J. E. OSMER.

DOOR OPERATING MECHANISM.

APPLICATION FILED JULY 28, 1906.

899,999.

Patented Sept. 29, 1908.

2 SHEETS—SHEET 1.

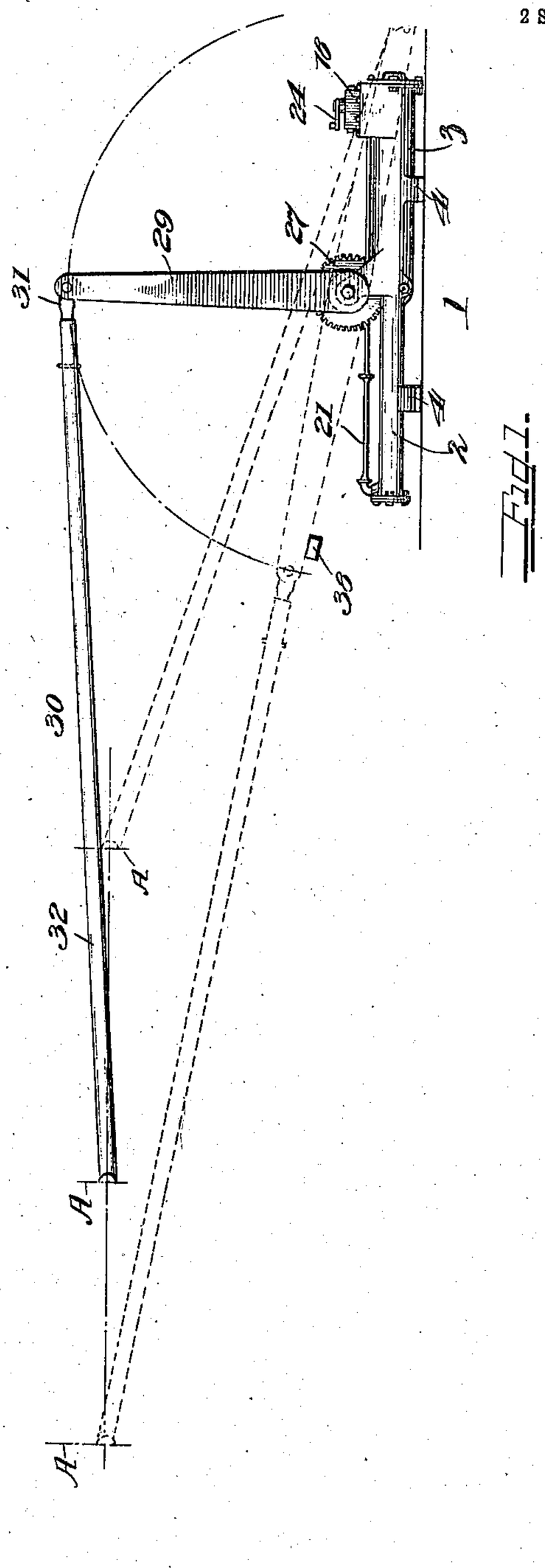

Fig. 1.

Witnesses

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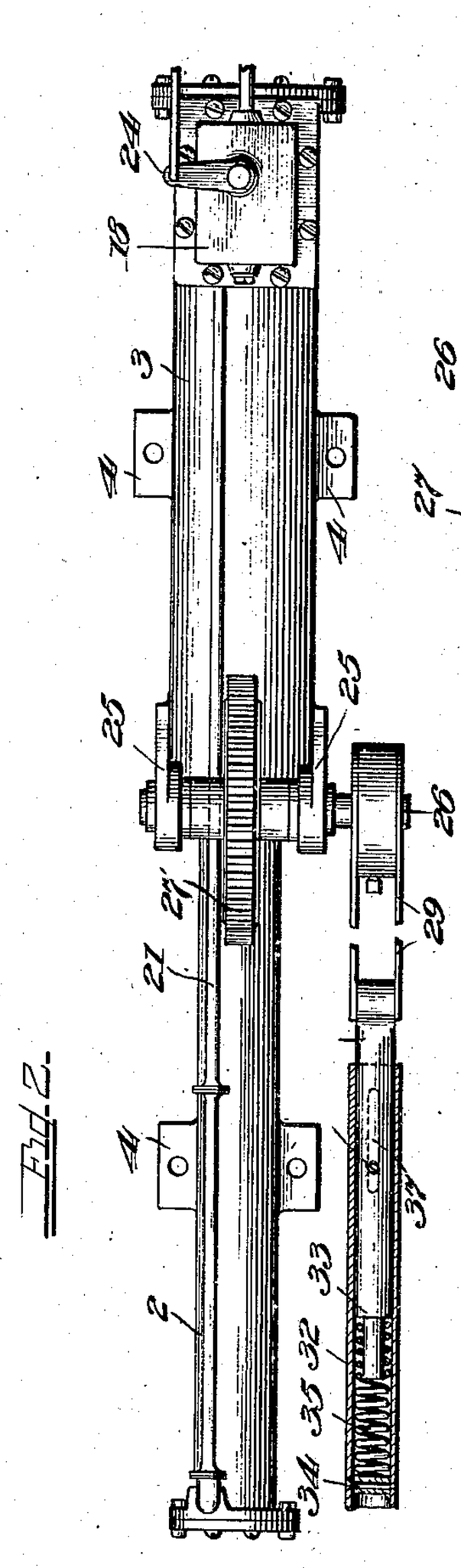

Fig. 2.

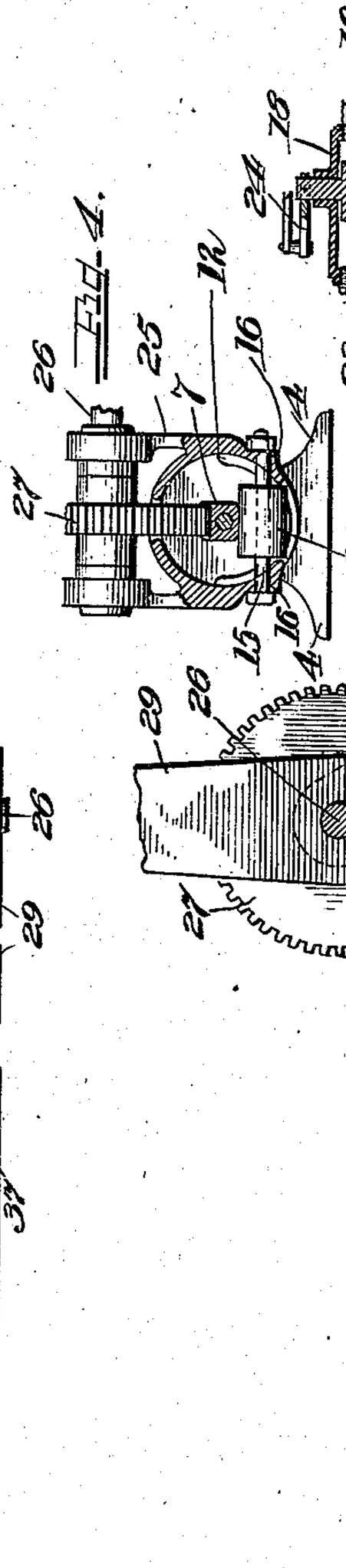

Fig. 4.

Fig. 3.

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UNITED STATES PATENT OFFICE.

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DOOR-OPERATING MECHANISM.

No. 899,999. Specification of Letters Patent. Patented Sept. 29, 1908.

Application filed July 28, 1906. Serial No. 328,254.

To all whom it may concern:

Be it known that I, JOHN E. OSMER, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Door-Operating Mechanisms, of which the following is a specification.

This invention relates to means for opening and closing a door, and the embodiment herein shown of the invention is particularly intended for opening and closing the sliding doors commonly used upon elevated and other railway cars.

One of the objects of this invention is to provide a pneumatic door-operating mechanism in which a single volume of pressure air is employed to produce the required reciprocation by expanding said air first in one (the high pressure) cylinder, and afterward further expanding the same air in another (the low pressure) cylinder.

A further object of the invention is the provision of a door-operating mechanism which may be placed in any convenient position within the car.

The invention also relates to the other features of improvement in a door-operating mechanism hereinafter set forth.

In the accompanying drawings Figure 1 is a side elevation of a door-operating mechanism embodying the features of my invention, said mechanism being illustrated in operative relation to a door. Fig. 2 is a top plan view of said door-operating mechanism. Fig. 3 is a longitudinal vertical central section through said mechanism. Fig. 4 is a transverse vertical section through the motor comprised in this door-operating mechanism.

This invention is herein shown as employed for opening and closing one of the side doors of a railway coach, though it will be understood that the invention may be readily adapted for the operation of other types of doors, as well as for giving a reciprocating or swinging movement to various other devices. The door-operating mechanism comprises a motor 1 operatively connected to the door A by means to be hereinafter described. The motor 1 may be located close to one of the side walls of the car and upon or near the floor, as herein shown, or said motor may be inverted and attached to the wall at a point near the ceiling. The motor comprises a high pressure cylinder 2 and a low pressure cylinder 3 arranged in tandem, said cylinders, in this instance, being formed of an integral casting. Lugs 4 cast integral with the cylinders 2 and 3 provide means for securing the motor to its support. Within the cylinders 2 and 3 are mounted pistons 5 and 6, respectively, said pistons being located at opposite ends of a rack bar 7 having rack teeth formed upon its upper side. The piston 5, in the present embodiment, is formed integral with one end of a tie-rod 8 extending through a longitudinal opening 9 in the rack-bar 7, a nut 10 turned upon the screw-threaded end of said tie-rod outside of the piston 6 securing said pistons and rack-bar firmly together.

The rack bar 7 has a disk 11 formed thereon adjacent to the piston 6, said disk being provided with a semi-cylindrical shoe 12 adapted to slide upon the lower part of the inner surface of the cylinder 3. At the opposite end of the rack bar 7 is formed a shoe 13 adapted to slide upon the lower walls of the cylinder 2. The pistons 5 and 6 are provided with suitable packing (not herein shown in detail) to prevent leakage of the pressure fluid past said pistons. The rack bar 7 is supported intermediate its ends upon a roller 14 rotatably mounted upon a shaft 15 lying within openings 16 in the cylinder casting. An opening 17 is formed in the lower side of said casting to permit of placing the roller 14 in position.

Upon the upper side of the low-pressure cylinder 3 near the outer end thereof is located the valve mechanism that controls the passage of air to and from both cylinders. The valve chest 18 is connected with any suitable source of pressure fluid such as an air compressor, by means of an inlet pipe 19; with the low-pressure cylinder 3 by a port 20; with the high-pressure cylinder 2 by a pipe 21; and with the exhaust by a port 22. The slide valve 23 is adapted to place the high pressure cylinder in communication with the source of pressure supply and the low-pressure cylinder in communication with the exhaust; and to establish communication between the high-pressure cylinder and the low-pressure cylinder. Said slide valve is reciprocated in any suitable way, as by means

of a crank 24 operatively connected to a controller (not shown) located within convenient reach of the operator.

Bearing lugs 25, preferably cast integral with the cylinders 2 and 3, extend upwardly therefrom and rotatably support a shaft 26. Said shaft has fixed thereto a pinion 27 adapted to mesh with the rack bar 7, the cylinders 2 and 3 having a slot 28 formed therein for the reception of said pinion. A lever 29 is rigidly mounted at one of its ends upon one end of the shaft 26, the other end of said lever being connected with the door A by means of a link 30.

To permit the door to be yieldingly stopped, so as to prevent injury to a passenger who might have his hand in the doorway when the door is being closed, the link 30 is made in two telescoping sections 31 and 32, the section 31 being bifurcated at one end for attachment to the lever 29. The opposite end of the link section 31 is reduced in diameter, providing an annular shoulder 33, between which shoulder and a pin 34 fixed in the tubular section 32 of the link is interposed a coiled spring 35. To limit the movement of the link-sections 31 and 32 with relation to each other a pin 36 is fixed in the section 31 with its ends lying within slotted openings 37 in the link-section 32.

38 is a stop supported from the floor or attached to the wall of a car in suitable position to limit the closing movement of the lever 29, said lever and the link 30 being in alinement when the door is fully closed.

Assuming the door to be open, the lever 29 swung to its extreme right-hand position (as shown in dotted lines in Fig. 1), and the pistons 5 and 6 consequently in the left-hand ends of their respective cylinders, the operation of the device is as follows: The operator moves the slide valve 23 to connect the high-pressure cylinder 2 with the source of pressure supply and the low-pressure cylinder with the exhaust. The admission of the pressure fluid within the high-pressure cylinder 2 forces the pistons 5 and 6 toward the right (Fig. 3), swinging the lever toward the left (Fig. 1) and closing the door. The lever 29 and link 30 are so proportioned that when the door is fully closed said lever and link are in alinement, thus locking said door in its closed position. When it is desirable to open the door, the operator moves the slide valve 23 into position to establish communication between the high-pressure cylinder 2 and the low-pressure cylinder 3, and close communication between the atmosphere and the low-pressure cylinder 3. The piston 6 within the low-pressure cylinder having a larger area than the piston 5 in the high-pressure cylinder, the pressure exerted upon the piston 6 will be greater than the pressure exerted upon the piston 5, causing a movement of said pistons toward the left (Fig. 3) and moving the lever 29 in the direction to open the door. It will thus be seen that one charge or volume of pressure fluid is used to obtain one complete (double) reciprocation of the door.

It is obvious that the motor herein shown may be used to operate railway switches and various other devices having a reversing or reciprocatory movement. It is also apparent that various changes may be made in the construction and arrangement of the parts of the door-operating mechanism hereinbefore described without departing from the spirit of the invention. I therefore desire to have it understood that I do not limit myself to the precise details herein set forth.

I claim as my invention:

1. In a mechanism for operating a door or other device, in combination, a high pressure cylinder and a low pressure cylinder; a valve mechanism for placing said high pressure cylinder in connection with a source of pressure fluid, for connecting said cylinders together, and for connecting said low pressure cylinder with the exhaust; pistons for said cylinders; a rack bar connecting said pistons; a pinion adapted to mesh with said rack bar; and an operative connection between said pinion and the device to be operated.

2. In a mechanism for operating a door or other device, in combination a high pressure cylinder and a low pressure cylinder; a valve mechanism for said cylinders; pistons for said cylinders; a rack bar connecting said pistons; bearing lugs fixed with relation to said cylinders; a shaft supported in said bearing lugs; a pinion fixed to said shaft and meshing with said rack bar; and a lever fixed to said shaft and operatively connected with the device to be moved.

3. In a mechanism for operating a door or other device, in combination, a high-pressure and a low-pressure cylinder; a valve mechanism for said cylinders adapted to place them in communication at intervals; pistons for said cylinders; a rack bar connecting said pistons; a pinion adapted to mesh with said rack bar; and an operative connection between said pinion and the device to be operated.

4. In a mechanism for operating a door or other device, in combination, a high-pressure cylinder and a low-pressure cylinder; a valve mechanism for said cylinders; pistons for said cylinders; a rack bar connecting said pistons; an opening being formed in the adjacent ends of said cylinders; bearing lugs on said cylinders at opposite sides of said opening; a shaft supported in said bearing lugs; a pinion fixed to said shaft extending through said opening into engagement with said rack bar; and a lever fixed to said shaft and operatively connected with the device to be moved.

5. In a mechanism for operating a door or other device, the combination of the high pressure cylinder and the low pressure cylinder arranged in tandem, the opposing ends of said cylinders being open to the atmosphere, an operating rod extending between the opposing ends of said cylinders and provided at its opposite ends with pistons for said cylinders, suitable means for the admission and escape of motor fluid to and from said cylinders, valve mechanism for controlling the flow of motor fluid to and from said cylinders, and means united to said connecting rod between said pistons for shifting the door or other device.

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