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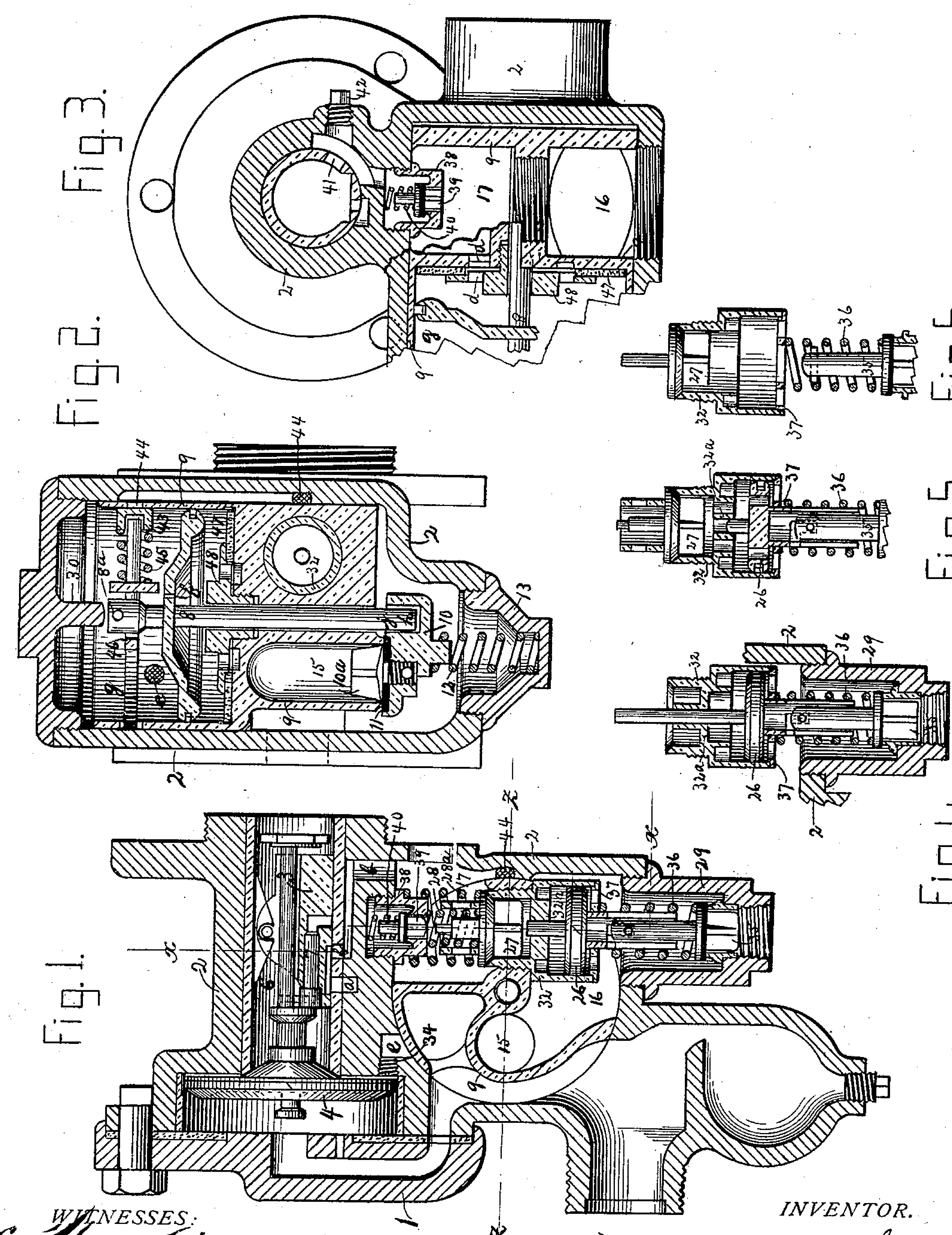
**M. CORRINGTON.**

**AIR BRAKE.**

(Application filed Aug. 31, 1898.)

(No Model.)

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## AIR-BRAKE.

SPECIFICATION forming part of Letters Patent No. 616,288, dated December 20, 1898.

Application filed August 31, 1898. Serial No. 689,966. (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 improvements in a quick-action triple valve, and includes the elements of novelty pointed out in the following specification and more particularly in the claims hereto annexed.

The novel elements of construction illustrated and described are intended more particularly to be employed with and as improvements upon the apparatus of my prior patent, No. 594,464, dated November 30, 1897. It will be observed on reference to said prior patent that the mechanism therein described makes provision for an emergency-passage from the train-pipe and having two possible termini which lead to the brake-cylinder and to the atmosphere, respectively, including, moreover, means for quickly venting the reservoir-pressure to the brake-cylinder in emergencies and means for limiting the amount of train-pipe air which is vented to the atmosphere. In describing the improvements illustrated in the drawings herein I shall refer more or less to said prior patent and shall use, so far as possible, the same reference letters and numerals to denote the same or equivalent elements of mechanism as in said patent.

Referring to the accompanying drawings, Figure 1 is the usual vertical section through a quick-action triple valve. Fig. 2 is an inverted section on the line $z$ $z$ of Fig. 1. Fig. 3 is a section essentially on the line $x$ $x$ of Fig. 1 looking toward the left, some of the operative parts being removed; and Figs. 4, 5, and 6 are sections of a part of Fig. 1, showing modifications of details.

Going first to Fig. 1 the cap 1 closes the chamber of the main-valve body 2, in which the triple valve operates, including the main valve 3, the main-valve-operating piston 4, the spring 6, and the graduating-valve 7. The exhaust-port $a$ leads to the atmosphere and the port $b$ to the brake-cylinder. These are the familiar parts of the Westinghouse triple valve.

The emergency-piston 8, Fig. 2, operates in a chamber of a bushing 9, located, preferably, in a horizontal position underneath and across the triple-valve chamber in a valve-body integral with the triple-valve casing. At the other end of the bushing 9 is the emergency or vent valve 10, having a guide $10^a$ and a rubber seat 11, and normally held in position by the spring 12 to close the mouth of emergency-passage 15. The bushing 9 has two cavities 16 and 17, the latter communicating with the brake-cylinder connection of the triple-valve casing. A cap 30 closes the chamber of piston 8 and a cap 13 closes the opening in the casing over the valve 10.

In a part of the bushing 9 between chambers 16 and 17 a case 32 is inserted having provision made in its lower portion for a piston 26 and in its upper portion for a check-valve 27. The latter valve may be normally seated by either or both of the springs 28 and $28^a$. A cap 29 is inserted in the opening between the chamber 16 and the atmosphere, and a valve 35 controls a port through said cap to the atmosphere. This valve 35 is coupled to the piston 26, so as to be lifted from its seat by the upward movement of said piston, and a spring 36, whose upper end bears on the rest 37 at the lower end of the case 32, is employed to return the piston 26 and valve 35 to normal position. The piston 26 preferably has a stem on its upper side which projects through a partition $32^a$ in the case 32 between the chambers of said piston and the check-valve 27. The partition $32^a$ has two holes made into but not through it for the insertion of a wrench to turn the case 32 into and out of place.

For convenience I have shown the triple valve having but one traverse both in service and emergency actions, so that reservoir-air will go to the cylinder through the passage $b$ in both cases. To provide a second passage for venting reservoir-pressure to the brake-cylinder in emergencies, I insert a valve-case 38 in the casing 2 in line with the movement of the piston 26, Figs. 1 and 3. A valve 39, seated by a spring 40, governs a port through the case 38, and the space above said valve 39 is open to the main-valve chamber and reservoir through the passage 41, Fig. 3.

I may make a still further provision for admitting reservoir-air to the brake-cylinder in emergencies, as shown in Figs. 1 and 2. I arrange a valve 43 over a port or passage 44, leading from the upper side of piston 8 to the brake-cylinder, as shown. This valve 43 is held on its seat by the spring 45 and is coupled operatively to the piston 8 by the lever 46. The space surrounding the valve 10 is freely open to the train-pipe. (See Figs. 1 and 2.) From this space the air goes through the port *d*, Fig. 3, to the right-hand side of piston 8. (Lower side in Fig. 2.) The chamber *g* between the piston 8 and cap 30 may be filled with pressure either by charging air through the small port *f*, Fig. 2, or by removing the plug 34 from the passage *e*, Fig. 1, thus opening the reservoir to the chamber *g* through passage *e*. (See Figs. 1 and 2. See also Figs. 2 and 3 of my said prior patent, No. 594,464.)

The operation of the apparatus is as follows: Air is charged into the train-pipe and thence through the charging-port past the triple-valve piston until the auxiliary reservoir is charged to normal capacity. At the same time, supposing the plug 34 is removed and the port *f* in piston 8 is closed, air will go through passage *e* into chamber *g*, charging the same with normal reservoir-pressure. Train-pipe air will also go through port *d* to the opposite side of piston 8. For a service operation the usual reductions of train-pipe pressure cause the triple valve to move to the left, when the valve 7 admits pressure from reservoir to cylinder through passage *b*. The emergency piston and valve remain stationary, being held there by the spring 12. On the sudden reduction in train-pipe pressure usual for emergency actions the triple valve moves, as before, to open the reservoir to cylinder, and the preponderance of pressure on the upper side of piston 8, Fig. 2, forces it down, opening valve 10 and venting train-pipe air into passage 15 and chamber 16. From this point it flows upward through the rest 37 against the piston 26, lifting said piston upward and opening the valve 35, past which the pressure is vented to the atmosphere. The same upward movement of the piston 26 lifts the check-valve 27 upward, so that its stem opens the valve 39 and allows the reservoir-pressure to flow rapidly to the cylinder. The air will flow out of the train-pipe rapidly past the valve 35, and the spring 26, aided also, it may be, by the springs 28 and 28ª, will very quickly force the piston 26 back to normal position to close the valve 35. I prefer, as a matter of fact, to rely upon the spring 36 to limit the time the valve 35 shall remain open and to employ the spring 28 or 28ª to merely close the check-valve 27; but I have shown all these springs in Fig. 1 in a situation so that their combined action shall tend to return the piston 26 and valve 35 to normal position. It is evident that I may make the spring 36 so stout that no amount of pressure admitted against the piston 26 in the operation of brakes would open the valve 35, and also that I may make it so weak that the piston 26 would remain in position to hold the valve 35 open until practically all the train-pipe air was exhausted to the atmosphere. It is therefore evident that I may so regulate the tension of the spring that I may cause the valve 35 to open and then close as soon as the pressure on the under side of piston 26, and therefore the train-pipe pressure, has fallen to such a point as I may desire. In other words, the piston 26, the valve 35, and the spring 36 make what is virtually a pressure-retaining or safety-valve device to open and allow a portion of the train-pipe air above a determinate pressure to escape and then close the escape-port and retain said determinate pressure in the train-pipe.

A still further means is shown in Fig. 2 of admitting reservoir-air to cylinder in emergencies, as already explained, and the operation is that when the piston 8 is forced downward to open the valve 10 the pin 8ª in the stem of piston 8 engages the lever 46, so that the valve 43 moves across the port or passage 44, through which the reservoir-pressure coming into chamber *g* through passage *e* flows rapidly to the cylinder. It will be observed that this last arrangement is a virtual duplication of the conditions existing with the triple valve. In both there is a piston exposed on one side to train-pipe and on the other side to auxiliary-reservoir pressure. In both there is a slide-valve on the reservoir side of the piston and a port or passage leading to the brake-cylinder and controlled by said valve, and in both, when the train-pipe pressure is sufficiently reduced to cause the piston to be moved in that direction by a preponderance of reservoir-pressure, the piston draws with it the valve, so as to open the port and allow pressure to flow from the reservoir to cylinder. I do not, therefore, claim said last-described construction herein, because I believe it to be obvious, but I merely describe it as capable of operation with the devices which I do claim. The gasket 47, held in position by the nut 48, is for the piston 8 to rest against when forced down by pressure on its upper side.

Looking at Fig. 1 it will be observed that the train-pipe air will go freely through the space between the bushing 9 and the outer casing away from the observer or toward the observer or downward in Fig. 2, so that the space in which the emergency-valve 10 operates will be in free communication with the train-pipe. The same is true of the various figures of my said prior patent, No. 594,464, in which the chamber containing valve 10 is freely charged with train-pipe air. From this chamber the train-pipe air goes through port *d*, Fig. 2 of said prior patent, to the right-hand side of emergency-piston 8. Now the means for getting train-pipe air to the right-hand side of piston 8 herein are the same as in said prior patent, the piston 8 and port *d* representing corresponding parts in the two devices.

Thus far I have supposed that the plug 34 was removed and that the chamber *g* was open to the reservoir through passage *e*, in which case also the port *f* in piston 8 should be closed. Let us now suppose that the passage *e* is closed by the plug 34 and the port *f* is open, remembering that the train-pipe air is freely admitted to the right-hand side of piston 8 through port *d*, as above explained. The train-pipe air will then charge directly through said port *f* into the chamber *g* and the piston 8 will be actuated to open the valve 10 in emergencies by pressure in the chamber *g* in constant communication with the train-pipe. In this condition of operation the valve 43 should be disconnected from piston 8 or the passage 44 closed. As soon as the valve 10 is opened the air quickly escapes from chamber *g* through port *f*, allowing the spring 12 to move the piston back to normal position and close the valve 10.

In my said prior patent, No. 594,464, the valve 10 is operated by the piston 8 by means of a lever shown therein, in which it is necessary that the outer end of the lever shall have a fulcrum or bearing in order that the valve may be lifted from its seat. It is also necessary in that construction to prevent the valve 10 from revolving laterally around the opening 15, else the stem of the piston 8 would pass by the side of the lever and the valve would not be operated. In my improvement herein I dispense with the lever of my said prior patent by making a socket in the valve 10 slightly larger than the diameter of the stem of piston 8 and inserting the stem in said socket. When the proper conditions of pressure above and below piston 8 are established for effecting the emergency operation, the piston starts downward and at first slightly "cants" or "tilts" the valve 10, and thereupon in the early movement of said piston the valve "binds" upon opposite sides of the piston-stem at the points *h* and *j*. The further movement of the piston 8 carries the valve 10 bodily away from the mouth of the passage 15 by a direct thrust. Care must be taken not to make the socket in the valve into which the piston-stem enters too large, else that portion of the valve will be moved so far that the guide $10^a$ will bind on the walls of the passage 15 and the valve will not be opened. The stem of the piston being within the socket of the valve prevents any lateral rotation of the valve about the guide $10^a$.

It will be seen that the check-valve 27 has a central stem and an outside hollow stem. The central portion is for lifting the valve 39 and the hollow portion is for limiting the upward movement of the valve. It will be apparent, I believe, that in so far as opening the valve 39 by the upward movement of the piston 26 goes the stem of the valve 27 may be taken to be a mere prolongation of the upper stem of the piston 26. This becomes clear when we consider Fig. 4, in which the valve 27 is absent and the stem of the piston 26 extends upward far enough to lift the valve 39, provided the apparatus of this figure were put in proper place in Fig. 1. In Figs. 1 and 4 all the air which is vented from the train-pipe escapes to the atmosphere. In Fig. 5 one or more holes are made through the piston 26 and also through the partition $32^a$. When in this device the air from the train-pipe strikes the piston, it lifts it upward and opens the valve 35, as before, but a part of the air at the same time passes through the piston and partition $32^a$ and goes thence past the check-valve 27 to the brake-cylinder. The check-valve is made as in Fig. 1, so that in its upward movement its stem may open the valve 39. With this construction the air vented from the train-pipe may be sent partly to the atmosphere and partly to the brake-cylinder. Care must be taken not to make the holes in the piston 26 too large, else the piston will not be operated to open the valve 35, and of course if the holes be made large enough all the air may be sent to the brake-cylinder and none to the atmosphere. In Fig. 6 the piston 26 has been uncoupled from the valve 35 and removed entirely and the partition $32^a$ bored out. The spring 36 will hold the valve 35 permanently closed and all the air vented through passage 15 will go to the cylinder. One of the advantages of having the check-valve 27 present is that I may operate the mechanism to exhaust the train-pipe air to the atmosphere for any desired length of time, and thereafter exhaust to the cylinder, either partly or wholly, without adding any new parts. If the train-pipe air is to be exhausted partly to the cylinder, holes may be bored in piston 26 and partition $32^a$, or if it is to be exhausted wholly to the cylinder the piston 26 may be removed and the part 32 taken out and again replaced after the partition $32^a$ is bored out. In Fig. 4 the check-valve is wanting, but its seat has been prepared in the upper part of case 32. The lower part of the port through the cap 29 is threaded, so that instead of depending upon the valve 35 to close said port when the air is to be vented wholly to the brake-cylinder that valve may be removed and a plug screwed into the threaded port. If the upper stem of piston 26 in Fig. 1 is made as short as in Fig. 5, it will not strike the valve 27, which will therefore remain permanently seated, and in such case the valve 39 will not be opened. Again, if the piston 26 be removed from Fig. 1 the hole through the partition $32^a$ now filled by the piston-stem will establish an opening from passage 15 to the brake-cylinder. Its size would of course depend upon the size of the stem which it was made to accommodate. In cases where it is not desired to open the valve 39 by the upward movement of the piston 26 I much prefer that the stem of said piston be made so short that it will not touch the check-valve 27, as shown in Fig. 5. Then in the emergency action the piston 26 will open the valve 35, but will be returned wholly by the spring 36, unaided by the springs on the check-valve. As quickly as the valve 35 is closed any remaining pressure in chamber 16 will leak gradually past piston 26, establishing equilibrium above and below it, so that there will be no danger of lifting the piston 26 and opening valve 35 when the train-pipe is charged for releasing brakes under those conditions of pressure in which the valve 10 remains open. It will be observed, therefore, that as quickly as the emergency or vent valve 10 is opened two possible lines of flow are established for the train-pipe air—one leading to the atmosphere and the other to the brake-cylinder—that a secondary valve is located in the former of these and a piston in the latter, which may open the secondary valve on the opening of the emergency or vent valve, and that a spring or springs may be employed to close the vent to the atmosphere as soon as the train-pipe air has fallen to a predetermined pressure.

I claim—

1. In a quick-action automatic brake mechanism the combination of an emergency or vent valve for venting the air from the train-pipe, a passage controlled by said valve and leading by one branch to the atmosphere and by another branch to the brake-cylinder, respectively, a secondary valve located in the branch passage from the vent-valve to the atmosphere, a piston-chamber forming part of the branch passage from the vent-valve to the brake-cylinder for accommodating a piston for opening said secondary valve on the opening of the vent-valve, and means for returning said piston and secondary valve to their normal positions on the train-pipe pressure falling to a predetermined point.

2. In a quick-action automatic brake mechanism, the combination of an emergency or vent valve for venting the air from the train-pipe, a passage controlled by said valve and leading by one branch to the atmosphere and by another branch to the brake-cylinder, respectively, a secondary valve located in the branch passage from the vent-valve to the atmosphere, a valve for controlling the admission of reservoir-air to the brake-cylinder, a piston-chamber forming part of the branch passage from the vent-valve to the brake-cylinder for accommodating a piston for opening both said last two mentioned valves, and means for returning said piston and valves to normal position.

3. In a quick-action automatic brake mechanism, an emergency or vent valve for venting the air from the train-pipe, an emergency-piston for imparting opening movement to the same, a socket in the valve, a spring for closing said valve whose bearing is at one side of the socket, a stem on the piston extending within said socket in such manner that the movement of the piston first "cants" the valve, and then causes it to bind upon the stem and move bodily and directly away from its seat.

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Witnesses:

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