No. 675,251. Patented May 28, 1901.

E. G. SHORTT.

PRESSURE REDUCING VALVE FOR AIR BRAKES.

(Application filed Sept. 13, 1899.)

(No Model.) 4 Sheets—Sheet 1.

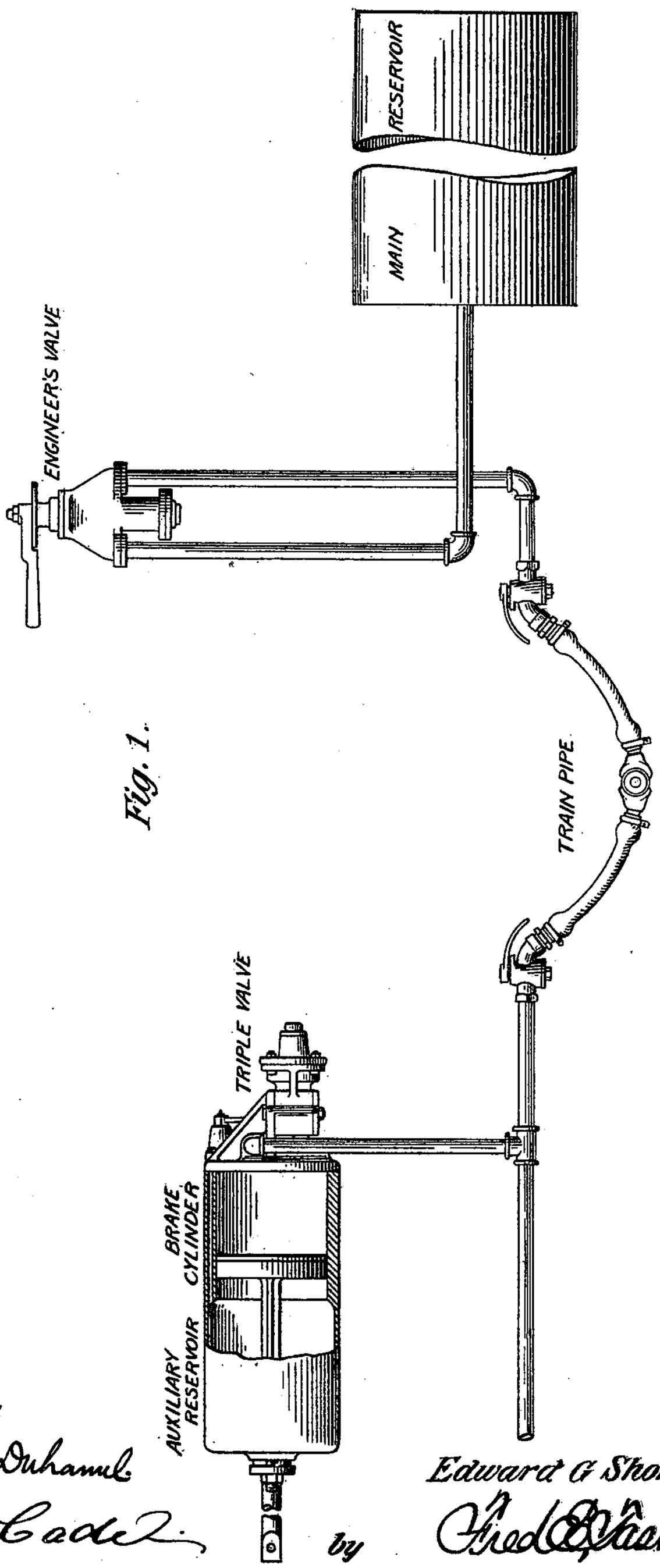

Fig. 1.

Witnesses:
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J. S. Codell

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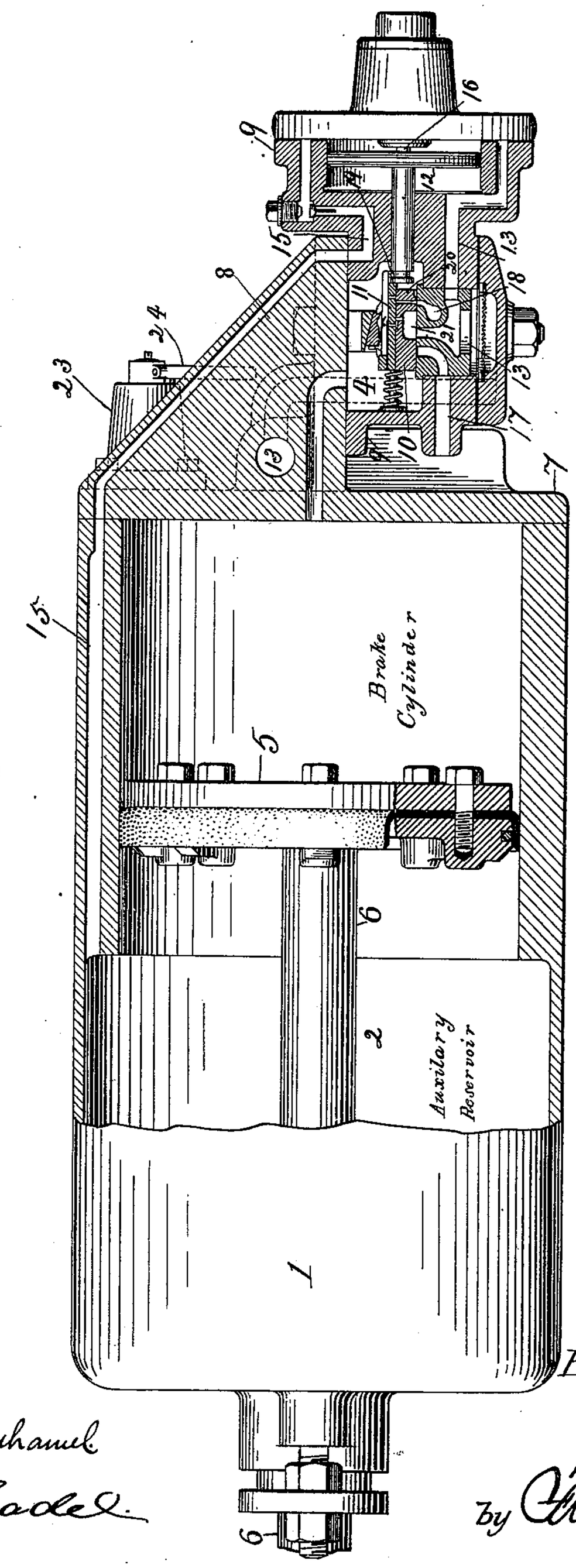
Fig. 2.



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(Application filed Sept. 13, 1899.)

(No Model.) 4 Sheets—Sheet 3.

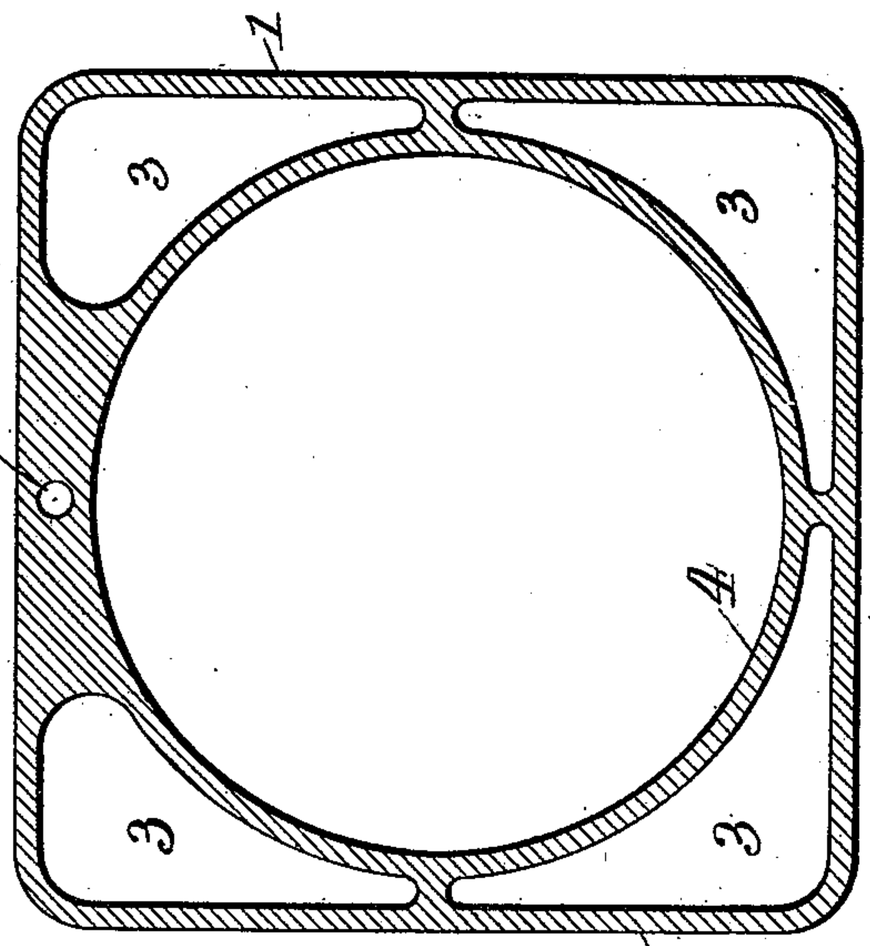

Fig. 4.

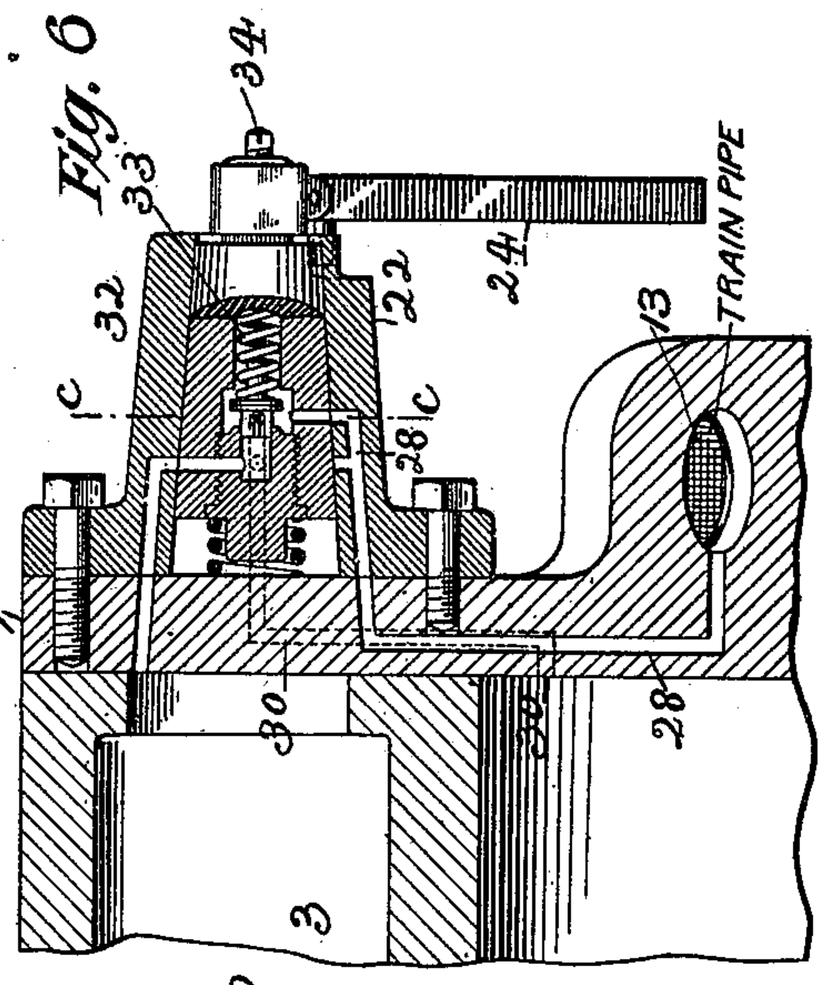

Fig. 6.

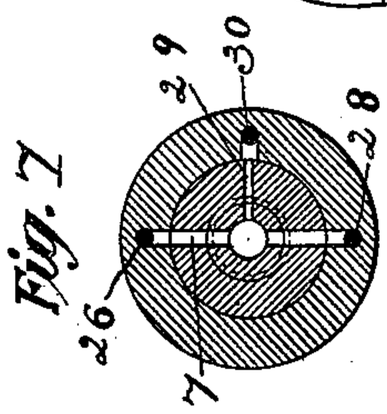

Fig. 7.

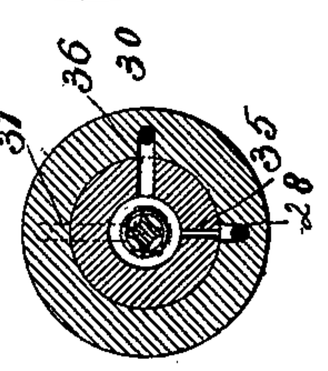

Fig. 8.

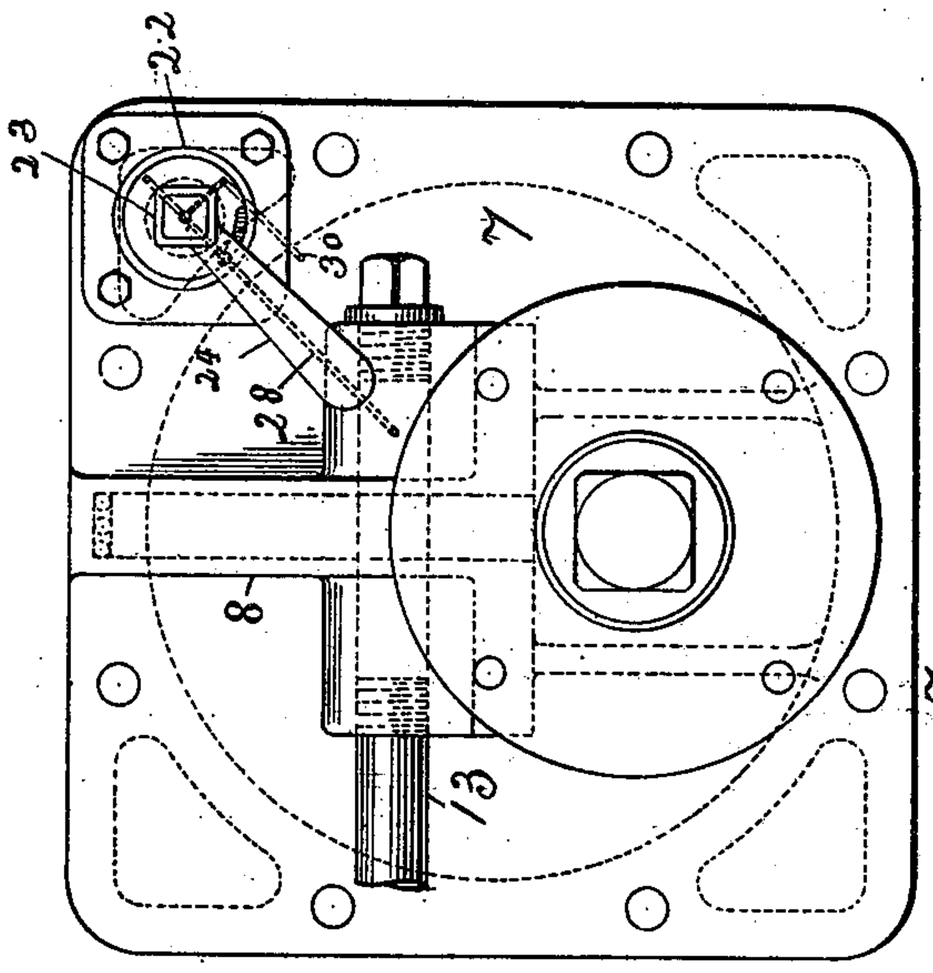

Fig. 3.

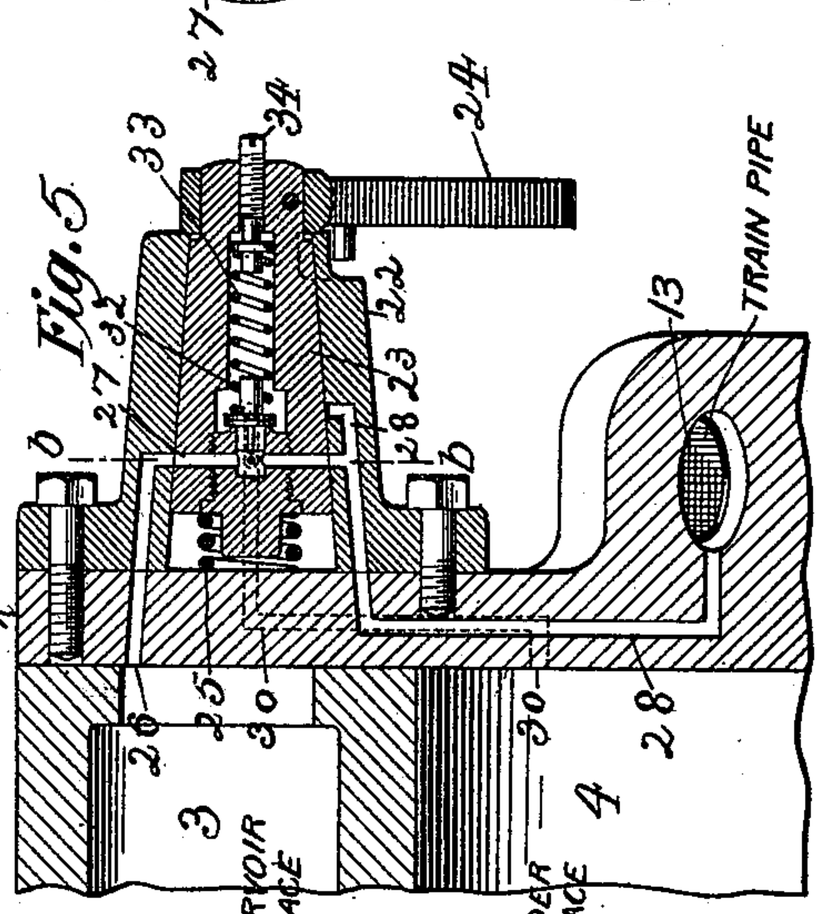

Fig. 5.

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No. 675,251. Patented May 28, 1901.

E. G. SHORTT.

PRESSURE REDUCING VALVE FOR AIR BRAKES.

(Application filed Sept. 13, 1899.)

(No Model.) 4 Sheets—Sheet 4.

Fig. 10

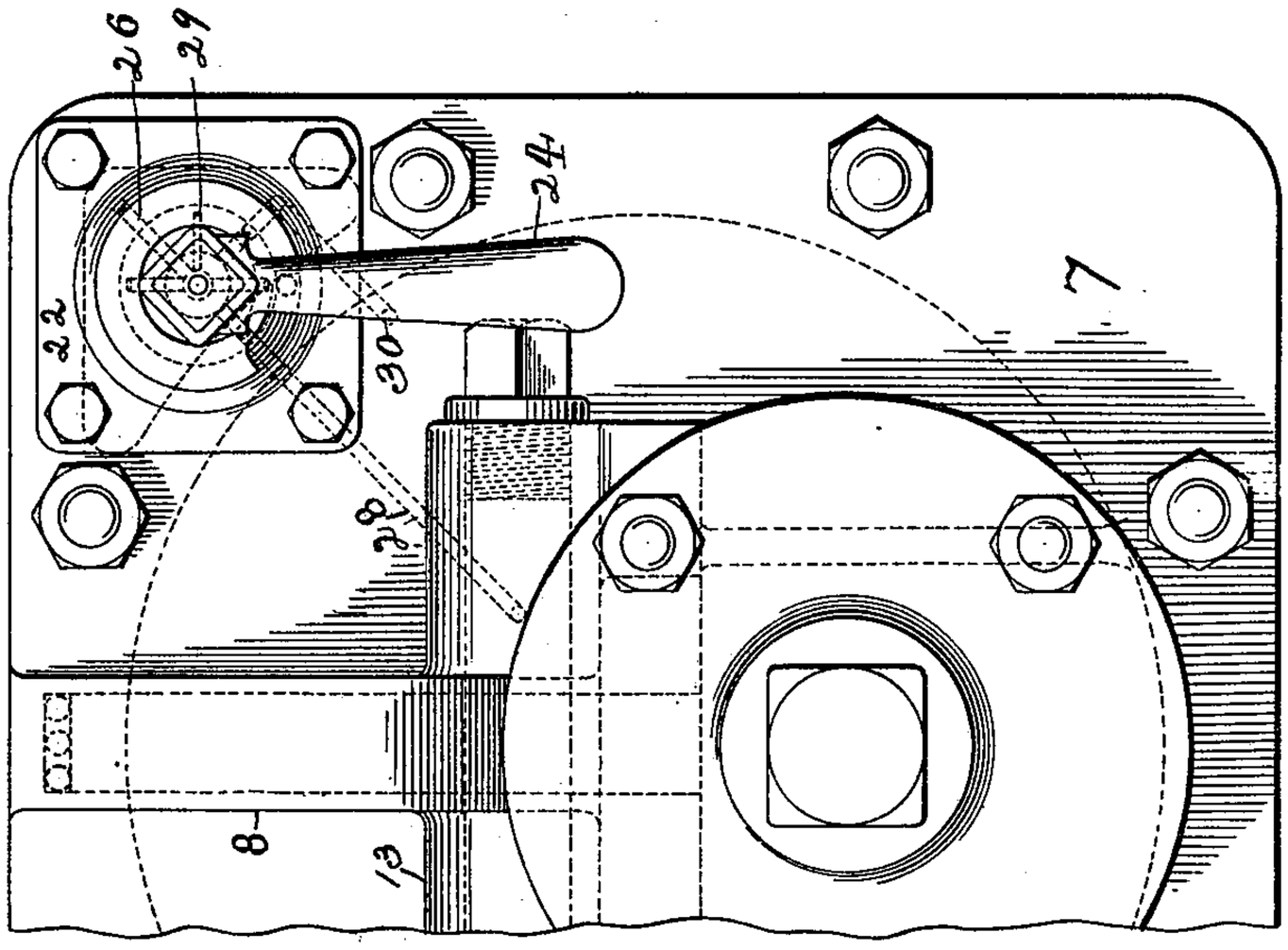

Fig. 9

Witnesses:
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Edward G. Shortt,
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UNITED STATES PATENT OFFICE.

EDWARD G. SHORTT, OF CARTHAGE, NEW YORK, ASSIGNOR TO THE INTERNATIONAL AIR BRAKE COMPANY, OF JERSEY CITY, NEW JERSEY.

PRESSURE-REDUCING VALVE FOR AIR-BRAKES.

SPECIFICATION forming part of Letters Patent No. 675,251, dated May 28, 1901.

Application filed September 13, 1899. Serial No. 730,299. (No model.)

To all whom it may concern:

Be it known that I, EDWARD G. SHORTT, a citizen of the United States, residing at Carthage, in the county of Jefferson and State of New York, have invented certain new and useful Improvements in Pressure-Reducing Valves for Air-Brakes, of which the following is a specification.

The invention relates to railway air-brakes.

Among the essential features of the present improvement are those relating to that class of equilibrio air-brake valve mechanism known as "high-pressure or high-speed train mechanism."

One principal feature is adapted to act, after a full application of the brakes, to gradually reduce the braking power as the speed of the train diminishes, this for the purpose of permitting the application of a high initial braking power and effecting the gradual reduction of the same, as the momentum of the train is being overcome, to such an extent or in such manner that the skidding or sliding of the car-wheels will not occur or for the purpose of adapting the braking power of a brake apparatus to the braking work it is to do, such as braking an unloaded or a loaded car.

Another feature relates to improvements on the mechanism of my United States Patent No. 473,789, dated April 26, 1892, which provides that the air holding the brakes applied in the case of releasing the brakes of a disconnected or isolated car can be returned to the train-pipe instead of bled to the atmosphere and the brake be repeatedly reset and released; and this present feature has for its object to insure that in making such release the exhaust-valve mechanism will not be moved to exhaust the system.

Other features that might be mentioned will be brought out in the description and claims.

In the drawings accompanying this specification I illustrate an equilibrio brake mechanism, together with my improvements for accomplishing with such mechanism the above-set-forth effects.

By the term "triple valve mechanism" I mean one that acts to control the passage of air from the train-pipe to the brake-cylinder, to effect braking pressure on the brake-piston, and to release or overcome such pressure.

In the drawings, Figure 1 represents a general diagrammatic view of an equilibrio air-brake mechanism embodying my improvements. Fig. 2 shows a central longitudinal view of a brake-cylinder, auxiliary reservoir, and a form of triple valve mechanism controlling these parts. Fig. 3 is an end view of the same from right hand of Fig. 2. Fig. 4 is a cross-section of the same through the brake-cylinder. Figs. 5 and 6 are enlarged detail sectional views on plane *a a* of Fig. 9 of the valve mechanism for reducing the braking-application pressure and for equalizing same with the train-pipe, the valve handle and plug being turned in Fig. 5 as shown by Fig. 9 and in Fig. 6 as shown by Fig. 10. Figs. 7 and 8 are sections of the valve casing and plug on planes *b b* and *c c* of Figs. 5 and 6. Figs. 9 and 10 are enlarged end views similar to Fig. 3.

In referring to the views in detail, 1, Figs. 2 to 4, represents the exterior shell or casing of the reservoir and cylinder structure, which is substantially square in cross-section and rectangular in shape lengthwise. 2 denotes the reservoir-space; 3, the angular spaces between the brake-cylinder 4 and the walls 1; 5 6, the brake-piston and piston-rod, and 7 the head-plate which closes the structure and carries the neck 8, to which is secured the casing 9 of the triple valve mechanism, all as set forth in my Patent No. 538,547. 10 indicates the emergency-valve, and 11 the graduation-valve of the triple valve mechanism, and 12 is the piston thereof, 13 the train-pipe and train-pipe space on one side of said valve mechanism, 15 the passage from the reservoir to reservoir-valve 16, operated by piston 12 to put this passage to communication with train-pipe space, and 17 the exhaust-port from the train-pipe, all as more fully set forth in my United States Patent No. 538,552, of April 30, 1895. 18 is the exhaust-passage from the cylinder for either graduation or emergency actions, which leads to the atmosphere independently of the train-pipe passage instead of through the same, as

shown in the said patent, all as set forth and claimed in my copending application for Letters Patent, filed September 13, 1899, Serial No. 730,298. 19 and 20 are the graduation-passages in the graduation and emergency valves, and 21 is the train-pipe-exhaust passage in the emergency-valve. It is unnecessary to describe the construction of these parts with greater minuteness here, inasmuch as they are presented simply by way of example or to illustrate one way of practically applying my present improvements.

Referring to Figs. 5 to 10, 22 denotes the casing of the valve for gradually reducing brake-application pressure after the brakes have been applied. 23 is the plug-valve of the same; 24, the handle attached to the valve and by which it is turned, and 25 its seating-springs. This casing is secured to or made a part of the head 7 and is provided with the passage 26, openly continuing through head of and to the reservoir-space 3, which passage is located to register with passage 27, piercing the plug-valve, and the latter with passage 28, extending to the train-pipe space 13, while the valve-passage 29 is located to at the same time register with the passage 30, extending to the brake-cylinder space 4. In the same plane with passage 27 is located a passage 31, Fig. 8, which with the handle turned as in Figs. 6 and 10 registers with reservoir-passage 26. Just above this passage 31 and opening thereinto is located the seat of the pressure-retaining valve 32, the pressure-spring 33 of which is regulated by the screw 34. Above the valve-seat and on plane *c c*, Fig. 6, the wall of the plug is pierced, Fig. 8, by the passages 35 and 36, the former of which registers with the train-pipe passage 28 and the latter with the cylinder-passage 30. It is to be noted that passage 29 is smaller in size and capacity for carrying air than the passages 26, 27, and 28, and hence for this adjustment of the valve air will flow from the reservoir to the train-pipe in greater volume than to the cylinder; also, that passage 35 is smaller than is passage 36, and hence for this adjustment the volume to the cylinder is greater than to the train-pipe.

Assuming that in running practice it is desired after full or emergency application to gradually reduce the braking pressure as the speed of the train diminishes and to a point where it is practical to maintain a uniform pressure on the brake-shoes, then the valve-handle would be in position of Figs. 6, 8, and 10. Here it should be noted that under these conditions and during graduation applications pressure from the cylinder and train-pipe would be maintained upon the retaining-valve 32, which pressure, together with the retaining-spring tension, would suffice to hold the valve closed against reservoir-pressure. At the time of emergency application, however, the air is practically all vented from the cylinder, and the retaining-valve is at once raised and begins to draft air from the reservoir into the train-pipe and cylinder, the valve having been returned to its running position by the expansion of the abutting springs. Such air as goes into the train-pipe is saved and such as goes into the cylinder acts both by escaping from the reservoir and by pressure on brake-piston to reduce the braking pressure. When the air in the cylinder has reached a point of prepondering pressure over train-pipe pressure, the triple-valve piston and graduation-valve are moved to graduate off the excess by one or more movements and until the tension of the spring of the retaining-valve, together with the pressure collected in the cylinder, overcomes the reservoir-pressure and holds the retaining-valve closed.

It is to be noted that the brake-actuating air is allowed to gradually release or escape through the cylinder after application, that it is applied (upon the brake-piston) to reduce the braking pressure, as also to help to close the retaining-valve, that a portion thereof is saved in the train-pipe and a portion in the cylinder, and that only such amount is let to atmosphere as is necessary to continue the action of transferring the pressure from the braking side of the brake-piston to the opposite side or to the train-pipe until the retaining-valve be closed, thus also maintaining the triple valve in running condition. Thus the air released to reduce braking pressure is utilized not alone to help by its pressure to overcome the braking pressure, but also to recharge the system and while the brakes are still on.

During application action if reservoir-air escape by the brake-piston into the cylinder the graduation-valve will discharge it, and thus prevent any creeping off of the brakes.

Assuming the case of a disconnected or isolated and braked car and of course that the train-pipe ends thereof are closed, the moving of the handle of the valve to the position of Figs. 5, 7, and 9 will cause the braking pressure to become equal on both sides of the brake-piston, the air flowing faster to the train-pipe than to the cylinder, and thus insuring the triple-valve piston remaining in running position—that is, not moving to either graduation or emergency position. After such release the brakes can again be applied by opening the train-pipe, say, by using an angle-cock as though it were an engineer's valve.

What I claim as new is—

1. In a fluid-brake mechanism, a pressure-retaining valve controlling passages extending from the operative face of the brake-piston to its opposite face, one leading to the train-pipe and one to the reservoir, and acting after brake-application action to reduce the pressure of the application-air by withdrawing it from the active face and applying it to the other.

2. In a fluid-brake mechanism, a pressure-retaining valve, controlling passages extend-

ing from the reservoir and one leading to the train-pipe and one to the brake-cylinder, whereby after application action the reservoir-air is withdrawn to the cylinder and train-pipe.

3. In a fluid-brake mechanism, a pressure-retaining valve controlling an exhaust-passage from the reservoir and acting to partially exhaust the same after application action, said valve being normally held seated by a spring and by train-pipe pressure.

4. In an equilibrio fluid-brake mechanism a pressure-retaining valve controlling an exhaust-passage from the reservoir and acting to partially exhaust the same after application action, said passage extending to and being also controlled by the graduation-valve of the exhaust-valve mechanism, and a cock containing the pressure-retaining valve.

5. In combination in a fluid-brake mechanism, and with the train-pipe, exhaust-valve, brake piston and cylinder, and auxiliary reservoir, a passage-provided plug-cock and retaining-valve-controlled passages extending through the said cock from the reservoir to the brake-cylinder and to the train-pipe, for the purpose set forth.

6. In a fluid-brake mechanism, retaining-valve-controlled passages extending from the reservoir to the brake-cylinders and to the train-pipe, the passage to the train-pipe being larger than that to the cylinder, for the purpose set forth.

7. In a fluid-brake mechanism an exhaust-passage from the reservoir to a cock acting to open said passage in one position of its adjustment to a passage containing a pressure-retaining valve, and acting in another position of adjustment to open said passage to a relatively small passage to the brake-cylinder, and to a relatively larger passage to the train-pipe, for the purpose set forth.

8. In combination in an equilibrio air-brake mechanism and with the exhaust-valve mechanism, brake-piston, and the chamber thereof, means acting after brake application to withdraw the brake-application air on one side of the piston to the other side thereof and to the train-pipe, and to opposite sides of the exhaust-valve piston to cause the same to be held in normal or running condition.

In testimony whereof I affix my signature in presence of two witnesses.

EDWARD G. SHORTT.

Witnesses:
MILTON CARTER,
E. D. EAMES.