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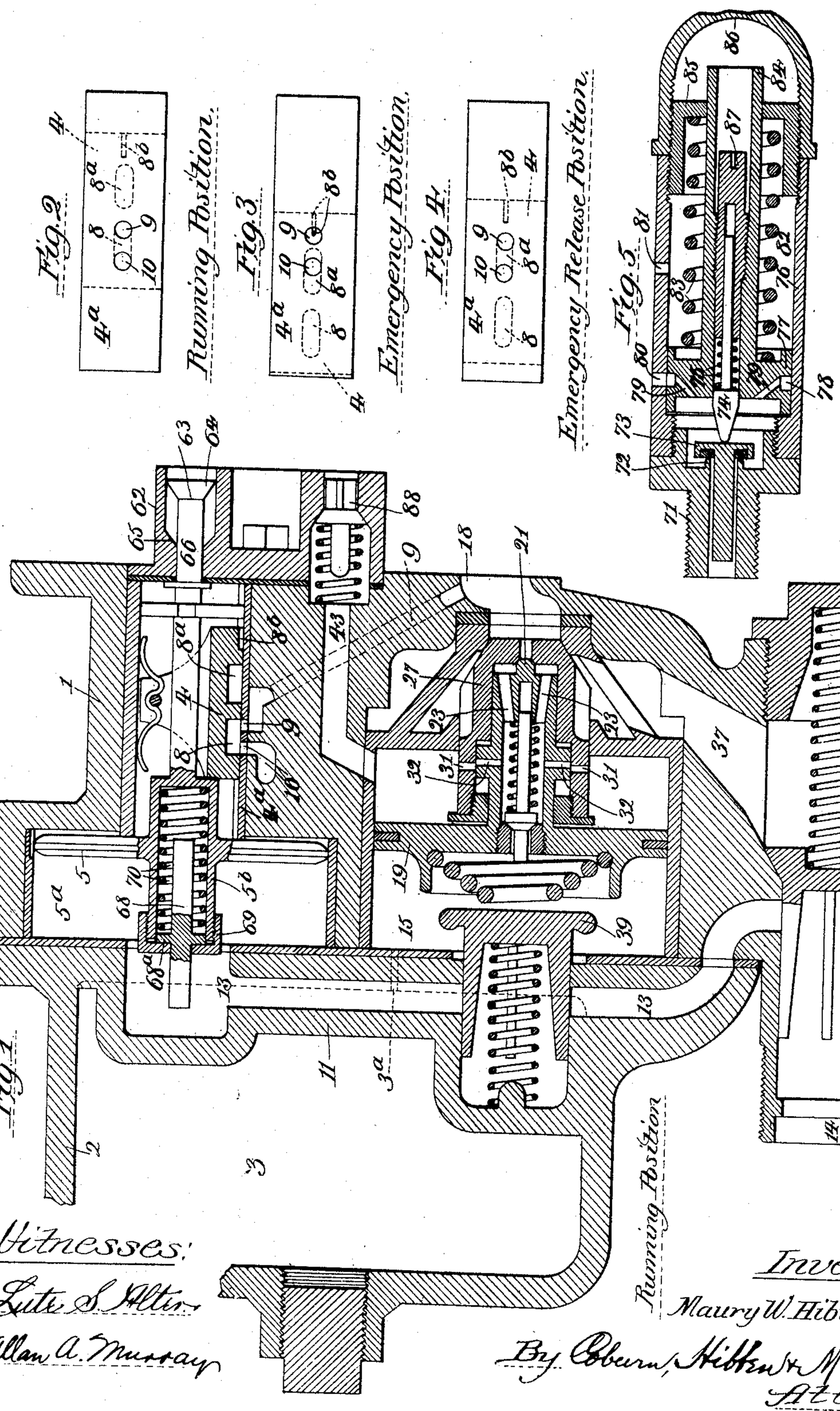
M. W. HIBBARD.

METHOD OF OPERATING FLUID PRESSURE BRAKES.

(No Model.) (Application filed Sept. 2, 1898.)



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UNITED STATES PATENT OFFICE.

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METHOD OF OPERATING FLUID-PRESSURE BRAKES.

SPECIFICATION forming part of Letters Patent No. 619,570, dated February 14, 1899.

Application filed September 2, 1898. Serial No. 690,084. (No model.)

To all whom it may concern:

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

My invention has relation to the art of fluid-pressure brakes; and it consists in a new and useful method of operating such brakes.

For the purpose of describing my method with clearness and precision I have filed herewith a drawing of a device in which the different steps of my method or process may be shown; but it will be understood that such drawing is employed only for the purpose above indicated and not with the intention of any limitation upon my method.

In running trains of cars at a high speed and in making stops at such speed it is particularly desirable to set the brakes with a very heavy initial tension, and as the speed is reduced to release the tension proportionate to the decrease in speed of the train, so as to prevent the sliding of the wheels. At the same time it is desirable to hold the pressure in the auxiliary reservoir for further application of the brakes, and it is also desirable to speedily release the brakes after the train has come to a stop.

My method of operating fluid-pressure brakes consists, in general terms, of releasing the brake-cylinder by restoration of train-pipe pressure to an amount less than the auxiliary-reservoir pressure—that is, independently of auxiliary-reservoir pressure.

Heretofore in the operation of brakes it has been necessary to restore the train-pipe pressure to equal the pressure of the auxiliary reservoir, which in emergency action is very high. This method of operation is objectionable in that it is impossible to speedily release the brakes and allow the train to proceed.

In the drawings, Figure 1 represents a section of a device for actuating fluid-pressure brakes; Figs. 2, 3, and 4, detail views showing the different positions of the release-valve upon its seat in different conditions of the brakes, and Fig. 5 a sectional view of a blow-down device for releasing the brake-cylinder pressure to a predetermined amount.

Referring to the accompanying drawings, the main casing 1 has a hollow cap 2, forming a chamber 3, and is provided with an upper chamber 5^a, designated the "release-chamber," and with a lower chamber 15, designated the "emergency-chamber." The piston 19 travels in the chamber 15 and actuates the service-valve 21. The emergency-valve 27, together with the service-valve, controls the passage 18, leading to the brake-cylinder, and governs the flow to the brake-cylinder of auxiliary-reservoir pressure through the passage 43 and of train-pipe pressure through nozzle 14, past check-valve 38, and through passage 37. The train-pipe pressure feeds into chamber 15 upon the left of piston 19, Fig. 1, through passage 13 and past the part 39, and such chamber also connects with the chamber 3 through the small port 3^a, which penetrates the cap 2. The piston 5 operates in the larger diameter of the release-chamber and actuates a slide-valve 4, which works upon a bushing or valve-seat 4^a in the smaller diameter thereof. The train-pipe is in communication with the release-chamber at the left of the piston 5, Fig. 1, through the passage 13, and the auxiliary reservoir is fed in the well-known manner through the usual by-port. The slide-valve has a recess 8 to normally connect port 9 from the brake-cylinder with the release-port 10, which ports terminate upon the face of the valve-seat. The slide-valve is provided with a second recess 8^a and also with a groove or end slot 8^b.

It will be understood that obvious changes may be made in the relative location and arrangement as well as in the number of the ports and recesses.

The entrance from the release-chamber to the auxiliary reservoir is provided with an end piece 62, which has a passage governed by what I will term an "auxiliary-reservoir check-valve" 63. This valve has a truncated conical head 64, adapted to fit into a recess or cavity 65 of similar shape, forming a valve and its seat. The stem 66 of this valve may be made triangular, and the head has a loose fit in the end piece, so as to permit the pas-

sage of fluid under pressure into the auxiliary reservoir in the feeding operation when the valve is open.

The piston 5 has a hollow projecting stem 5^b, and its stem on the right, Fig. 1, is also made hollow, as clearly shown in the drawings. A plunger-rod 68, having a flange or shoulder 68^a, travels in the hollow stems and is held therein by an end cap 69, which is screwed upon the stem 5^b. This rod is adapted to work against the tension of a coiled spring 70, located within the hollow stem.

The blow-down device comprises a plug 71, adapted to be screw-fixed or otherwise secured in the oil-port of the brake-cylinder, or it may be fixed in the casing 1 of the valve device or in any other way, so as to have direct communication with the brake-cylinder or its passages. In the drawings I have shown such blow-down device as a separate part, with its screw-threaded end, which can be inserted in the usual oil-port of the brake-cylinder or otherwise, as above indicated. This plug 71 has a central bore terminating in a valve-seat 72, upon which is seated the valve 73. This valve is normally forced to its seat by the contact of a stem 74, which is held thereagainst by a spring 75. A casing 76 is screwed to the plug and is provided with a chamber, in which a piston 77 travels. This piston has an annular groove 78, connecting, respectively, with passages 79 in the piston and the exhaust-port 80. The port 81 is formed in the casing to connect the chamber 82 at the right of piston 77, Fig. 5, with the atmosphere. A spring 83 surrounds the stem 84 of the piston and abuts at one end against the piston and at the other end against a cup 85, screw-fixed to the casing 76. This cup governs the tension of the spring 83, and the screw 87 governs the tension of spring 75. A cap 86 closes the outer end of the device and acts as a lock-nut for the cup.

The passage 43 from the auxiliary reservoir to the emergency-chamber 15 may, if desired, be provided with a check-valve device 88, although such device is not essential and may be dispensed with, if desired. It may be used as a matter of precaution to prevent any pressure that may leak past the operating parts in chamber 15 from entering the auxiliary reservoir and which might otherwise prevent the proper operation of the valve mechanism.

In running the train at ordinary speed a pressure of seventy pounds is usually maintained in the train-pipe and the auxiliary reservoir and a pressure of ninety pounds in the main or locomotive reservoir. This pressure will actuate brakes satisfactorily at ordinary speed and will ordinarily give a pressure of about fifty pounds in the brake-cylinder in service stops and about sixty pounds in emergency stops.

In running at high speed the full ninety pounds or a higher pressure will be admitted to the train-pipe and auxiliary reservoir. This will give in emergency action about eighty pounds or more in the brake-cylinder, and the pressure-reducing valve or blow-down device will reduce this pressure to a predetermined amount as the train stops, and eighty pounds or more pressure will be retained in the auxiliary reservoir.

In running with seventy pounds in the auxiliary reservoir a reduction of eight pounds, more or less, is made in the train-pipe to set for service action. The piston 5 will move outward and the stem 68 abut rib 11, the spring 70 around the stem being of such resistance as to prevent the piston 5 from moving farther unless a greater reduction than eight pounds is made in the train-pipe. This travel of the piston will cause the recess 8 in the slide-valve 4 to close the ports 9 and 10 from the brake-cylinder and atmosphere, respectively. The service-valve 21 will then open and permit fluid under pressure to flow from the auxiliary reservoir through passages 43, 31, 32, 23, and 18 to the brake-cylinder, thereby setting the brakes with a tension proportionate to the train-pipe reduction.

The blow-down device may be adjusted to relieve the pressure in the brake-cylinder above any predetermined amount. If in service action a pressure in excess of such amount is admitted to the brake-cylinder, the valve 73 will lift and permit fluid under pressure to flow through passages 79, groove 78, and exhaust-port 80 to the atmosphere, thereby relieving the brake-cylinder of excess pressure and preventing the sliding of the wheels in service action.

When an emergency reduction is made in the train-pipe, the emergency-valve 27 admits auxiliary-reservoir pressure and train-pipe pressure to the brake-cylinder. The great reduction produced in the train-pipe pressure will cause the piston 5 to make its full travel, forcing rod 68 inward and carrying with it the slide-valve 4, so that the recesses 8 and 8^a will be in the position shown in Fig. 3, when none of the ports will be connected. The travel of the stem of the piston 5 will permit the valve 64 to close communication between the chamber 5^a and the auxiliary reservoir, and the slot 8^b in the slide-valve 4 will connect with passage 9, which will produce an equalization between the brake-cylinder pressure and the pressure in the release-valve chamber on the inner side of piston 5.

During the emergency application of the brakes, the emergency-valve having closed the communication between the auxiliary reservoir and the brake-cylinder owing to the pressure in the expansion-chamber 3 and the valve 64 having closed the auxiliary reservoir from the release-chamber, the high emergency pressure will be maintained in the auxiliary reservoir and the pressure in the release-chamber will equalize with that in the brake-cylinder, whose pressure will be reduced by the blow-down device in proportion to the decrease in speed of the train. The pressure in

the release-chamber on the inner side of piston 5 is now reduced to brake-cylinder pressure—that is to say, fifty pounds, assuming that the blow-down device is set at such pressure. Therefore when the train stops the pressure will stand at seventy or eighty pounds or more in the auxiliary reservoir and at fifty pounds in the brake-cylinder.

To release the brake, the pressure in the train-pipe need not be increased to the auxiliary-reservoir pressure, but is increased to brake-cylinder pressure. Thereupon the piston 5 will move inward and carry slide-valve 4, allowing the recess 8^a to connect passages 9 and 10, as shown in Fig. 4, which is the emergency release position, and the pressure will be exhausted from the brake-cylinder and the brakes will be released by a low train-pipe pressure. The stem 66 of the auxiliary-reservoir check-valve is of such length as to permit the inner end of the stem of the piston 5 to abut it when recess 8^a connects the passages 9 and 10, and the piston may be held to that position until the pressure in the train-pipe equals the auxiliary-reservoir pressure, whereupon the piston will move inward its full travel to the position illustrated in Figs. 1 and 2.

In emergency action the blow-down device operates as follows: The high pressure in the brake-cylinder will lift the valve 73 from its seat and force piston 77 outward until its stem abuts cap 86. This will cause groove 78 in the piston to pass exhaust-port 80, whereupon the pressure will slowly leak around the outside of the piston into chamber 82 and to the atmosphere through port 81. As the pressure is reduced the spring 83 will slowly return the piston inward until the groove registers with the exhaust-port 80, when the pressure will pass through the passages 79 into the groove and through port 80 to the atmosphere.

It is obvious that the blow-down device may be adjusted to permit the brake-cylinder to be released by any predetermined train-pipe pressure.

My method or process of actuating railway-brakes, therefore, consists in admitting fluid under pressure from the auxiliary reservoir and train-pipe to the brake-cylinder, (producing a high initial pressure in the brake-cylinder,) retaining a high pressure in the reservoir, reducing the pressure in the brake-cylinder proportionate to the decrease in velocity of the car-wheels, and then releasing the brakes with train-pipe pressure against reduced brake-cylinder pressure.

I do not herein claim the apparatus disclosed in this application, as the same is made the subject-matter of a separate application, filed by me on July 21, 1898, Serial No. 686,486, for a device for actuating fluid-pressure brakes.

I claim—

1. The method of operating fluid-pressure brakes which consists in admitting fluid under pressure to the brake-cylinder, closing the brake-release by auxiliary-reservoir pressure opposed to reduced train-pipe pressure, retaining the high equalized pressure in the auxiliary reservoir, reducing said pressure opposed to said train-pipe pressure and releasing the brakes by a restoration of train-pipe pressure to an amount less than the pressure retained in the auxiliary reservoir.

2. The method of operating fluid-pressure brakes which consists in admitting fluid under pressure to the brake-cylinder, retaining the high equalized pressure in the auxiliary reservoir, reducing the brake-cylinder pressure and releasing the brakes by restoration of train-pipe pressure to an amount slightly in excess of the brake-cylinder pressure.

3. The method of operating fluid-pressure brakes which consists in admitting auxiliary-reservoir pressure and train-pipe pressure into the brake-cylinder, retaining the high equalized pressure in the auxiliary reservoir, reducing the brake-cylinder pressure to a predetermined amount and then releasing the brake-cylinder by restoration of train-pipe pressure to an amount equal to the reduced brake-cylinder pressure, independently of auxiliary-reservoir pressure.

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