No. 644,356. Patented Feb. 27, 1900.

M. W. HIBBARD.

FLUID PRESSURE BRAKE.

(Application filed Oct. 21, 1899.)

(No Model.)

Fig. 1.

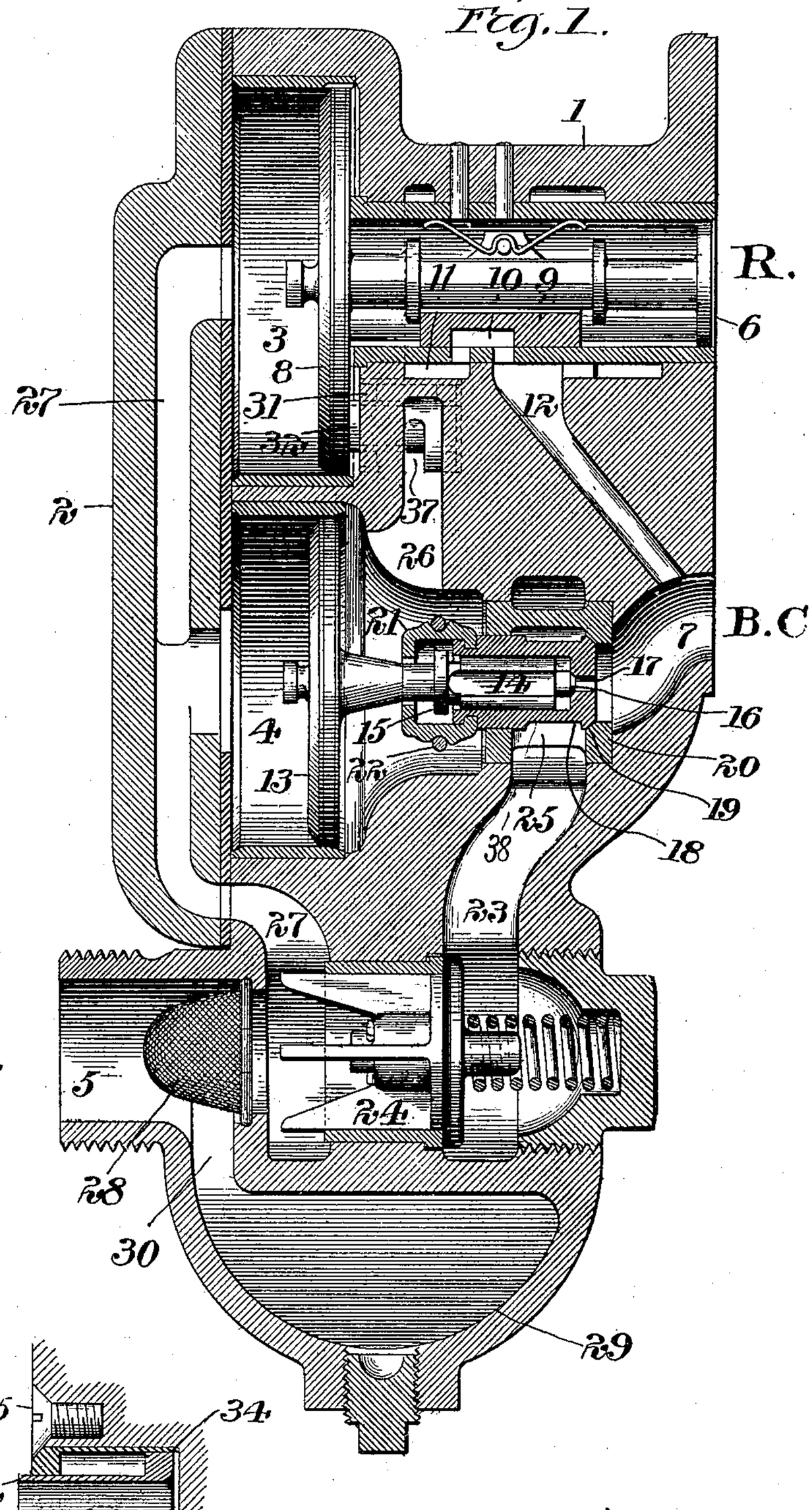
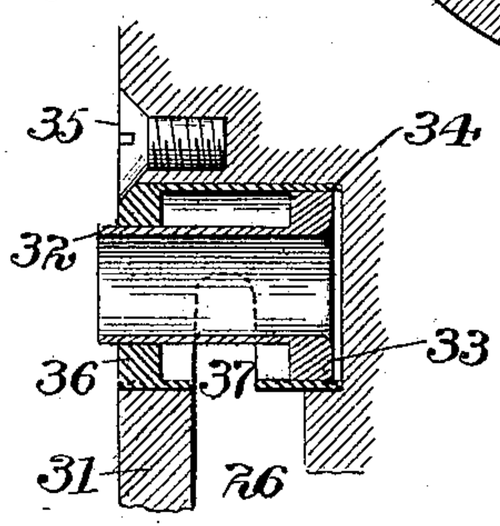


Fig 2



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UNITED STATES PATENT OFFICE.

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FLUID-PRESSURE BRAKE.

SPECIFICATION forming part of Letters Patent No. 644,356, dated February 27, 1900.

Application filed October 21, 1899. Serial No. 734,326. (No model.)

To all whom it may concern:

Be it known that I, MAURY W. HIBBARD, a citizen of the United States, and a resident of Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Fluid-Pressure Brakes, of which the following is a specification.

My invention has application to that type of valve device for actuating fluid-pressure brakes in which the brake-release mechanism and the service and emergency mechanism are separate and independent from each other, both physically and operatively; and its object is mainly to simplify the construction of such a device, reduce the number of its parts, and perfect the reliability of its action.

In the accompanying drawings, Figure 1 is a central vertical sectional elevation of my valve device, and Fig. 2 a section of a detail part thereof.

The casing 1, which has a cap or cover 2, is provided with two chambers 3 and 4, respectively, for the movable abutments, (pistons or diaphragms, as desired,) which in the drawings are shown as pistons. The casing has the usual connections with the train-pipe at 5, (denoted by T P,) with the reservoir at 6, (denoted by R,) and with the brake-cylinder at 7, (denoted by B C.) Within the chamber 3 travels the brake-release piston 8, actuating the brake-release valve, which is shown as a slide-valve 9, provided with a recess 10, governing the exhaust-port 11 and port and passage 12, leading from the brake-cylinder through passage or connection 7. Within the chamber 4 travels a piston 13, which is provided with a stem having a fluted or grooved portion 14 and having the flange or enlargement 15. The extreme free end 16 of the stem forms the service-valve proper and seats upon and controls the port 17 in the hollow emergency-valve 18, which in turn is seated (except in emergency action) on a seat 19, preferably formed on a separate bushing 20, inserted in the chamber 4 at its connection or passage 7, communicating with the brake-cylinder. A split collar 21, held together by a ring 22, surrounds the stem and its flange 15 and is secured to the inner end of the emergency-valve substantially as shown, although any other obvious construction for the purpose designed, such as forming the inner end of the emergency-valve with a chamber in which the flange 15 may have movement without affecting the emergency-valve, may be adopted. The annular space shown between the stem and the collar permits of the passage of reservoir-air in the service action. The casing has a passage 23 between the train-pipe and brake-cylinder and governed in one direction by the check-valve 24. This direct passage to the brake-cylinder extends through the passage 25 in the bushing 20, but is normally closed at this point by the emergency-valve. A port or passage 26 communicates between the reservoir and the chamber 4 on the reservoir side of the piston 13. The train-pipe air is led from the train-pipe nozzle or connection 5 through passage 27 into chambers 3 and 4 independently and on the train-pipe side of these pistons, respectively. A strainer 28, having its apex directed against the air feeding through the device, is located in the train-pipe nozzle or connection 5 to strain or deflect any dust or dirt before the air reaches the interior of the casing. A chamber 29 is formed on the lower part of the casing as a drain-cup, and the same has an opening 30, communicating with the train-pipe nozzle immediately below the strainer and communicating with the train-pipe air before such air passes the strainer, so that the deflected dirt may fall into the cup. This cup forms a trap, inasmuch as it is outside of the path of the train-pipe air and unaffected thereby, such cup connecting with the train-pipe only through the contracted throat or passage 30.

The two pistons are independent, and the piston 3 is preferably made of slightly-larger area, so that the same reduction in pressure will have a greater and earlier effect on it than on the other piston, causing such release-piston to move first, thereby producing a consecutive order of movement of the pistons. However, as a matter of abundant precaution (rather than as a matter of necessity) to guard against even remote possibilities, such as the sticking of the release-valve piston from any cause, means may be provided in the passage 26, which communicates between the reservoir sides of the two pistons, to cause such

release-valve piston to move prior to the admission of reservoir-air into the brake-cylinder, although the service-valve piston may have moved to open the service-port. Such means are arranged in the inner wall 31 of the chamber 3 and on the reservoir side of the piston 8; but the same do not appear in full lines on the central vertical section of Fig. 1, because arranged at one side of such central line, but is shown in such figure in dotted lines. As shown, such means comprise simply a tube 32, open at both ends and having a flanged rim 33, movable in a bushing 34, which may be simply pressed into a cavity or chamber at the upper end of passage 26, where it communicates with the chamber 3, or else it may be held in, as shown, by a screw 35, screwing into the wall 31 of the casing 1 and against the bushing. Simply pressing the bushing into such chamber or cavity will be found sufficient. This bushing at its outer end has an inturned annular flange 36, through which the tube 32 is adapted to operate, and also has a port or passage 37 through its side, communicating with the passage 26.

The parts being in their normal position shown and the reservoir charged in the usual and well-known manner past the release-valve piston, upon a reduction of train-pipe pressure for service action the release-valve piston will make its full travel outward to close the brake-release and the service-piston will unseat the service-valve. The reservoir-air will then flow from the reservoir through passage 26, through the split collar and the grooves on the stem, and thence through the open service-port to the brake-cylinder, producing the usual service application of the brakes. In case said precautionary means be employed in the communication 26 between the reservoir sides of the pistons the reduction of reservoir-pressure in chamber 4 caused by the opening of the port to the brake-cylinder will cause the reservoir-air to act on the right of the rim flange or piston 33 and move the tube to the left, thereby establishing a free communication between the reservoir and brake-cylinder through the tube 32, passages 37 and 26, and through the service-port, but only after the brake-release piston has moved. Until the brake-release has thus moved the reservoir-air is choked or prevented from entering the brake-cylinder. There is, therefore, no danger of exhausting the reservoir to atmosphere in case the release-valve piston should stick, although there might be a small flow of reservoir-pressure, as the tube is not designed to be air-tight. When the air flowing to the brake-cylinder has reduced the reservoir-pressure below the train-pipe pressure, the service-valve piston will move back to seat the service-valve. On further reduction of train-pipe pressure the same action occurs until equalization between the reservoir and brake-cylinder results. Upon restoration of train-pipe pressure the brakes will be released and the service-valve seated. Upon a reduction for emergency action the release-valve piston will make its usual travel, which is the same as in service action, to close off the exhaust, and the other piston will make a full travel, so as to cause the flange on its stem to contact the split collar and lift the emergency-valve from its seat, at the same time closing the annular space before referred to, thereby causing the reservoir-air to accumulate to quicken the action of the piston 13 in lifting the emergency-valve. Simultaneously the train-pipe air will lift the check-valve and flow to the empty brake-cylinder through the brake-cylinder port thus fully opened by the emergency-valve. This pressure in the brake-cylinder will be augmented by the reservoir-pressure, which will flow rapidly through the grooves 38 on the exterior of the emergency-valve, which grooves are carried beyond the bushing and will enter the brake-cylinder. Upon restoration of train-pipe pressure the parts will assume their normal position. (Shown in the drawings.)

In this device the construction and operation of the parts, which are reduced to a minimum number, is most simple in character, thereby contributing to the efficiency of the mechanism. Moreover, the usual springs for the movable abutments may be dispensed with, and the device illustrated contains no springs whatever except a check-valve spring, which is not concerned in the delicate operations, and consequently the movable abutments are actuated in both directions solely by fluid-pressure.

It is required in actual practice that quick action shall occur upon a train-pipe reduction of ten pounds or more, but not under that amount. In my device the area of the service-piston and that of the emergency-valve is so proportioned, taking the friction also into account, that the piston will not lift it from its seat unless a reduction of at least ten pounds pressure is made in the train-pipe, whereby quick action cannot occur unless this differential of ten pounds exists between the pressure on the two faces of the piston. When from any cause the brake-release piston should thus fail to move, but the other piston should operate as usual to open the service-valve, only that pressure on the right of the service-valve piston will be admitted to the brake-cylinder, (which pressure when admitted will exhaust to atmosphere, because the release-port is supposed to be open,) and consequently the normal reservoir-pressure will be retained by the choke-off device to act against the brake-release piston, so that such piston will have the full benefit of all train-pipe reductions, which will eventually, if possible to move it at all, cause it to move regardless of the operation of the service-valve. To guard against such improper admission of reservoir-air and the exhaust to atmosphere under such conditions and to compel or at least to urge the movement of the brake-release piston by failure to move at a train-pipe

reduction which should ordinarily cause it to move, are the main objects of the choke-off device, which device is of course used to provide against remote contingencies and not as an element essential to the practical operation of the valve device.

Although I have described more or less precise forms and details of construction, I do not intend to be understood as limiting myself thereto, as I contemplate changes in form, the proportion of parts, and the substitution of equivalents, as circumstances may suggest or render expedient and without departing from the spirit of my invention.

I claim—

1. In a railway-brake-actuating device of the type in which a movable-abutment-actuated release-valve and a movable-abutment-actuated service-valve are independent of each other, the combination, with said valves, of means for causing the full train-pipe reduction to affect the abutment of the release-valve and cause it to move regardless of the operation of the service-valve and the consequent opening of such latter valve, the movement of said means to permit the passage of auxiliary reservoir-pressure being dependent upon the movement of the service-valve.

2. In a railway-brake-actuating device of the type in which a movable-abutment-actuated release-valve and a movable-abutment-actuated service-valve are independent of each other, the combination, with said valves, of means for holding substantially the full reservoir-pressure against the release-valve abutment until such latter abutment operates its valve, the service-valve operating independent of any movement of the release-valve, the opening of said means being dependent upon the movement of the service-valve.

3. In a railway-brake-actuating device of the type in which the brake-release valve and service-valve are independent, the combination, with said valves governing respectively the brake-release ports and the brake-cylinder port, of movable abutments for actuating them, and means for choking or preventing the flow of reservoir-pressure through the brake-cylinder port until the brake-release valve has closed the exhaust, the opening of said means being dependent upon the movement of the service-valve.

4. In a railway-brake-actuating device of the type in which the brake-release valve and service-valve are independent, the combination, with said valves, of movable abutments for actuating them, and means in the route of the reservoir-air to the brake-cylinder and physically independent of the release-valve abutment for assuring the closing of the exhaust from the brake-cylinder before the admission of pressure thereto.

5. A railway-brake-actuating device having a brake-release valve independent of the service and emergency valves, the emergency-valve governing, in emergency action, both the reservoir and train-pipe pressure through a port to the brake-cylinder, independent movable abutments for operating the release-valve and for operating the service and emergency valves, the abutment of the service and emergency valves being operated and controlled in all its movements solely by fluid-pressure in a train-pipe reduction for service action, the service-valve abutting the emergency-valve and halting until a sufficient reduction is made in train-pipe pressure to produce emergency action.

6. In a railway-brake-actuating device, a drain-cup formed on said device and having a single constricted port or opening communicating with the train-pipe nozzle of the device, but outside the path of flow of the train-pipe air and unaffected thereby whereby a trap is formed, in combination with a substantially-conical strainer pointing against the direction of incoming air and located in said nozzle substantially above said port or opening, whereby dust, dirt, &c., striking the strainer will drop into said drain-cup and remain trapped therein without disturbance by the flow or current of the train-pipe air.

7. In a device for actuating fluid-pressure brakes, the combination, with a casing having a chamber with ports communicating with the auxiliary reservoir and with the brake-cylinder, of a hollow emergency-valve normally seated in the brake-cylinder port and having a service-port communicating with the brake-cylinder port, a movable abutment within such casing and having a stem movable within the emergency-valve and whose free end normally closes said service-port, a flange or enlargement on the stem, the emergency-valve having a hollow portion surrounding the said stem and its enlargement, but having a passage between the stem and such surrounding portion for reservoir-air and means for releasing the brake-cylinder.

8. In a device for actuating fluid-pressure brakes, the combination, with a casing having a chamber with ports communicating with the auxiliary reservoir and with the brake-cylinder, of a hollow emergency-valve normally seated in the brake-cylinder port and having a service-port communicating with the brake-cylinder port, a movable abutment within such casing and having a stem movable within the emergency-valve and whose free end normally closes said service-port, such stem having a surface groove for the passage of reservoir-air, a flange or enlargement on the stem, a collar secured to the inner end of the emergency-valve and surrounding the stem and its flange but providing an annular space around the stem for the passage of reservoir-air and means for releasing the brake-cylinder.

9. In a device for actuating fluid-pressure brakes, the combination, with a casing having a chamber with ports communicating with the auxiliary reservoir and with the brake-

cylinder, of a hollow emergency-valve normally seated in the brake-cylinder port and having a service-port communicating with the brake-cylinder port, a movable abutment within such casing and having a stem movable within the emergency-valve and whose free end normally closes said service-port, a flange or enlargement on the stem, a split collar secured to the inner end of the emergency-valve and surrounding the stem and its flange but leaving a space around the stem for the passage of reservoir-air in service action, and means for releasing the brake-cylinder.

10. In a railway-brake-actuating device of the type in which the brake-release valve and service-valve are independent and located in separate chambers in a casing, the combination, with such a casing, of movable abutments in said chambers respectively, a passage communicating between said chambers for the flow of reservoir-pressure with its end in the form of a chamber or enlarged passage next to the release-valve chamber on the reservoir side of its abutment and a tube having a flanged rim at its inner end and movable in said chamber or enlarged passage to govern such reservoir-pressure passage, said tube choking such pressure in case the release-valve should fail to move in advance of the service-valve.

11. In a railway-brake actuating device, a release-valve and a service-valve, abutments for operating such valves, in combination with means for preventing the normal free flow of pressure from the reservoir if the release-valve should fail to operate and thus fail to close the brake-release, the opening of such means to permit the flow of reservoir-pressure being controlled by the opening of the service-valve, the service-valve being capable of movement according to train-pipe reductions and independent of the fact whether the release-valve operates or not.

12. A railway-brake-actuating device having a movable-abutment-actuated release-valve, and a service and an emergency valve both actuated by another and single abutment affording no communication between its two faces, and controlled solely by fluid-pressure, a slight reduction in train-pipe pressure moving the service-valve to abut the emergency-valve until a further reduction is made and on a further reduction lifting the emergency-valve.

13. In a railway-brake-actuating device, a release-valve and a service-valve, abutments for operating such valves, the service-valve abutment being always exposed on one side to reservoir-pressure, in combination with means for preventing the normal free flow of pressure from the reservoir if the release-valve should fail to operate and thus fail to close the brake-release, the service-valve being movable according to train-pipe reductions and independent of whether the release-valve operates or not.

14. In a railway-brake-actuating device of the type in which the brake-release valve and service-valve are independent, the combination, with said valves governing respectively the brake-release ports and the brake-cylinder port, of movable abutments for actuating the valves and always exposed on one side to reservoir-pressure, and means for choking or preventing the flow of reservoir-pressure through the brake-cylinder port until the brake-release valve has closed the exhaust.

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