(No Model.)

J. T. HAYDEN.

FLUID PRESSURE BRAKE.

No. 496,200. Patented Apr. 25, 1893.

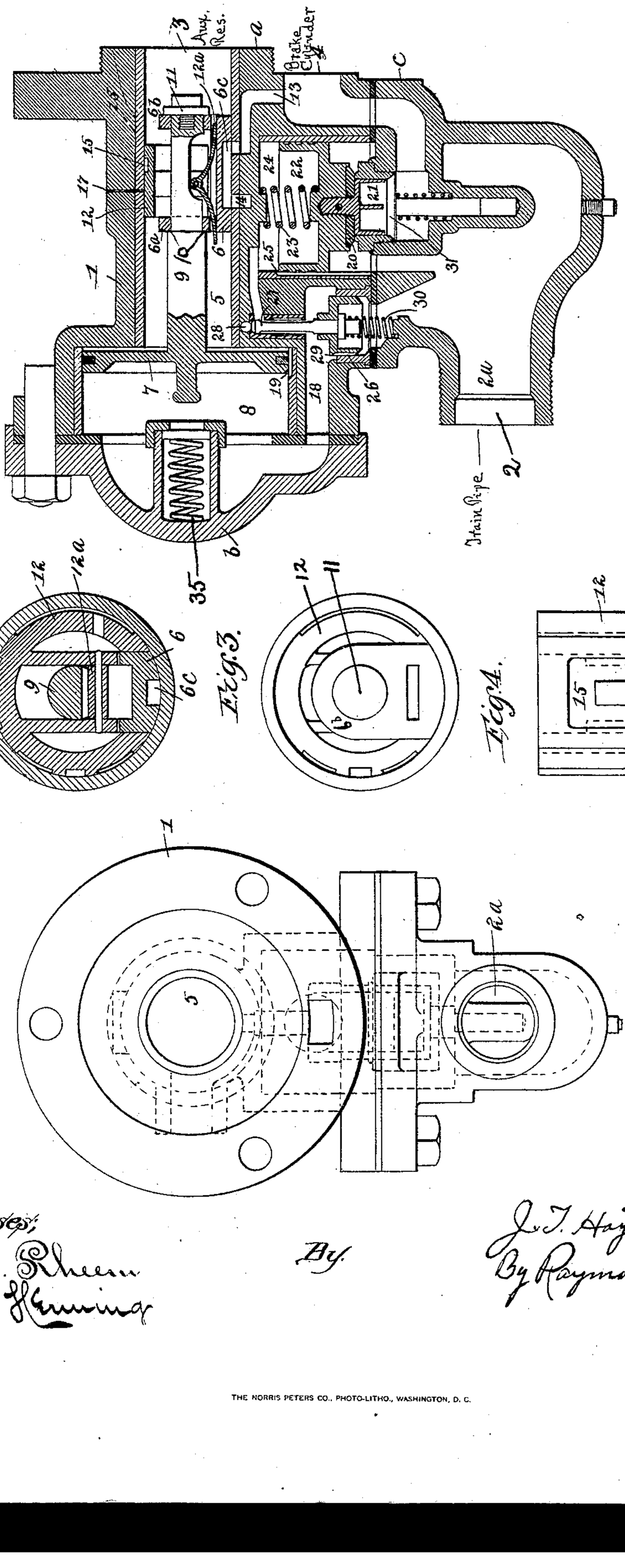

Fig. 5.

Fig. 2.

Fig. 3.

Fig. 4.

Fig. 1.

Witnesses;
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UNITED STATES PATENT OFFICE.

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FLUID-PRESSURE BRAKE.

SPECIFICATION forming part of Letters Patent No. 496,200, dated April 25, 1893.

Application filed July 2, 1892. Serial No. 438,776. (No model.)

To all whom it may concern:

Be it known that I, JAMES T. HAYDEN, a citizen of the United States, residing at 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, reference being had to the accompanying drawings.

My invention relates more especially to the class of devices known as triple valves which are employed in fluid pressure brake apparatus for controlling the admission and exhaust of fluid to and from the brake cylinder.

It also relates to a device for quickening the application of the brakes.

The valve herein illustrated is intended to work in the manner of the usual automatic air brake; that is to say, it is so constructed that its action is controlled by varying the pressure of fluid in the train-pipe, a reduction of the pressure therein causing the triple valve to admit fluid pressure to the brake-cylinder, the amount admitted being proportioned to the amount of reduction of pressure in the train-pipe. The release of the brakes is effected by restoring the pressure in the train-pipe to its normal amount, such restoration causing the main valve to shift so as to open the passages leading from the brake cylinder to the atmosphere. I have also provided devices by which a quick application of the brakes may be effected with maximum force in cases of emergency. The action of the emergency devices is so related to that of the devices employed for effecting the usual working stops that the action of the latter may also be quickened when the emergency devices are put into operation. The action of the latter devices, however, is not dependent upon the action of the former.

In the accompanying drawings: Figure 1 is an end view of the valve casing, the interior ports and passages being indicated in dotted lines. Figs. 2, 3 and 4 are views in section and elevation of the main or triple valve proper and its immediately related parts. Fig. 5 is a longitudinal section of the complete valve mechanism.

Referring to Fig. 5, 1 designates the valve casing which may be made in any convenient number of parts. As shown in the drawings it consists of the main casting *a* which includes the greater part of the apparatus, a cap *b*, and a casting *c* which forms the drip cup and also the connection to the train-pipe.

2 designates the point of attachment to the train-pipe; 3 the point of connection to the auxiliary reservoir, and 4 the passage communicating with the brake cylinder.

The auxiliary reservoir, brake cylinder and the other parts necessary to constitute a complete brake mechanism are not shown as their construction and mode of connection are too well known to require illustration.

5 designates the chamber in which the main valve 6 works.

7 is the piston fitted in the cylindrical chamber 8 and connected to the valve 6 by the spindle 9. Said spindle is shouldered at 10, and the lugs 6^a and 6^b rising from the valve 6, surround the spindle. The connection of the lug 6^b to the valve is shown in Fig. 3. The lug 6^a is substantially a duplicate of the lug 6^b. A cap 11 is screwed into the end of the spindle and its projecting flange forms a shoulder against which the lug 6^b abuts. The valve 6 is thus connected with little or no lost motion to the spindle 9. Between the lugs 6^a and 6^b is placed a ring 12, which from its functions, as hereinafter explained, I shall designate as a balance plate. Said plate is fitted between the lugs 6^a and 6^b so as to have a limited amount of lost motion as shown.

The construction and fitting together of the triple valve 6 and the balance plate 12 are clearly shown in Figs. 2, 3 and 4. For convenience in manufacture the chamber in which the valve 6 and balance plate 12 are placed is made cylindrical. The valve 6 occupies the lower portion in the chamber, as most plainly shown in Figs. 2 and 3 and the balance plate 12 occupies the remaining circumference of said chamber. The valve and plate are kept in close contact with the walls of the chamber independently of the pressure thereon, by means of a spring 12^a which is fastened to one of said members, and bears upon the other, as shown. The valve 6 has a cavity 6^c formed in its lower surface said

cavity in the position shown in Fig. 5, forming the connection between the port 13 opening into the brake cylinder passage 4 and the port 14 which opens into the atmosphere. The balance plate has portions of its bearing surface cut away as best shown in Figs. 2 and 3, so that air circulates freely nearly all around it and in the position shown in Fig. 5 it is so nearly balanced as to impose no appreciable frictional resistance to movement by the piston 7. But a portion of its surface is cut away as shown at 15 in the top view in Fig. 4 so that the cavity formed by the cutting does not extend to the ends of the plate. Air under pressure usually fills this cavity. From the upper surface of the balance plate an orifice 17 leads to the atmosphere. The position of this orifice is so calculated with reference to the cavity 15 of the said plate that when the latter has been moved forward in the application of the brakes as hereinafter described, the air is exhausted from said cavity and the previously existing counter balance of the internal pressure on the balance plate due to this air filled cavity is destroyed, thus producing a frictional resistance, the purpose of which will hereinafter appear. The chamber 8 which contains the piston 7 communicates by means of the passage 18 with the train-pipe. In order to supply air to the auxiliary reservoir, the usual feeding groove 19 is made past the piston 7. The form and location of the balance plate shown are the best known to me as it occupies no space unnecessarily and is directly connected to the main valve; but other forms and locations may be given it, so long as it is connected directly or indirectly with the main valve.

The action of the devices just described is as follows: The normal position of the parts is as shown in Fig. 5 and in this position the brake cylinder is in communication with the atmosphere, the brakes are released, and the same pressure exists in the auxiliary reservoir as in the train-pipe. A reduction of pressure in the train-pipe will correspondingly reduce the pressure upon the front side of the piston 7 and the latter will thus be caused to move, under the influence of the auxiliary reservoir pressure, to the left. The result of such movement will be, first, to close the passage from the brake cylinder to the atmosphere through the ports and passages 13, 6^c and 14. The further movement of the piston and its attached valve 6 will uncover the inner end of the passage 13 and air will be thus permitted to pass from the auxiliary reservoir to the brake cylinder. The spring 35 in the cap *b* forms a stop which limits the movement of the triple valve piston and hence limits the opening of the passage 13. In the quick application of the brakes, however, it yields slightly so as to permit a full opening of the passage 13. By the movement of the piston the balance plate will have been carried to such a position that the orifice 17 will be in communication with the cavity 15 and the removal of the pressure from said cavity will destroy the counterbalancing pressure on the balance plate just described, whether the spring 3 be made to yield or not so that the balance plate will be pressed firmly against its seat in the chamber 5. When sufficient air has passed from the auxiliary reservoir to the brake cylinder to reduce the pressure in the former slightly below that existing in the train-pipe, the piston 7 will start back toward its original position as soon as it has enough force to move the main valve. The main valve will be moved until the slack existing between the balance plate and the valve 6 is taken up, but further movement will be prevented by the increased resistance of the balance plate. The slack between the main valve and balance plate is sufficient to allow the main valve 6 to move to cover the passage 13, but not to place said passage in communication with the exhaust. The flow of air from the auxiliary reservoir to the brake cylinder will thus be cut off and the brakes will be held on until they are released by the restoration of full pressure to the train-pipe, which additional pressure will enable the piston 7 to overcome the resistance of the main valve 6 and the balance plate. The parts thus being restored to their original position the exhaust passage will be open from the brake cylinder to the atmosphere and the brakes released.

The devices for effecting an emergency application of the brakes consist of a valve 20 controlling a passage 21 which communicates at its opposite ends with the train-pipe and the brake cylinder passages respectively. Said valve is connected to a piston 22 and is normally held upon its seat by a spring 23. The piston 22 is fitted closely but not tightly in the chamber 24 and a small leakage groove 25 is made past it, so that under ordinary conditions the pressure on each side of the piston is equalized. In the passage 18 forming the communication between the chamber 8 and the train-pipe, is placed a piston 26. To said piston 26 is attached a small valve 27 which controls communication between the chamber 24 and the port 28 leading to the atmosphere, and it may also control communication between said port 28 and the passage 18. It is apparent that it will do so if the stem connecting the piston 26 and the valve 27 be made smaller than the passage in which it works. It is shown slightly smaller in the drawings. In the piston 26 or chamber in which it is fitted is made a leakage groove 29, which permits sufficient air to pass without disturbing the piston 26, to effect the operation of the triple valve under ordinary conditions, the spring 30 which holds the piston 26 up and the valve 27 closed, being made strong enough to hold the piston 26 motionless. But if an unusual and sudden reduction of pressure is made in the train-pipe, the groove 26 will not be sufficient to allow

the air in chamber 8 and passage 18 to escape without shifting the piston 29 which will therefore be depressed. The air in the chamber 24 above the piston 22 will thus be allowed to escape through the port 28 and the valve 20 will be lifted by the air pressure beneath the said piston. The remaining air in the train-pipe will thus be permitted to escape almost instantaneously into the brake cylinder, the passage between the train-pipe and the brake cylinder being much larger than that which is used in making the ordinary service stops. The check valve 31 opens to allow the passage of the air from the train pipe into the brake cylinder but prevents its return. The stem of the valve 27 is not fitted air tight and consequently air is also allowed to pass from the passage 18 to the port 28 and thus the action of the main valve admitting air from the auxiliary reservoir to the brake cylinder, is hastened because the air in the chamber 8 more quickly escapes from in front of the piston 7, which actuates said main valve. It is not essential to the working of the apparatus that this last described action should take place; but I prefer a construction permitting it to take place.

I claim—

1. The combination in a brake mechanism of a casing having a passage directly connected with the train-pipe and the brake cylinder; a valve controlling said passage; a piston connected to said valve and normally under air pressure on both sides; a valve controlling an escape port from the chamber on one side of said piston; a piston connected to the last named valve and independent of the triple valve and actuated by a greater reduction of train-pipe pressure than the normal to open said escape port, substantially as described.

2. The combination in a brake mechanism of an automatic triple valve of any known or usual construction; a valve controlling a passage directly connecting the train-pipe and brake cylinder; a piston connected to said valve and normally under air pressure on both sides; a valve controlling an escape port from the chamber on one side of said piston; and a piston connected to the last named valve and situated in the passage from the train-pipe to the triple valve, substantially as described.

3. The combination in a brake mechanism of an automatic triple valve of any known or usual construction; a valve controlling a passage directly connecting the train-pipe and brake cylinder; a piston connected to said valve and normally under air pressure on both sides; a valve controlling a port forming an escape from the chamber on one side of said piston and also from the face of the triple valve piston; and a piston situated in the passage from the train-pipe to the triple valve and controlling said escape-port valve, substantially as described.

4. The combination in an automatic brake mechanism of a casing containing ports and passages communicating with the train pipe, the auxiliary reservoir and the brake cylinder respectively; and containing passages through which communication may be established between the brake cylinder and the auxiliary reservoir or the atmosphere; a main valve adapted to control said last named ports and passages; a piston connected to and adapted to actuate said valve; and a balance plate loosely connected to said main valve and having a cavity which is placed in communication with the open air when the first named valve is shifted so as to apply the brakes, substantially as and for the purpose described.

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