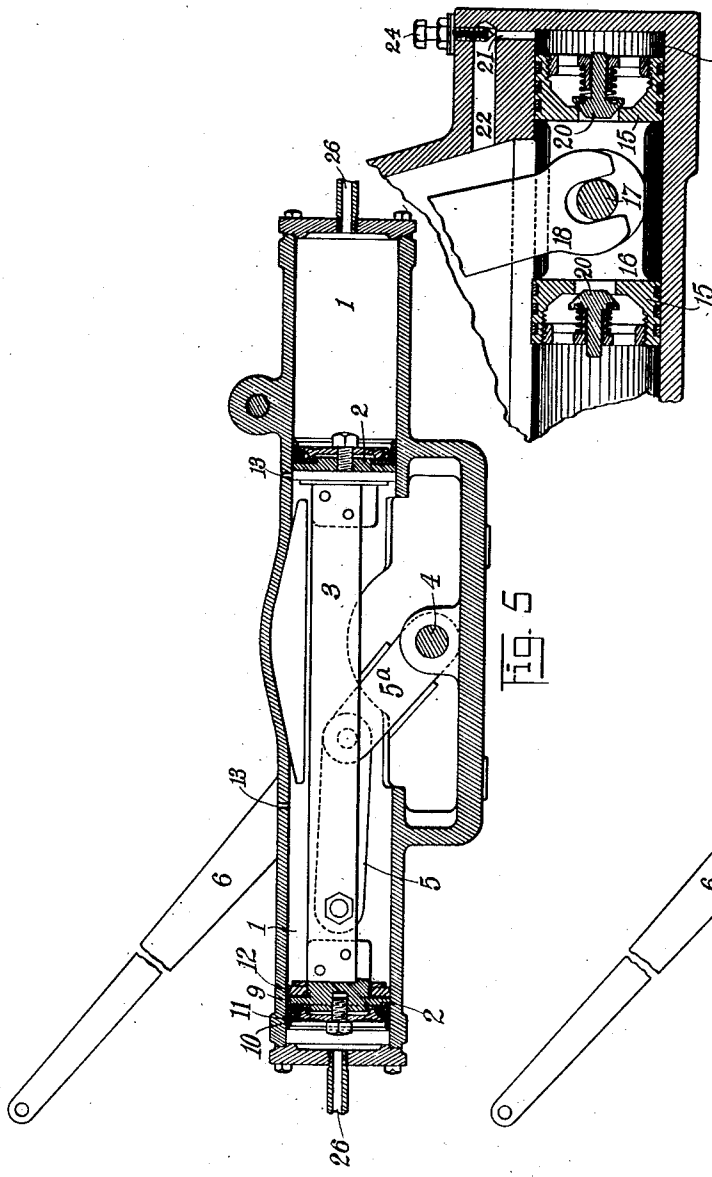


Fig. 5

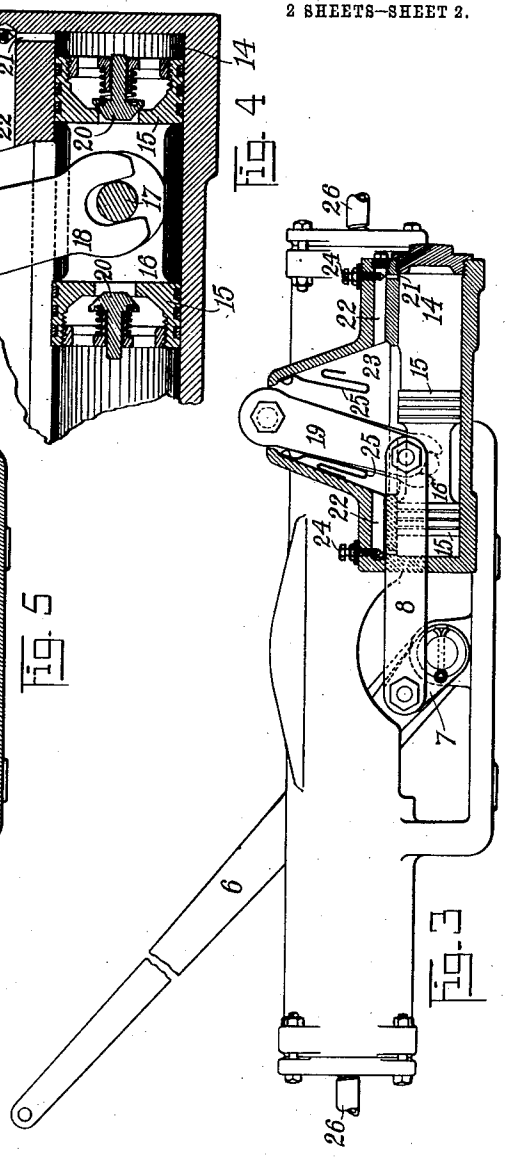


Fig. 3

Fig. 4

Witnesses

Edw. W. Vaill Jr.

Inventor

James F. McElroy

by

Betts Sheffield Bentley & Betts

Atty.

UNITED STATES PATENT OFFICE.

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

FLUID-MOTOR AND RETARDING DEVICE THEREFOR.

1,120,833. Specification of Letters Patent. **Patented Dec. 15, 1914.**

Application filed February 15, 1909. Serial No. 477,867.

To all whom it may concern:

Be it known that I, JAMES F. McELROY, a citizen of the United States, residing at Albany, in the county of Albany, State of New York, have invented certain new and useful Improvements in Fluid-Motors and Retarding Devices Therefor, of which the following is a specification disclosing what I now consider the best of the various forms in which the principle of my invention may be embodied.

My present invention relates to motors adapted to be operated by compressed air or other fluids and has for its object the provision of a motor for reciprocating objects and one particularly adapted for the opening and closing of gates or doors on railway cars.

It especially relates to a retarding device for controlling the movements of the motor but which may also be used in any similar situation.

My invention will be more clearly understood by a reference to the following description and accompanying drawings.

Referring to the drawings, Figure 1 represents an elevation of my improved motor shown applied to a sliding door; Fig. 2 is a plan view thereof; Fig. 3 is an elevation of my improved motor showing the dash-pot or retarding device thereof in section; Fig. 4 is a sectional view of a portion of the dash-pot or retarding device; and Fig. 5 is a vertical section of the power cylinders of my improved motor.

Referring to Fig. 5, it will be seen that my improved motor consists of two cylinders 1, 1, in line with and having their open ends opposite each other. In these cylinders are contained pistons 2, 2, joined together by a piston rod 3, which is preferably made of two flat bars arranged side by side so as to distribute the pressure of the pistons and allow of directly operated parts between them; a horizontal rock shaft 4 is placed preferably beneath the piston rod and is connected therewith by means of a link 5 and crank 5^a between the two bars of piston rod 3.

At one end of the rock shaft is situated the driving bar 6, in the form of a lever arm, which communicates the motion of the pistons to the door or other part to be operated, and at the other end of the rock shaft is attached a crank 7 (see Fig. 3), which is connected to the dash-pot mechanism by means of the rod 8.

Each piston 2 consists of a plate 9, and a clamping plate 10, which holds in place a leather packing 11. To lubricate these pistons I employ a felt washer 12 slightly larger in diameter than the diameter of the pistons, which is so arranged that it will be opposite a hole 13 in the cylinder (see Fig. 5) when the piston has reached the limit of its travel, through which hole oil may be introduced.

The dash-pot or retarding device, (Figs. 3 and 4) consists of a casing 14 and two pistons 15, 15, connected together by a piston rod 16, on which is mounted a pin 17 engaging a U-shaped aperture in a crank 18. This crank is attached to a transverse rock shaft above the dash-pot and is also connected to the aforesaid rock-shaft 4 by means of rod 8 and crank 19. In each piston 15 is a check-valve 20, adapted to be operated by the pressure of the fluid contained in the dash-pot working against a spring which tends to hold the valve closed.

The casing 14 is provided with ports 21, 21, communicating by means of passages 22, 22, with a space 23, which is used as a reservoir for oil or other fluid with which the dash-pot is filled. Directly above the ports 21 are located screws 24, 24, for adjusting the size of their openings. By this adjustment the action can be made easier and quicker in one direction than the other, if so desired. The reservoir 23 also communicates with the casing 14 by means of the slot, through which crank 18 passes. On each side of the reservoir 23 are located springs 25, 25, which aid in overcoming the inertia and initial frictions of the pistons.

The operation of my improved motor is as follows: A compressed fluid, such as air, is introduced into one of the cylinders 1, 1, through one of the pipes 26, 26, thereby propelling the piston forward, and, through the motion of crank 5 and driving bar 6, moving the door or other part to be operated. The movement of the air piston produces a corresponding movement in one direction or the other of the pistons 15 of the dash-pot through the medium of the connecting mechanism. The motion of pistons 15 of the dash-pot closes the forward one of the two check-valves 20 and opens the rear one. The oil or other fluid with which the dash-

pot 14 is filled may then be, at first, displaced into the reservoir 23 through the slot through which crank 18 passes, and through port 21. When, however, piston 15 has reached the end of this slot, that avenue of escape is closed, and all of the fluid must be displaced into the reservoir through port 21, thereby interposing a considerably higher resistance to the travel of the piston. When air piston 2 has reached the desired limit of its travel, piston 15 will also have reached a corresponding point and compressed air is then also admitted by the pipe at the opposite end of the motor. The air pressure is thus balanced and the motor stops at whatever point it may be at the instant the counterbalancing pressure is admitted. Then by connecting either of the pipes 26 with the atmosphere the pressure at the opposite end will cause the piston to continue or to reverse as desired.

One advantageous application of my improved motor is to the mechanical operation of doors or gates on street railway cars. Heretofore attempts have been made to check the motion of the door by confining air behind one of the pistons of the motor when the door has reached a certain point. This arrangement is not satisfactory as it does not respond promptly for the reason that the piston must move a certain distance through the cylinder to accumulate the pressure of air necessary to check the motion of the door.

Using a relatively non-compressible fluid, such as oil, in the dash-pot of my improved motor, I am enabled to check the progress of the door at any point and retain perfect control over it under all circumstances. For instance, if the door be opened slightly and then immediately closed, the dash-pot of my improved motor will prevent its rapid motion, whereas in the arrangements used prior to my invention the piston would not have sufficient time in which to accumulate sufficient pressure to check the movement of the door.

A further advantage of my improved motor for this particular kind of service is obtained by the form of the dash-pot, by means of which it is possible for me to operate the door at relatively high speed during the initial part of the closing movement and at a slow speed during the latter part of the movement.

By limiting the size of the ports in the pistons of the dash-pot so that the pistons will meet with the resistance of the fluid in the dash-pot during the greater part of their travel, I can make the door move at a regular rate of speed during the greater part of the closing movement. If the motor had no retarding effect except at the end of its stroke the door in encountering an obstruction would move in a jerky and irregular manner due to the fact that sufficient pressure would not have accumulated in the power cylinder to overcome the added resistance offered by the obstruction, which would cause the door to move suddenly past the obstruction when sufficient pressure had been accumulated. In my improved motor, using ports of the size indicated, the moment the door encounters an obstruction and tends to stop, the resistance offered by the piston in the dash pot ceases and the extra force of the air cylinder causes the door to move evenly over the obstruction, and gives the door an even and continuous motion, regardless of uneven friction in the movement of the door.

When the ports are thus arranged, I preferably give the air cylinder an excess of power, this excess being sufficient to overcome any obstruction which may occur to the movement of the door.

In view of the many modifications which may be made, I do not wish to confine myself to the precise structure shown and described.

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

1. A fluid motor comprising a pair of cylinders, pistons therein and connected by a piston rod, a rocker shaft, a lever operated thereby, a crank carried by said shaft, a link connection between said crank and said piston rod, a dash pot including pistons working in a liquid and a reservoir, a rocker shaft above said reservoir, a crank carried thereby and engaging the pistons of the dash pot, a second crank carried by the rocker shaft of the reservoir, and a crank and link connection between the last mentioned crank and the first mentioned rocker shaft.

2. A fluid motor comprising a casing including air cylinders equipped with pistons and piston rod and a dash pot cylinder containing liquid, a rocker shaft having a crank and link connection with the said piston rod, a lever operated by said rocker shaft, pistons and a piston rod therefor in the dash pot cylinder, a reservoir for the dash pot cylinder, a rocker shaft for the dash pot, a crank in said reservoir and carried by the dash pot rocker shaft and engaging the dash pot pistons, a second crank carried by the dash pot shaft and a crank and link connection between the last mentioned crank and the first mentioned rocker shaft.

3. The combination with a motor including a rocker shaft actuated thereby, a crank carried by the shaft, a retarding device including a casing having a communicating fluid reservoir, a piston in the casing, a rocker shaft above the casing and having a crank extending through the reservoir and engaging the piston, resilient means in the reservoir for engaging the crank, a sec-

ond crank carried by the reservoir rocker shaft, and a link connecting the last mentioned crank of the reservoir rocker shaft and the crank of the motor actuated rocker shaft.

4. A fluid motor comprising a pair of cylinders provided with pistons, a rod connecting the pistons, a rocker shaft provided with cranks, a link connecting one of the cranks and the piston rod, a retarding device including a rocker shaft and a crank carried thereby, and a link connecting the other crank for the first mentioned rocker shaft with the crank of the rocker shaft and the retarding device.

5. A fluid motor comprising oppositely disposed cylinders, pistons therefor, a rod formed of bars connecting the said pistons, a rocker shaft having a crank mounted between said bars, a connection between said crank and said bars, a retarding device, and a connection between the retarding device and the rocker shaft.

In testimony whereof, I have hereunto signed my name in the presence of two witnesses, this 11th day of February, 1909.

JAMES F. McELROY.

Witnesses:

ERNEST D. JANSEN,

BEULAH CARLE.