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J. H. BLEOO.

STRAIGHT AIR AUTOMATICALLY ACTING BRAKE.

APPLICATION FILED JUNE 12, 1902.

NO MODEL.

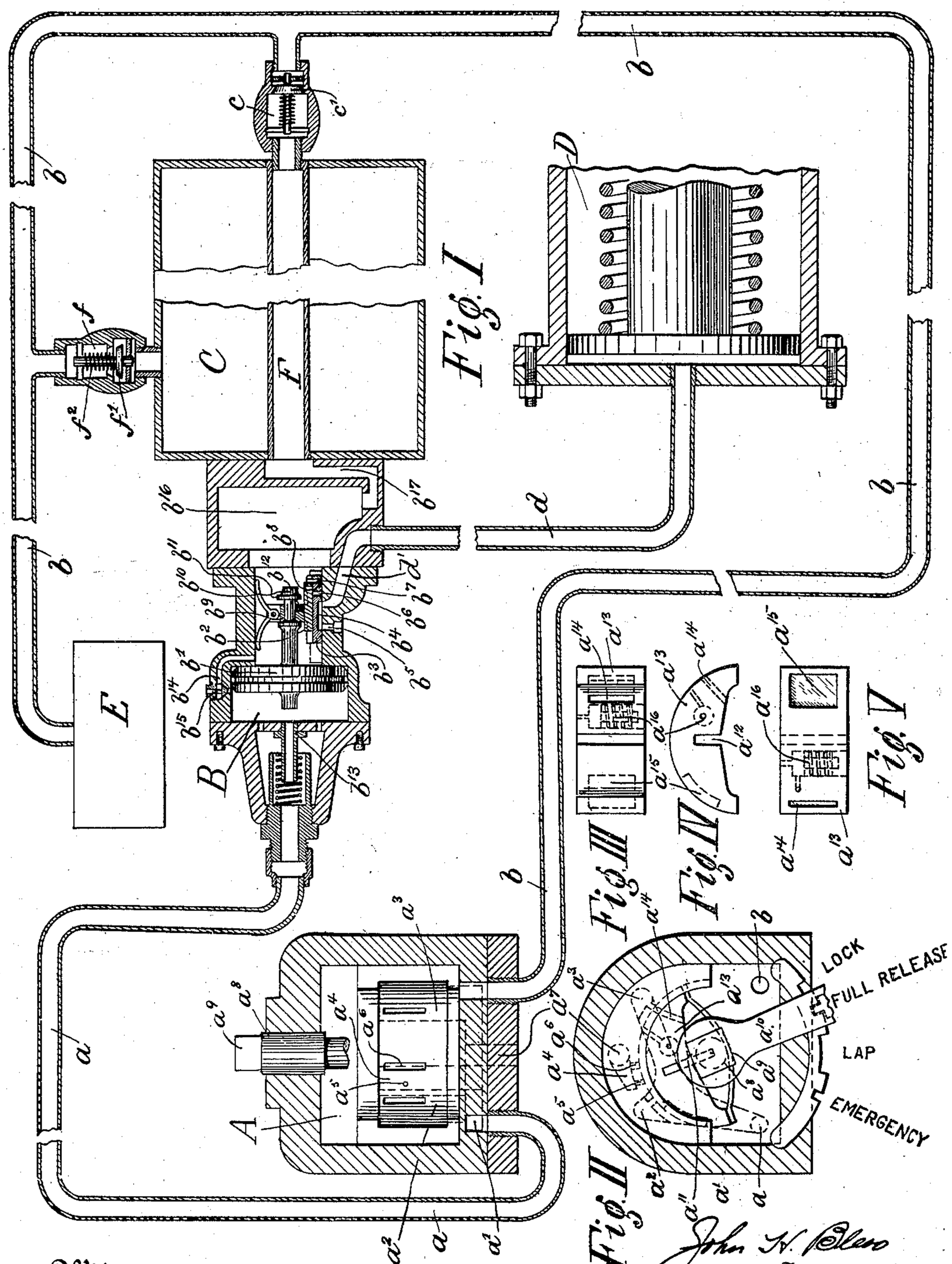

Fig. I

Fig. III

Fig. IV

Fig. V

Fig. II

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UNITED STATES PATENT OFFICE.

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STRAIGHT-AIR AUTOMATICALLY-ACTING BRAKE.

SPECIFICATION forming part of Letters Patent No. 757,015, dated April 12, 1904.

Application filed June 12, 1902. Serial No. 111,322. (No model.)

To all whom it may concern:

Be it known that I, JOHN H. BLEOO, a citizen of the United States, and a resident of the borough of Brooklyn, county of Kings, city and State of New York, have invented certain new and useful Improvements in Straight-Air Automatically-Acting Brakes for Trolley or Single Cars, of which the following is a specification.

My invention relates to automatic air-brakes for trolley or single cars; and the aim of my invention is to produce a structure particularly adapted for single cars.

To these ends my invention consists in the novel features hereinafter set forth and claimed.

In the accompanying drawings I have shown, partly in diagram, a system in which my invention is embodied, it being understood, however, that I do not limit myself to the construction shown herein.

In the drawings, Figure I is a sectional view, partly diagrammatic, showing a complete system in which my invention is embodied. Fig. II is a plan view of the controlling-valve, the contour of the ports being shown in the dotted lines; and Figs. III, IV, and V are side and plan views of the operating part of the controlling-valve.

In the drawings, A indicates the controlling-valve as a whole; B, the triple valve; C, the reservoir; D, the brake-cylinder; E, the pump, and F an air-pipe for insuring automatic operation of the system, as will be hereinafter described.

The controlling-valve is connected to the triple valve by the pipe a and through a pipe b to the reservoir through a valve-chamber f, provided with a valve f', normally held open by as pring f^2 for purposes presently to be explained. The pipe b beyond the reservoir connects to the air-pump E. A valve-chamber c, containing a spring-valve c', connects the pipe F to the pipe b.

The triple valve may be described as follows: b' is a piston-valve working in the valve-casing and provided with a two-part slide-valve b^2 and b^3. The part b^2 of the slide-valve is adapted to move first and to have a free sliding motion upon the lower part b^3. The lower part b^3 has or may have the following ports and recesses, viz: a recess b^4, adapted to connect the brake-cylinder with the atmospheric port b^5, a passage b^6, adapted to admit air to effect the application of the brake, and a port b^7, also adapted to admit air to the brake-cylinder. The upper portion or member b^2 of the triple valve is or may be provided with a passage b^8, which registers with the passage b^6 upon movement of the slide-valves one on the other.

The upper member b^2 of the compound slide-valve is rigidly connected to a yoke b^9, in which the stem b^{10} of the piston-valve works freely, the shoulders b^{11} serving to strike against the yoke b^9 to effect the movement of this portion of the slide-valve. The top member b^2 of the slide-valve is connected by a rod b^{12} to the stem b^{10} of the piston-valve, so that the upper member of the slide-valve will move before the lower member commences to move. A suitable spring-buffer b^{13} is provided to limit the movement of the piston-valve in the service application, but which will yield when the emergency application takes place.

A passage b^{14} serves as a by-pass from the front to the rear of the piston-valve and is controlled by a spring check-valve b^{15}. In the rear of the piston-valve b' is a chamber b^{16}, which communicates through a port b^{17} with the pipe F.

The brake-cylinder D communicates by a pipe d with a cored-out port or passage d' in the triple-valve casing. The controlling-valve is preferably of the construction shown, viz: The pipe a communicates with a port a', having two vertical branches a^2 a^3 in the curved inner face of the valve casing or chamber. A port a^4, having two branches a^5 a^6, communicates with a pipe a^7, leading to the atmosphere.

The operating part of the valve consists of a valve-spindle a^8, preferably having a prismatic portion a^9 for the reception of a handle a^{10} and grooved for the reception of a tenon a^{11}, which is adapted to connect the spindle with a slot a^{12} in a rotary slide-valve a^{13}. This rotary slide-valve is provided with a port a^{14}

for effecting full release of the brakes. The rotary slide-valve is also provided with a recess a^{15} for effecting the service or emergency stop. A port containing a spring check-valve a^{16} is also provided in the rotary slide-valve. This port is for the purpose of admitting air to the pipe a to check the motion of the piston-valve b' when the handle has been turned to the lap position.

The operation of the construction so far described is as follows: When the parts are in position of full release, as shown in the drawings, the air from the pipe b passes by the port a^{14} into the port a^3 and thence by the port a' into the pipe a and the triple valve, passing around the triple valve, through the port or passage b^{14}, into the chamber b^{16} and the pipe F. The pressure is now equal in all parts of the system. When it is desired to apply the brakes, let us say to make a service application, the handle a^{10} is moved into the service position, (indicated in Fig. II,) in which position the port a^{15} will serve to connect the ports a^2 and a^5, thereby permitting the escape of the air to the atmosphere, reducing the pressure in the pipe a, and thereby affording a movement of the piston-valve b' to the left. The first effect of such movement will be to slide the upper member of the slide-valve upon the lower member until the ports or passages b^8 and b^6 are brought into registry. The lower member will now commence to move and will bring the ports b^8 and b^6 into communication with the port of the pipe d, so that the air in the pipe F and chamber b^{16} will be discharged into the brake-cylinder, at the same time opening the valve c' against its spring, so as to replenish the air in the pipe F from the reservoir and pump, the pressure in the pipe F, chamber b^{16}, and brake-cylinder being now ten pounds less than the pressure in the reservoir, the reduction being effected by the reducing-valve c'. When an emergency stop is to be made, the handle is thrown from the release position to the emergency position, connecting the port a^2 with both of the ports a^5 and a^6, thereby effecting an emergency application of the brake, the piston-valve being thrown much more violently to the left, thereby bringing the larger port b^7 into communication with the port d', and by reason of the suddenness of the reduction and the consequent surge of air and larger openings for the passage of air the reduction of the pressure by the valve c' is only five pounds instead of ten pounds, as heretofore mentioned, the reason for such difference being that the valve c' opening quicker and to a greater extent upon the emergency application cannot close so quickly as before.

I will now proceed to describe the function of the spring-valve f'. This valve is maintained open by the spring so long as the pressures in the reservoir and pipe-lines are equal, or substantially so. If a break should occur in any part of the system other than the reservoir, the pressure in the reservoir would immediately force the valve f' down upon its seat, thereby maintaining the reservoir-pressure and also maintaining the valve c' firmly in its seat. Under these circumstances the pressure on the left side of the piston-valve b' being released the said piston-valve will move laterally and the air in the pipe F and chamber b^{16} will pass to the cylinder and apply the brake.

It will be observed in connection with the foregoing description that no matter where the break occurs between the pump and reservoir and the pump and the train-line and the pump and the engineer's valve and the pump and triple valve the brakes will be immediately set, and it will be impossible to release the brakes until some person effects the unseating of the valve f', so that in case of any derangement of the system the brakes will be automatically set and the car cannot be again started until the trouble has been fully brought to the attention of the motorman and obviated, so that he will be warned to run in on his hand-brake.

If by any possible chance the controlling-valve should be turned to the lap position so rapidly as not to set the brakes and the pipe b should break, the brakes will be set, as above indicated, for the reason, among others, that the rotary valve-body is capable of a slight radial movement, owing to the loose blade-and-slot connection, the valve being held up to its operating-face by a light leaf-spring, as shown.

Having described my invention, what I claim, and desire to secure by Letters Patent, is—

1. In an air-brake system for single cars the combination of a brake-cylinder, a controlling-valve and a governing-valve of the triple-valve type, a reservoir C, and pipe connections all connected in such manner as to receive pressure from a single source and to maintain the same given air-pressure throughout the system when the parts are in the release position, means for maintaining said given predetermined air-pressure throughout the entire system, hereinbefore specified, an automatically-unseated valve normally balanced when the air-pressure is normal and adapted to be seated upon leakage of air-pressure from one side thereof, means for supplying straight air to the brake-cylinder operative upon a movement of the automatically-unseated valve and an automatically-seated valve operative upon reduction of the air-pressure, whereby upon breakage or excessive leakage in the system the brake will be automatically set.

2. In an air-brake apparatus the combination of a brake-cylinder, a controlling-valve, a reservoir, a governing-valve of the triple-valve type, a pipe F and a plurality of check-valves, one controlling the admission of air to the pipe F and the other controlling admis-

sion of air to the reservoir, one of the said valves being seated automatically and the other of the said valves being unseated automatically, and means whereby a reduction of pressure in the pipe system will effect the seating of both valves.

3. In an automatic safety air-brake system the combination of a brake-cylinder, a governing-valve of the triple-valve type, a reservoir and a controlling-valve, the said brake-cylinder, reservoir, governing-valve and triple valve being united by a single-pipe system whereby an equalization of pressure may be maintained under normal conditions throughout the entire system and a check-valve intervening between the reservoir and the source of air-supply with means for normally holding the said check-valve off its seat and for permitting the said check-valve to be reseated upon a reduction of pressure on the supply side.

4. In an automatic safety air-brake system the combination of a brake-cylinder, a governing-valve of the triple-valve type, a reservoir and a controlling-valve, the said brake-cylinder, reservoir, governing-valve and triple valve being united by a single-pipe system whereby an equalization of pressure may be maintained under normal conditions throughout the entire system and a plurality of check-valves one intervening between the reservoir and the source of air-supply and the other intervening between the governing-valve and the source of air-supply.

5. In an automatic safety air-brake system the combination of a brake-cylinder, a governing-valve of the triple-valve type, a reservoir and a controlling-valve, the said brake-cylinder, reservoir, governing-valve and triple valve being united by a single-pipe system whereby an equalization of pressure may be maintained under normal conditions throughout the entire system and a check-valve normally held in an open position and a check-valve normally held in a closed position with means for closing one of the valves upon a reduction of air-pressure on its supply side and for opening the other valve upon a reduction of the pressure upon the side opposite to the supply side.

6. In an automatic safety air-brake system the combination of a brake-cylinder, a governing-valve of the triple-valve type, a reservoir and a controlling-valve, the said brake-cylinder, reservoir, governing-valve and triple valve being united by a single-pipe system whereby an equalization of pressure may be maintained under normal conditions throughout the entire system, a plurality of valves and means for maintaining the said valves in their closed position upon an abnormal reduction in pressure and for causing a brake-applying movement of the governing-valve to take place whereby upon a break occurring in the system or an abnormal reduction of the pressure the brake will be applied and held set until the abnormal condition has been remedied.

7. The combination of a brake-cylinder, a governing-valve in the nature of a triple valve, an air-supply pipe in communication with the governing-valve on one side thereof, an air-containing space on the opposite side of the governing-valve and a controlling-valve in the air-supply pipe having means for effecting the admission of air to the governing-valve at a normal pressure when in one position and at a reduced pressure when in another position whereby after a normal pressure has been communicated to the governing-valve the pressure may be reduced by the controlling-valve so as to check the motion of the governing-valve at the desired point.

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