(No Model.)

H. McNULTA.

AIR BRAKE.

No. 471,801. Patented Mar. 29, 1892.

Fig. 3.

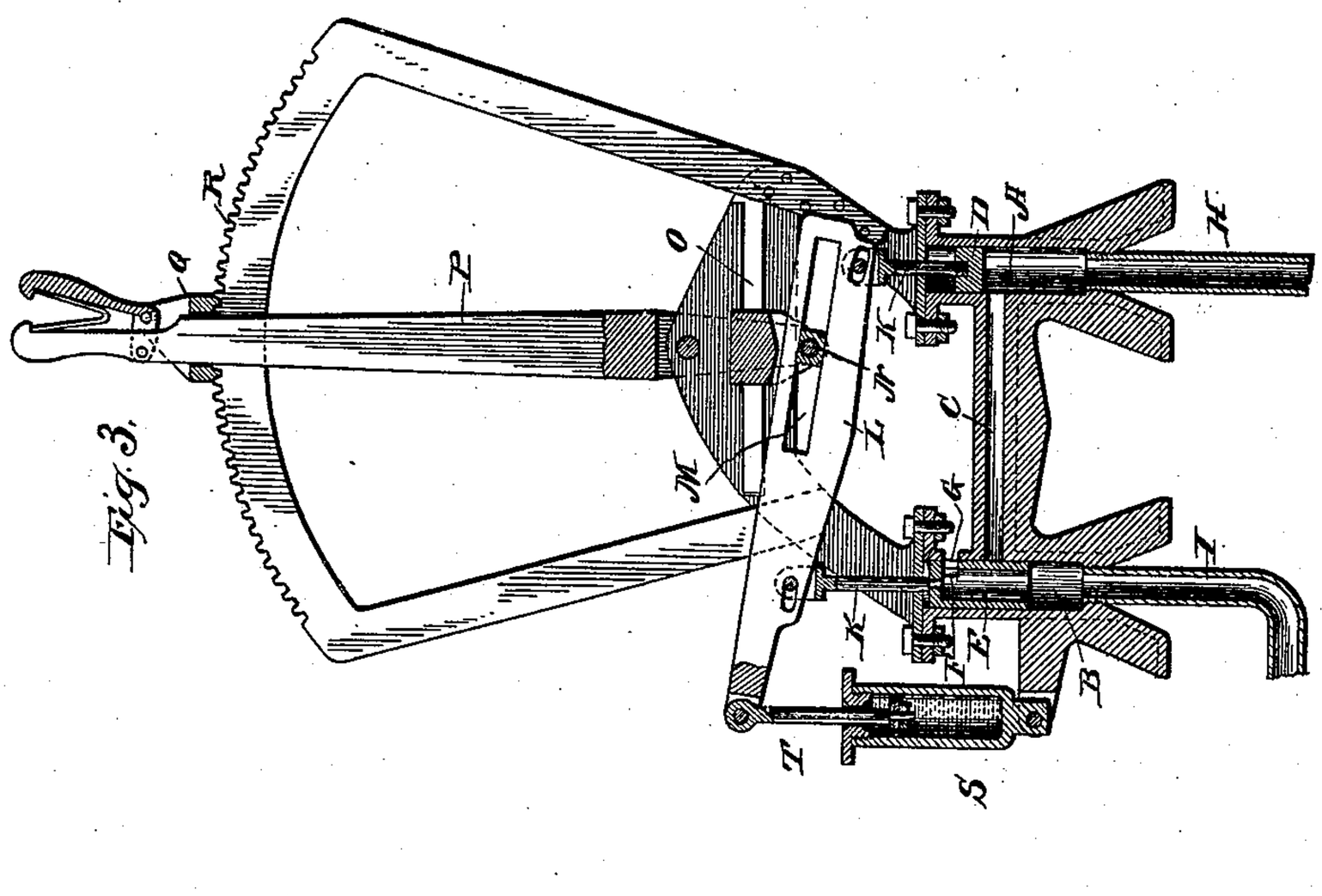
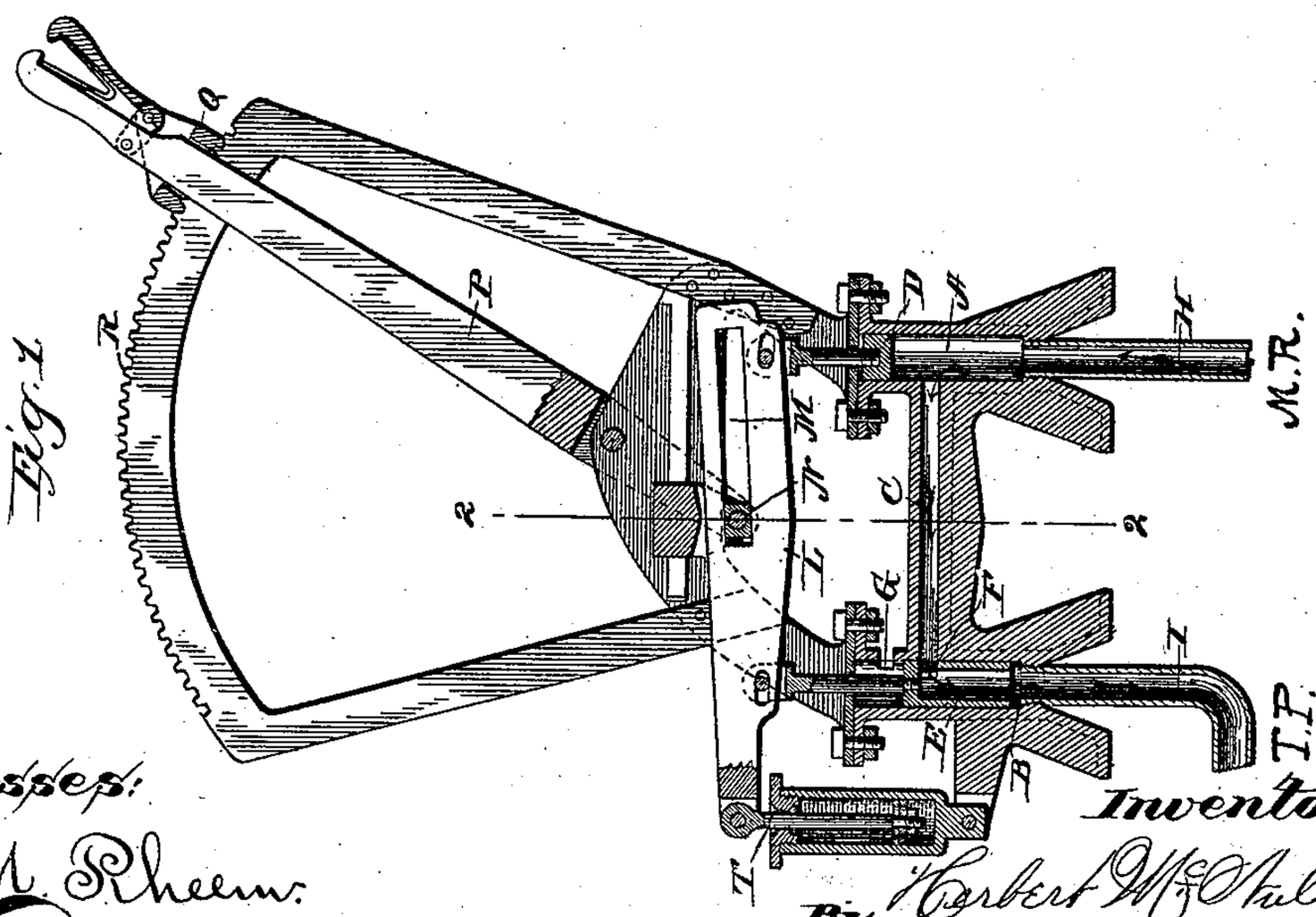


Fig. 2.

Fig. 1.



M.R.

Witnesses:

Wm. M. Rheem.

C. Hurdeman.

Inventor:

Herbert McNulta

By Elliott & Quohundro.

Attys

UNITED STATES PATENT OFFICE.

HERBERT McNULTA, OF CLEVELAND, OHIO.

AIR-BRAKE.

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Application filed October 27, 1890. Serial No. 369,415. (No model.)

To all whom it may concern:

Be it known that I, HERBERT MCNULTA, a citizen of the United States, and a resident of Cleveland, Cuyahoga county, State of Ohio, have invented certain new and useful Improvements in Air-Brakes, of which the following is a specification.

This invention relates to improvements in that class of automatic air-brakes in which the setting and unsetting of the brakes is accomplished by a variation of the air-pressure in the train service-pipe controlled by the engineer by means of a valve upon the engine, through which the air must pass from the supply-reservoir to the train service-pipe, by which latter it is distributed to the various brake-cylinders upon the cars of the train.

The object of this invention is to obtain and maintain any desirable pressure in the train service-pipe from the maximum to the minimum, whereby the brakes upon all the cars may be set and maintained with any desired force.

This object is attained by the devices illustrated in the accompanying drawings, in which—

Figure 1 represents a sectional elevation of an engineer's valve embodying my invention; Fig. 2, a transverse vertical section on the line 2 2 of Fig. 1; Fig. 3, a section similar to Fig. 1, showing a changed position of the parts for setting the brakes.

Similar letters of reference indicate the same parts in the several figures of the drawings.

The system in which my apparatus is employed is substantially the same as that now commonly employed in automatic air-brake systems, and comprises generally an air-storage tank or reservoir on the engine or tender supplied by an air-pump which is connected through an engineer's valve, and a single-line train service-pipe having branches with brake-cylinders under the cars, the pistons of which are connected with so as to work the brake-levers; but as the reservoir and air-pump are now commonly used and well understood in the art to which my invention belongs I have not deemed it necessary to herein illustrate them.

Referring now by letter to the accompanying drawings, and more particularly to the engineer's valve illustrated in Figs. 1, 2, and 3, A B indicate two upright cylinders connected by a passage C about the center of length thereof, in which cylinders, respectively, were pistons D E, the latter being hollow and provided with an opening or port F at one side thereof, adapted and arranged to register alternately with the passage C and an exhaust-port G, located above said passage. The cylinder A is connected by pipe H with the storage tank or reservoir, in which the air is contained under pressure, while the cylinder B is connected by pipe I with the train service-pipe J, extending under each car of the train and connected by branch pipes with the brake-cylinders, as described in detail farther on.

Each piston D and E is connected by rod K with a lever L, provided with a slot M, in which works a movable fulcrum N, sliding upon guides O, formed upon the supporting-frame for the valve and actuated by a hand-lever P, having a latch Q engaging a segmental toothed rack R for locking the lever in any adjustable position. In the drawings the fulcrum-pin is shown as having a rocking block pivoted thereon, which works in the slot M of the lever L and which block necessarily rocks on the fulcrum-pin whenever the lever changes its position or whenever the fulcrum changes its position; but the employment of this block is merely a mechanical expedient, is not at all necessary or essential to the construction or operation of my device, and might be omitted entirely by simply making the fulcrum-pin of sufficient diameter to fill the slot M without departing from the spirit of my invention.

In practice, supposing the movable fulcrum N to be in the mid-position shown in Fig. 1 and the areas of the two pistons D and E being equal, air from the reservoir passes through pipe H, cylinder A, passage C, cylinder B, and pipe I into the train service-pipe operating to release the brakes in the manner hereinafter described. Now moving the fulcrum to the right—that is, toward the cylinder A—increases the length of the lever-arm of the piston E and correspondingly decreases the length of the lever-arm of piston D, and as the pressure is equal upon both pistons the advantage in leverage gained by piston E

causes it to rise, thereby cutting off the supply of air from the passage C, the piston continuing to rise under the influence of the back-pressure from the train service-pipe, which is practically equal to the reservoir-pressure until the opening F therein registers with the exhaust-port G, thus permitting the air to escape from the train service-pipe. The exhaust or escape of air will continue until the pressure in the train service-pipe is reduced sufficiently to equalize or compensate for the advantage gained by the increased length of the lever-arm of the piston E, thus establishing a balance between the two pistons D and E; but the exhaust-port being still open a little more air escapes sufficient to destroy the balance and to give the piston D the advantage, which, being forced up by the pressure from the reservoir, pushes the piston E down, thereby cutting off the exhaust, and the piston E finally settles to a position in which the opening F therein is between the supply-passage and the passage C and the exhaust-port G, both of which are thus closed. We now have a pressure in the train service-pipe that will be maintained as long as the fulcrum N remains fixed and the tank-pressure remains constant; but this pressure may be immediately increased or descreased by moving the fulcrum toward or away from its mid-position and will remain fixed at any desired pressure.

To prevent too rapid oscillation and thumping of the piston, I provide a dash-pot S of any suitable construction, the piston-rod T of which is attached to the lever L, the dash-pot, as usual, being filled with glycerine or some similar liquid, which flows from one side to the other of the piston as the latter is moved up and down by the lever. Should leakage reduce the pressure in the train service-pipe after the desired pressure is obtained—that is, while the brakes are set—the piston E will move down until the opening F therein registers with the supply-passage C and the leakage is made up, when the parts will again assume their last-described position with the supply-passage and exhaust-port both closed, the valve thus operating to automatically compensate for any leakage in the train service-pipe, so as to maintain the pressure therein at any desired degree without the necessity for manipulating the valve by hand.

While I have shown and described the pistons of the engineer's valve as of equal area and therefore balanced when they have equal length of lever-arm, it is obvious that this balance may be equally as well obtained with pistons of unequal area by giving to the piston of the lesser area the advantage in leverage; but the operation of the valve will not be changed and the pistons will be balanced the same as in the preferred construction before referred to.

In conclusion I may state that my engineer's valve may be used in connection with any air-brake system in which the setting or unsetting of the brakes is accomplished by a variation of air-pressure in the train service-pipes, and such systems are now so well understood that I have not deemed it necessary to herein illustrate or describe any system in connection with the valve.

Having described my invention, what I claim, and desire to secure by Letters Patent, is—

1. In an air-brake system, the combination, in an engineer's valve connected, respectively, with the supply-reservoir and the train service-pipe, of a pair of balanced pistons connected together and operated simultaneously to alternately establish and cut off communication between the supply-reservoir and the train service-pipe, substantially as described.

2. In an air-brake system, an engineer's valve comprising a pair of cylinders connected, respectively, with the supply-reservoir and the train service-pipe and with each other, and a pair of balanced pistons working in said cylinder and connected together and operated alternately to open and cut off communication between the supply-reservoir and the train service-pipe, substantially as described.

3. In an air-brake system, an engineer's valve comprising a pair of cylinders connected with the supply-reservoir and the train service-pipe and with each other, an exhaust-port for the cylinder connected with the train service-pipe, a pair of balanced pistons working in said cylinders and connected with a lever, and a movable fulcrum for said lever, substantially as and for the purpose described.

4. In an air-brake system, an engineer's valve comprising a pair of cylinders connected, respectively, with the supply-reservoir and the train service-pipe and with each other, an exhaust-port for the cylinder connected with the train service-pipe, a pair of balanced pistons working in said cylinders and connected, respectively, with a lever, the piston in the last-mentioned cylinder alternately opening the passage connecting it with the other cylinder and closing the exhaust-port, and vice versa, and a movable fulcrum for said lever between the pistons, substantially as described.

5. In an air-brake system, an engineer's valve comprising a pair of cylinders connected, respectively, with the supply-reservoir and the train service-pipe and with each other, an exhaust-port for the cylinder connected with the train service-pipe, a hollow piston working therein provided with an opening for alternately registering with the supply-passage from the other cylinder and the exhaust-port, a piston of equal area with the first-mentioned piston working in the other cylinder above the passage, a lever connected with both of said pistons, and a movable fulcrum for said lever between said pistons, substantially as described.

6. In an air-brake system, an engineer's

valve comprising a pair of cylinders connected, respectively, with the supply-reservoir and the train service-pipe and with each other, an exhaust-port for the cylinder connected with the train service-pipe, a pair of balanced pistons working in said cylinders and connected, respectively, with a lever, a movable fulcrum for said lever, and a hand-lever for operating said fulcrum, substantially as described.

7. In an air-brake system, an engineer's valve comprising a pair of cylinders connected, respectively, with the supply-reservoir and the train service-pipe and with each other, an exhaust-port for the cylinder connected with the train service-pipe, a pair of balanced pistons working in said cylinders and respectively connected with a lever, a movable fulcrum for said lever, a guide therefor, a lever for actuating the same, and a lock device for securing said lever in any adjusted position, substantially as described.

8. In an air-brake system, an engineer's valve comprising a pair of cylinders connected, respectively, with the supply-reservoir and the train service-pipe and with each other, an exhaust-port for the cylinder connected with the train service-pipe, a pair of balanced pistons working in said cylinders and respectively working with a lever and a movable fulcrum for said lever, means for actuating the same, and a dash-pot the piston of which is also connected with said lever, substantially as described.

HERBERT MCNULTA.

Witnesses:
R. C. OMOHUNDRO,
JAMES R. SCOTT.