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J. F. McELROY.

ENGINEER'S VALVE FOR AIR BRAKES.

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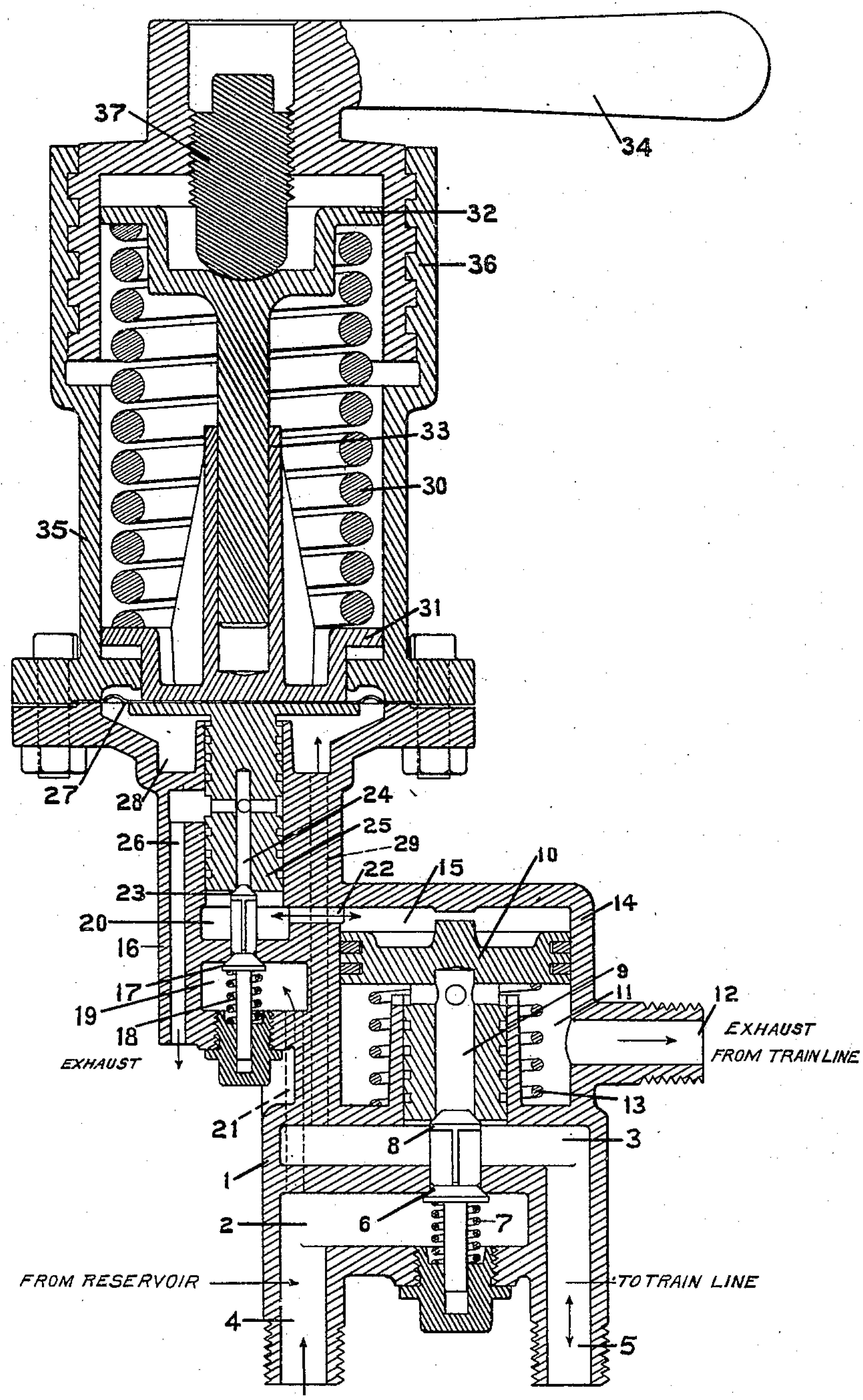

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UNITED STATES PATENT OFFICE.

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ENGINEER'S VALVE FOR AIR-BRAKES.

SPECIFICATION forming part of Letters Patent No. 792,152, dated June 13, 1905.

Application filed November 1, 1904. Serial No. 230,932.

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, and State of New York, have invented certain new and useful Improvements in Engineers' Valves for Air-Brakes, of which the following specification and accompanying drawing disclose as an illustration one embodiment thereof which I now regard as the best out of the various forms in which the principles of my invention may be applied.

The accompanying drawing represents a sectional view of the engineer's valve or controller.

This invention relates to air-brake systems for railways, and more particularly to the engineer's valve.

One objection to the systems in common use lies in the difficulty of decreasing the pressure of the brakes after they have once been set without first filling the train-pipe and releasing the brakes. In Letters Patent Nos. 768,537 and 768,538, granted to me, is described a system whereby the pressure of the brakes may be either increased or decreased by simply varying the train-pipe pressure without first releasing the brakes and whereby the auxiliary reservoir is automatically kept filled to a standard pressure determined by the train-pipe pressure irrespective of whether the brakes are set or released. The present invention provides an engineer's valve adapted for use with that and other air-brake systems.

The preferred construction herein described as embodying the invention includes the operation of the primary admission and release valves, interposed between the reservoir and train-pipe, by air-pressure from the reservoir and controlling this pressure by a relay-valve mechanism similar to the primary valves, but subject to the differential action of a spring and the train-pipe pressure. The tension of this spring is varied by the position of the engineer's lever, and according to its tension the train-pipe pressure will be greater or less, for when the tension is changed the relay and primary valves automatically readjust themselves until the train-pipe pressure has undergone a corresponding change.

1 is a primary-valve casing containing chambers 2 3, connecting by branches 4 5 with the main air-supply reservoir and train-pipe, respectively. A valve 6, closed by a spring 7 and reservoir-pressure, controls admission of reservoir-pressure to the chamber 3 and thence to the train-pipe, and a second valve 8 on the same stem controls the release from the train-pipe to the atmosphere. These valves are denominated, respectively, the "admission" and "release" primary valves.

The release-valve 8 seats at the mouth of a duct 9, formed in the stem of a piston 10 and branching to a chamber 11, located below said piston and having an exhaust-outlet 12. A spring 13 exerts upward pressure on this piston, and the piston works in a cylinder 14, formed on top of the casing 1 and containing an air-pressure chamber 15 above the piston, said piston and cylinder constituting an air-motor. On the side of the cylinder 14 is formed a casing 16 for the relay-valves, of which 17 is the relay admission-valve, seated by a spring 18 and controlling communication between chambers 19 and 20. Chamber 19 connects by an open duct 21 (shown dotted) with the chamber 2, and hence receives reservoir-pressure, while chamber 20 connects by an open duct 22 with the piston-chamber 15.

23 is the relay release-valve controlling the release from chambers 20 15 to the atmosphere and seating at the inlet end of a duct 24, formed in a sliding stem or piston 25, said duct branching to an exhaust-outlet 26 in the casing. The stem 25 is attached to a diaphragm 27, on the lower side of which is an air-pressure chamber 28, communicating by an open duct 29 (shown dotted) with the chamber 3, and hence receiving train-pipe pressure. The upper side of the diaphragm 27 is loaded by a strong spring 30, exerting its pressure through a lower sliding saddle 31, and the upper of said spring abuts against an upper sliding saddle 32, the two saddles telescoping on each other at 33. The position of the upper saddle in a vertical path determines the tension of the spring and is controlled by the engineer's lever 34, whose hub and the upper end of the spring-casing 35 have interengag-

ing screw-threads 36. An adjustable bearing-piece 37 on the axis of the lever or handle 34 abuts against the spring-saddle 32.

In the operation of this mechanism any increase of air-pressure in the piston-chamber 15 tends to depress the piston 10, closing the primary release-valve 8 and opening the primary admission-valve 6, thus opening the reservoir to the train-pipe, so as to increase the air-pressure in the latter. A decreased pressure in the piston-chamber has the contrary effect, tending to shut off the reservoir from the train-pipe and open the latter to the release-chamber 11. This increase or decrease of pressure in 15 is effected by the relay-valves 17 23 through a variation in the tension of spring 30, controlled by the set in a horizontal arc of the engineer's lever 34. Thus when said lever is moved to decrease the tension of the spring the train-pipe pressure in chamber 28 acting upwardly on diaphragm 27 tends to raise the stem 25, opening release-valve 23 and allowing the admission-valve 17 to close, thereby shutting off the reservoir from piston-chamber 15 and exhausting the air-pressure from the latter, thus in turn causing the primary admission-valve 6 to close and the primary release-valve 8 to open. An increase in tension of the spring 30 has the contrary effect, closing the relay release-valve 23 and opening the relay admission-valve, whereby reservoir-pressure is admitted to piston-chamber 15 and the primary admission-valve 6 opened and release 8 closed. The result is that the diaphragm always automatically assumes a position which causes the train-pipe pressure to equal the spring-pressure. If, for example, the spring-pressure be increased with the object of easing the brakes without throwing them off, the lever 34 need merely be moved to a position corresponding to the decreased pressure desired. The relay admission will then open and the release close and the primary admission and release will follow, as dictated by the ensuing increase of pressure in piston-chamber 15. The train-pipe pressure thereupon increases until it causes relay admission-valve to close. Primary admission-valve will then open no farther. The action does not stop at this point; but train-pipe pressure, tending to still further increase, opens relay release and decreases the pressure in the piston-chamber to a point allowing the primary admission-valve to close. The parts finally reach equilibrium with the predetermined desired pressure in the train-pipe and enough pressure in the piston-chamber 15 to maintain the primary valves closed. Should the train-pipe pressure tend to fall from drafts thereon or from leakage, the mechanism will automatically admit enough reservoir-air to the train-pipe to restore the pressure without any movement of the engineer's lever. To increase the set of the brakes, the tension of spring 32 is decreased by a new set given to lever 34, and the mechanism assumes equilibrium at a decreased train-pipe pressure. To throw off the brakes, the spring is simply given a tension which will admit a maximum pressure to the train-pipe. It will be seen that the engineer's control of the train-pressure is accordingly more powerful and delicate than heretofore. It may also be added that an important advantage is gained by employing air-pressure to operate the valves communicating with the train-pipe and using the adjustable spring merely to give the said operating pressure. By this means the engineer merely determines the pressure to be maintained in the train-pipe, while the work of raising or lowering the train-pipe pressure is mechanically performed by the power of the air-pressure. This leaves the determining apparatus used by the engineer independent of the actual valve operation required to raise or lower the train-pipe pressure, so that both the determining action and the pressure-changing action may be performed more accurately, more positively, more strongly, and more certainly.

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

1. An engineer's air-brake controller comprising in combination a train-pipe, air-actuated primary-valve mechanism for increasing and decreasing the pressure in said pipe to release and set the brakes, and a relay-valve mechanism controlling said primary-valve mechanism.

2. An engineer's air-brake controller comprising in combination a train-pipe, primary admission and release valves controlling the pressure therein so as to release and set the brakes, an air-motor for operating said valves, and a relay-valve mechanism controlling said motor.

3. An engineer's air-brake controller comprising in combination a train-pipe, a reservoir-chamber, a primary-valve mechanism controlling the pressure in said train-pipe, an air-motor for actuating said valve mechanism, and a relay-valve mechanism controlling the admission of reservoir-air from said chamber to and its release from said air-motor.

4. An engineer's air-brake controller comprising in combination a primary-valve mechanism controlling the train-pipe, an air-motor for actuating said mechanism, an admission-valve between the reservoir and the air-motor, and a release-valve for exhausting said air-motor.

5. An engineer's air-brake controller comprising in combination a primary-valve mechanism for controlling the train-pipe pressure, an air-motor for operating said mechanism, means for operating said motor by air-reservoir pressure, and a relay-valve mechanism controlling said motor.

6. An engineer's air-brake controller comprising in combination a train-pipe, a primary-valve mechanism for increasing and decreas-

ing the train-pipe pressure, a relay-valve mechanism controlling the primary mechanism, an engineer's handle, and yielding means interposed between said handle and relay-valve mechanism.

7. An engineer's air-brake controller comprising in combination a primary-valve mechanism controlling the train-pipe pressure, a relay-valve mechanism controlling the primary mechanism, and manually-controlled yielding means for variably loading said relay mechanism.

8. An engineer's air-brake controller comprising in combination a primary-valve mechanism controlling the train-pipe pressure, a relay-valve mechanism controlling the primary mechanism, manually-controlled yielding means for variably loading said relay mechanism, and means whereby the train-pipe pressure acts on said relay mechanism oppositely to said yielding means.

9. An engineer's air-brake controller comprising in combination a reservoir and a train-pipe, a primary admission and release valve mechanism interposed between the two, an air-motor actuated by the reservoir-pressure for operating said primary mechanism, a relay-admission and release-valve mechanism controlling said motor, a movable partition actuating the relay mechanism, a chamber on one side of said partition receiving the train-pipe pressure, a spring pressing oppositely on said partition, and an engineer's handle for varying the tension of said spring.

In witness whereof I have hereunto set my hand, before two subscribing witnesses, this 27th day of October, 1904.

JAMES F. McELROY.

Witnesses:
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