(No Model.)

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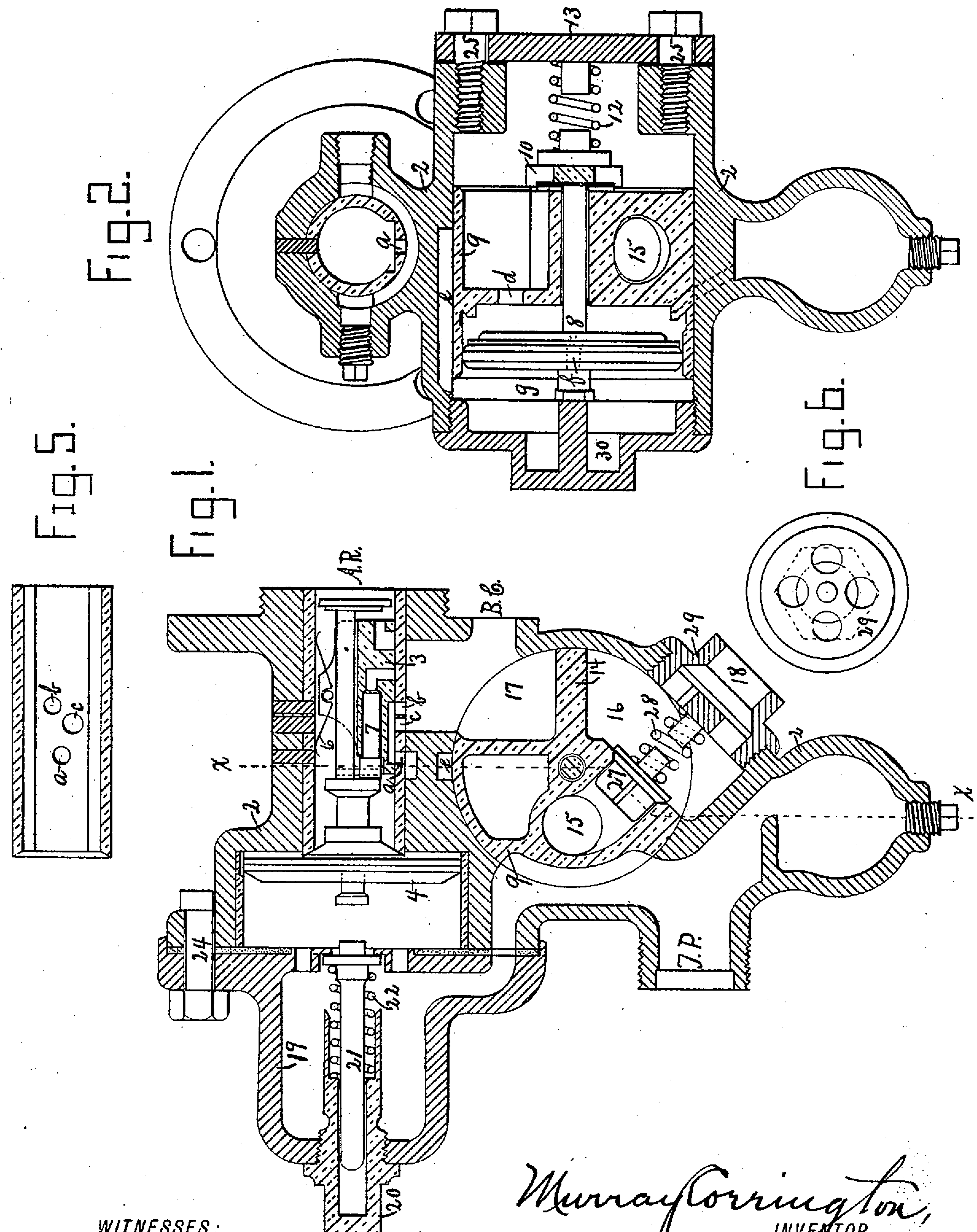
M. CORRINGTON.

AIR BRAKE.

No. 594,464. Patented Nov. 30, 1897.



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(No Model.) 3 Sheets—Sheet 2.

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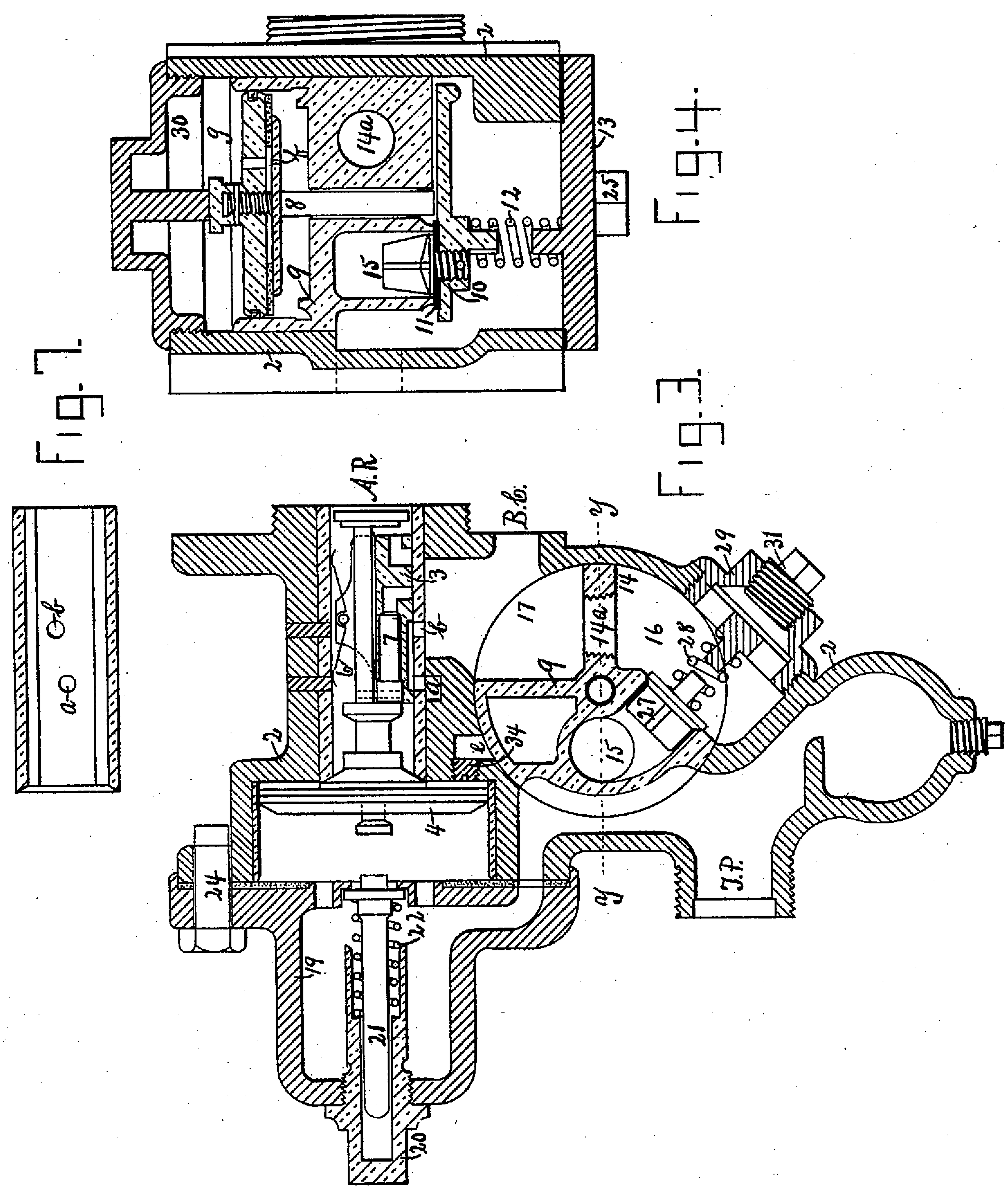

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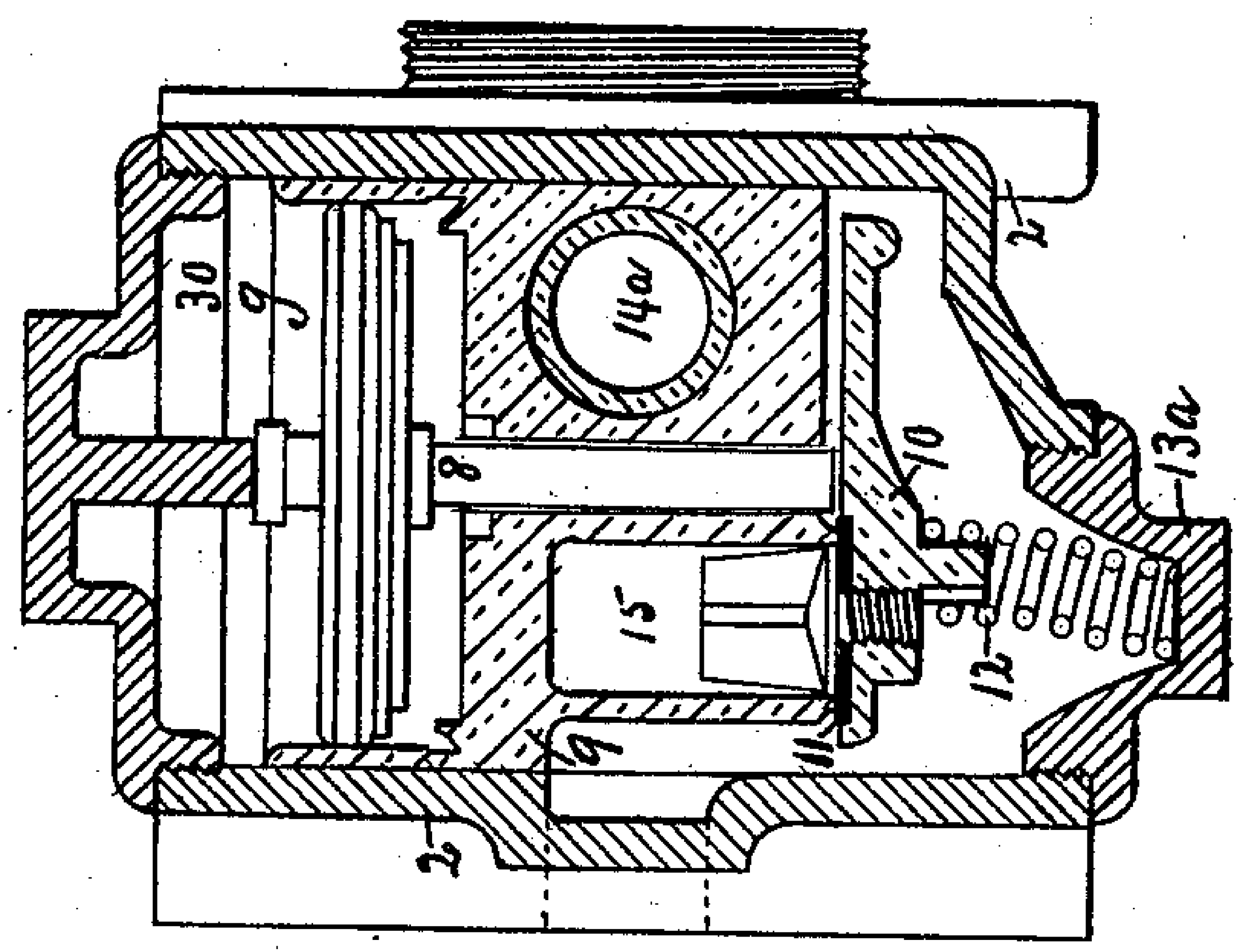

Fig. 9.

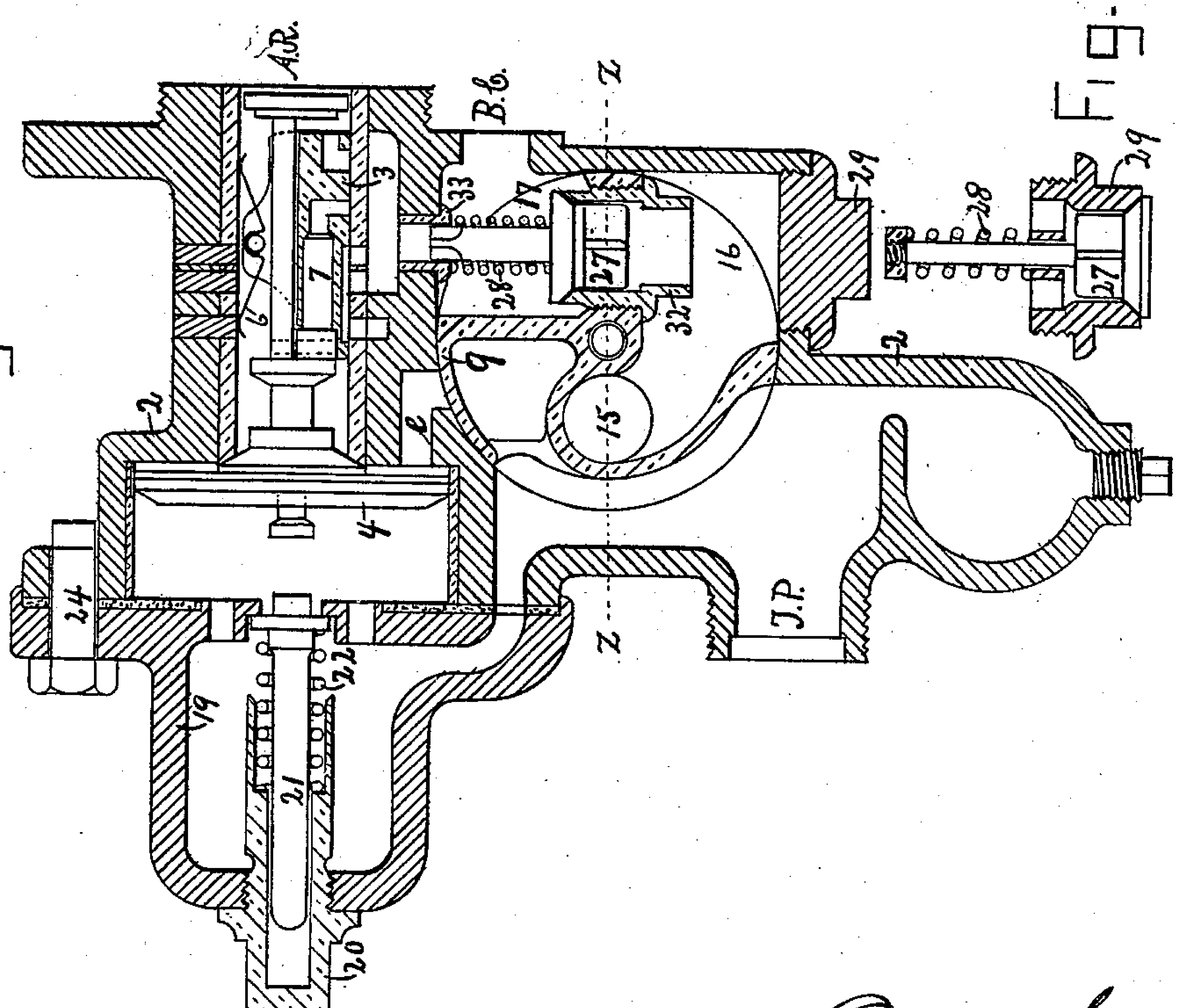

Fig. 8.

Fig. 10.

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UNITED STATES PATENT OFFICE.

MURRAY CORRINGTON, OF NEW YORK, N. Y.

AIR-BRAKE.

SPECIFICATION forming part of Letters Patent No. 594,464, dated November 30, 1897.

Application filed August 25, 1897. Serial No. 649,427. (No model.)

To all whom it may concern:

Be it known that I, MURRAY CORRINGTON, a citizen of the United States, residing at New York city, in the county and State of New York, have invented new and useful Improvements in Air-Brakes, of which the following is a specification.

My invention relates to a novel form of construction of a quick-action triple valve forming part of an automatic fluid-pressure brake system, and has for its principal objects, first, to provide a form of quick-action device by which I may unite in the same construction means whereby the train-pipe air may be vented either to the brake-cylinder or to the atmosphere in the emergency action, according to the adjustments of the apparatus; and, second, to provide means whereby the communication between the auxiliary reservoir and the brake-cylinder may be closed, while the emergency-passage between the train-pipe and brake-cylinder is open during the emergency action.

Referring to the accompanying drawings, Figure 1 is the usual vertical section through the center of a quick-action triple valve and its casing embodying the first part of my invention. Fig. 2 is a vertical section essentially in the dotted line *x x* of Fig. 1 and looking toward the left. Fig. 3 is a view similar to Fig. 1, showing certain modifications. Fig. 4 is an inverted sectional view in the dotted line *y y* of Fig. 3. Fig. 5 is a plan view of the main slide-valve seat of Fig. 1. Fig. 6 is an inverted plan view of the cap 29 of Fig. 1. Fig. 7 is a plan view of the main slide-valve seat of Fig. 3. Fig. 8 is a longitudinal section similar to Fig. 1, showing a modification and addition illustrating the second part of my invention. Fig. 9 is an inverted sectional view taken in the line Z Z of Fig. 8, and Fig. 10 is a sectional view of modified construction of the cap 29 and valve 27. The cap 19 of Figs. 1, 3, and 8 is not shown in Figs. 2, 4, and 9.

The triple valve shown and described herein differs in no respect, either in construction or mode of operation, from the well-known Westinghouse triple valve shown and described in the three patents to Westinghouse, No. 220,556, dated October 14, 1879, No. 360,070, dated March 29, 1887, and No. 376,837, dated January 24, 1888. The piston 4, the slide-valve 3, the slide-valve spring 6, and the graduating-valve 7 are the same as in the Westinghouse device. So, also, are the cap 19, the stop 21, the spring 22, and the nut 20. The exhaust-port *a*, Fig. 1, leads to the atmosphere and the ports *b* and *c* lead from the reservoir to the brake-cylinder.

In the construction of my invention I prefer to arrange underneath and across the triple-valve chamber a chamber in which is accurately fitted a bushing 9, having various ports and cavities or chambers, as illustrated. At one end of the bushing 9 is a chamber in which the emergency-piston 8 is located, and at the opposite end of said bushing the emergency-passage 15 opens from a portion of the valve-casing in free communication with the train-pipe. The emergency-valve 10, with the seat 11, normally closes the mouth of the passage 15, being held in position by the spring 12. (See Figs. 2, 4, and 9.) A cap 30 closes the end of the chamber containing the bushing 9 next to the emergency-piston, and a cap 13, Figs. 2 and 4, closes that end of the chamber next to the emergency-valve, the latter cap being held in place by the bolts 25. The bushing 9 also has two cavities or chambers 16 and 17, the former chamber being in communication with the passage 15 and also having an opening to the atmosphere through the valve-casing and the latter chamber being in communication with the brake-cylinder connection of the triple-valve casing. Between the chambers 16 and 17 is a partition 14, which may or may not, as desired, have a port 14^a through it. (See Figs. 1, 3, 4, and 9.)

Between the passage 15 and the chamber 16 a check-valve 27 is placed in the construction shown in Figs. 1 and 3, which opens toward the latter chamber and is held on its seat by the spring 28. The opening from the chamber 16 to the atmosphere is covered by the cap 29, which may or may not have a port through it. In Fig. 1 this port 18 in the cap 29 is open, in Fig. 3 it is closed by the plug 31, and in Fig. 8 the cap is solid.

The operation of the apparatus is as follows, referring to Figs. 1 to 7, inclusive: When air is charged into the train-pipe, it goes past the triple-valve piston and charges the auxiliary reservoir in the usual manner. At the same time the air flows from the train-pipe into the chamber in which the emergency-valve 10 operates, Fig. 4, thence through the port *d*, Fig. 2, against the emergency-piston 8, and through the charging-port *f* in said piston into the chamber *g* between the piston 8 and the cap 30. The charging-port *f* through the emergency-piston 8 is shown in dotted lines in Fig. 2 and in full lines in Fig. 4. In Figs. 1 and 2 one end of the passage *e* is open to the chamber *g*, but the other end thereof forms a merely blind passage having no connection with any other part of the system. In the normal condition, therefore, while the train is running, all parts of the system, including the train-pipe, auxiliary reservoir, and the chamber *g*, are charged with air at the normal running pressure, usually seventy pounds per square inch. The size of the chamber *g* will depend upon the distance between the piston 8 and the cap 30.

When it is desired to set the brakes in service, a moderate reduction of the train-pipe pressure is made through the engineer's valve, whereupon the triple valve moves back against the graduating-stop and causes the port in the slide-valve controlled by the graduating-valve 7 to register with the port *b*, Figs. 1 and 5. This allows air to flow from the auxiliary reservoir to the brake-cylinder and set the brakes in the usual manner. Further moderate reductions of the train-pipe pressure will admit more air from reservoir to cylinder until complete equalization after the usual manner of the Westinghouse triple valve. During these service operations the air from the chamber *g* flows out through the port *f*, causing a simultaneous reduction of pressure on both sides of the piston 8, and hence the piston 8 and the valve 10 remain in their normal positions.

When the brakes are to be set in an emergency action, a quick reduction is made in the train-pipe pressure in the usual way. This causes the triple valve to move through its full traverse, forcing the stop 21 back and compressing the spring 22 and the slide-valve (referring to Figs. 1 and 5) to open both the ports *b* and *c*, thus allowing the reservoir-air to flow rapidly into the brake-cylinder. Meanwhile the air in the chamber *g*, owing to the sudden drop in the air-pressure on the other side of the piston 8, forces said piston to the right, Fig. 2, (or down in Fig. 4,) and unseats the emergency-valve 10, whereupon a large amount of air is vented from the train-pipe through the passage 15, past the valve 27, and thence through the port 18, Fig. 1, to the atmosphere. The venting of the train-pipe thus under one car causes a similar operation of the mechanisms on the adjoining cars until all the brakes are set throughout the train. The air in the chamber *g* after this operation quickly flows out through the port *f* and allows the spring 12 to move the piston 8 back to normal position and close the valve 10, whereupon the train-pipe may be recharged for taking of the brakes in the usual way.

In the construction shown in Fig. 1 the spring 28 may be so adjusted that it will retain any amount of pressure desired in the train-pipe after opening the valve 10 from, say, ten pounds to forty pounds. In Fig. 3 a plug 31 closes the port in the cap 29, and a port 14^a is made in the partition 14, so that in the emergency action the train-pipe air coming from the passage 15 past the valve 27 flows through the port 14^a into the chamber 17 and thence into the brake-cylinder. The difference, therefore, between the two devices is that in Fig. 1 the train-pipe air is vented to the atmosphere, while in Fig. 3 it is vented into the brake-cylinder. In Fig. 3 also one end of the passage *e* opens into the triple-valve chamber in communication with the auxiliary reservoir; but this may be closed, as in the drawings, by the plug 34. When the mechanism is operated as in Fig. 3, I prefer also to open but one port from the reservoir to the brake-cylinder when the triple valve moves through its full traverse in emergencies, and hence I omit or close up port *c* in the slide-valve bushing, as shown in Figs. 3 and 7.

In order to convert Fig. 1 into Fig. 3, it is only necessary to remove the cap 29, then turn the valve-casing on its back, and bore a hole through the partition 14 and close up the port *c*, if desired; or of course Fig. 1 can be made without the port *c*. By cutting a thread in the port 14^a and also in the port 18 in the cap 29 a device, such as the plug 31, may be made to fit both ports, so that by being placed as in Fig. 3 the train-pipe air may be vented into the brake-cylinder, while if removed from the cap 29 and placed in the port 14^a the train-pipe air may be vented to the atmosphere in emergencies.

In Fig. 8 is shown a modification and further improvement. In this figure a cage 32 is inserted between the chambers 16 and 17, and the valve 27 is seated in its upper portion. The stem of the valve 27 extends into a bushing 33, inserted into the casing and so arranged that the air from the reservoir must flow through a port therein on its way to the brake-cylinder. The upper end of the valve-stem is winged, which allows the air to flow past it so long as the valve 27 is seated; but as quickly as the emergency-valve is opened and the train-pipe air strikes the valve 27 on its way to the brake-cylinder the stem is forced upward through the port in the bushing 33, and the solid or round portion of the stem shuts off the flow of reservoir-air to the cylinder so long as the train-pipe air is flowing through the emergency-passage to the cylinder. As quickly as the air ceases to flow from the train-pipe to the cylinder the spring 28, aided also by the reservoir-pressure on the end of the valve-stem, seats the valve 27 and again opens the reservoir to the cylinder and permits a full equalization of pressure between them. In Figs. 8 and 9 also the inner end of the passage e is left permanently open to the triple-valve chamber and auxiliary reservoir, so that the chamber g is in communication with and becomes a part of the auxiliary reservoir. In this construction, therefore, the emergency-piston is actuated by pressure from the auxiliary reservoir to open the emergency-valve instead of being actuated by pressure from the chamber g, which is always in communication with the train-pipe through the port f in the piston, as in Figs. 1, 2, 3, and 4.

In Figs. 8 and 9 I have preferred also to close the charging-port f in the piston 8. In Fig. 9 the cap 13^a takes the place of the cap 13 in the other figures. I prefer also to have the outer bearing of the spring 12 at one side of its inner bearing and more nearly over the center of the port 15, as shown in the drawings.

If it is desired to vent the train-pipe air to the atmosphere with the device shown in Fig. 8, one way in which it may be done is to simply remove the cap 29. The cage 32 and the valve 27 might also be omitted and the partition left between the chambers 16 and 17, as in Fig. 1. Again, the cap 29, valve 27, and spring 28 may be arranged as in Fig. 10 and inserted in Fig. 8 in place of the cap 29. The air from the train-pipe can in this manner be vented to the atmosphere past the valve 27, and the spring 28 can be so adjusted as to retain any desired pressure in the train-pipe, just as may be done with the spring 28 in Fig. 1, supposing that the communication is closed between chambers 16 and 17, as in Fig. 1. With the kind of device shown in Figs. 8 and 9 the slide-valve seat may be constructed either like Fig. 5 or Fig. 7.

It is evident that if the plug 34 be removed from the passage e in Fig. 3 the chamber g will be permanently open to the auxiliary reservoir, Fig. 2, and in that event the port f in the piston 8 should be closed, as in Fig. 9.

From what has been said above it is apparent that I may have any one of three types of valve, which for convenience I shall designate as types A, B, and C, respectively. In type A the train-pipe air is vented to the atmosphere in emergencies, Fig. 1, and the emergency-piston is actuated in direction to open the emergency-valve by pressure from a chamber in constant communication with the train-pipe, Figs. 2 and 4. In type B the train-pipe air is vented into the brake-cylinder in emergencies, Figs. 3 and 8, and the emergency-piston is actuated in direction to open the emergency-valve by pressure from a chamber always open to the train-pipe, Figs. 2 and 4. In type C the train-pipe air is vented into the brake-cylinder in emergencies, Figs. 3 and 8, and the emergency-piston is actuated in direction to open the emergency-valve by pressure from the auxiliary reservoir, as in Figs. 8 and 9, and in Fig. 3 if the passage e were open to the reservoir. Moreover, I may readily convert one of these types into another. For instance, I may construct a valve according to type A, as illustrated in Figs. 1 and 2, operate it in that form for a given length of time, and then convert it into type B by opening communication between the chambers 16 and 17 and closing the port 18, as in Figs. 3 and 4; or I may by making the last-described changes and then opening communication between the inner end of the passage e and the auxiliary reservoir, as in Fig. 8 or Fig. 3, with the plug 34 removed and also closing the port f in the emergency-piston, Fig. 9, convert the device into type C. Again, Figs. 8 and 9, now representing type C, may be constructed with the communication between chambers 16 and 17 closed, the passage e closed, and a port through the piston 8. It would then represent type A, but it could readily be converted into type B or type C by the slight changes herein described.

It will be observed that in all of the types of apparatus illustrated the emergency mechanism is wholly independent of the triple valve, and consequently the operation of the emergency-piston to open the emergency-valve and vent the train-pipe does not depend in any way upon the prior movement of the triple valve. Although I have preferred to show structures in which the triple valve has one traverse during service and another during emergency operations, such construction is not a necessity, since the triple valve may be allowed to have but one traverse, whether the brakes are to be set for service or emergency action, just as in the patent to Massay, No. 447,337, dated March 3, 1891.

I claim—

1. In a quick-action triple-valve mechanism, the combination of two cavities communicating respectively with the atmosphere and the brake-cylinder, a partition between said cavities, an emergency-passage opening from the train-pipe and means for closing or opening the partition between said cavities, whereby the train-pipe air may be vented at one time into the atmosphere and at another time into the brake-cylinder in emergencies.

2. In an automatic fluid-pressure brake system, the combination, with a triple valve, of a casing having two cavities opening respectively to the atmosphere and to the brake-cylinder, an emergency-passage from the train-pipe to one of said cavities and means for controlling the train-pipe air in emergency operations, whereby it may be vented at one emergency action to the atmosphere and at another to the brake-cylinder.

3. In an automatic fluid-pressure brake system, the combination, with a triple valve in a casing, of a bushing in a horizontal chamber underneath the triple-valve chamber, an emergency port or passage in said bushing communicating with the train-pipe, cavities in said bushing communicating with the atmosphere and brake-cylinder, respectively,

and means for controlling the various communications, whereby the train-pipe air may be vented either to the atmosphere or to the brake-cylinder in emergencies.

4. In an automatic fluid-pressure brake system, the combination, with a triple valve for controlling communication between an auxiliary reservoir and a brake-cylinder and a quick-acting valve for controlling communication between a train-pipe and a brake-cylinder, of a supplemental valve device for closing the former communication while the latter communication is open.

5. In a brake mechanism, the combination, with a train-pipe, an auxiliary reservoir and a brake-cylinder, of an emergency-passage leading from the train-pipe to the brake-cylinder, an emergency-valve controlling said passage and normally closing the same, a triple valve controlling a service-passage from the auxiliary reservoir to the brake-cylinder and a valve device in said emergency-passage actuated by air from the train-pipe to close said service-passage, so long as train-pipe air is flowing through said emergency-passage.

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