(No Model.) 2 Sheets—Sheet 1.

H. M. LOFTON.

TRIPLE VALVE FOR AIR BRAKES.

No. 519,679. Patented May 8, 1894.

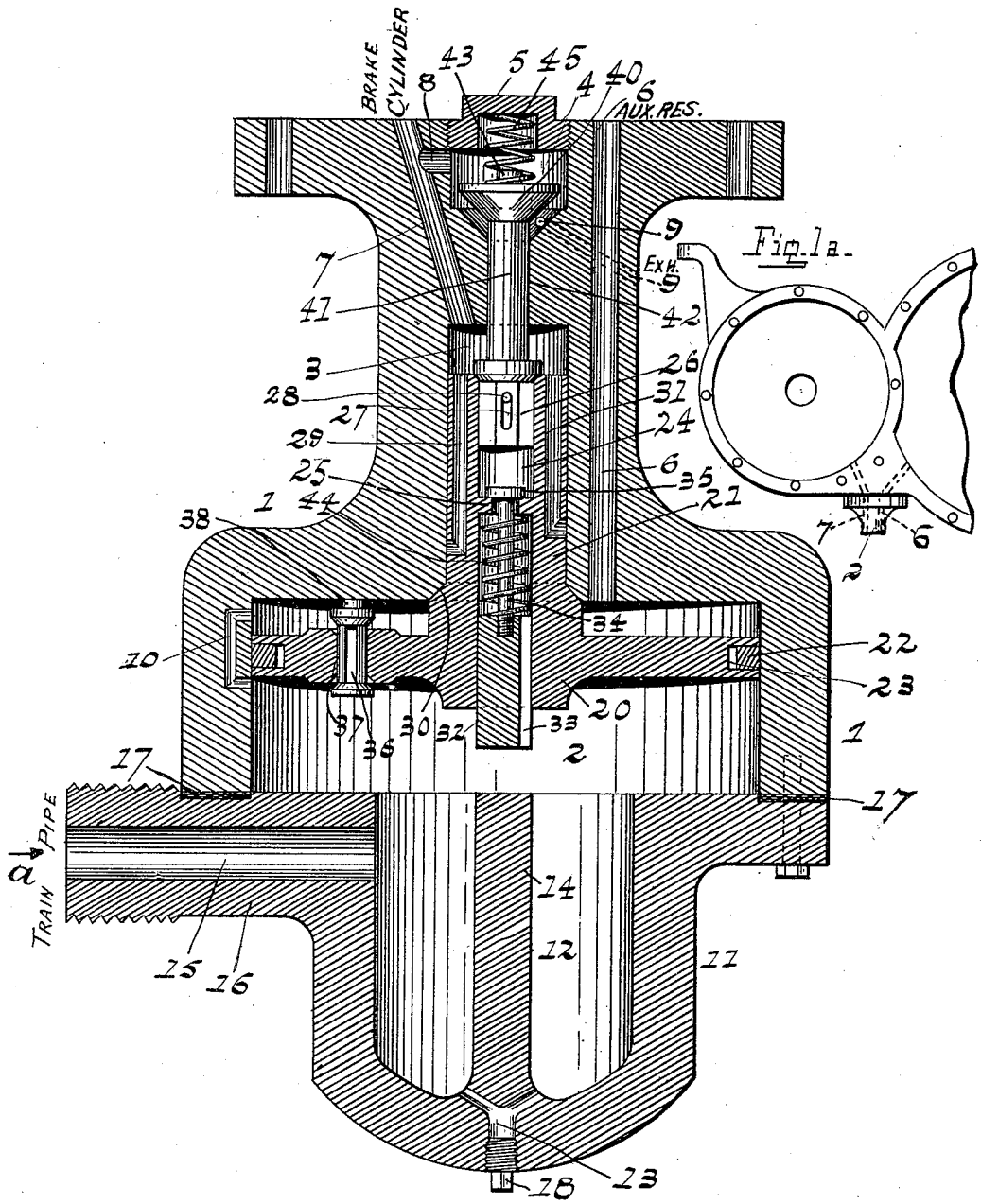

Fig. 1.

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(No Model.) 2 Sheets—Sheet 2.

H. M. LOFTON.

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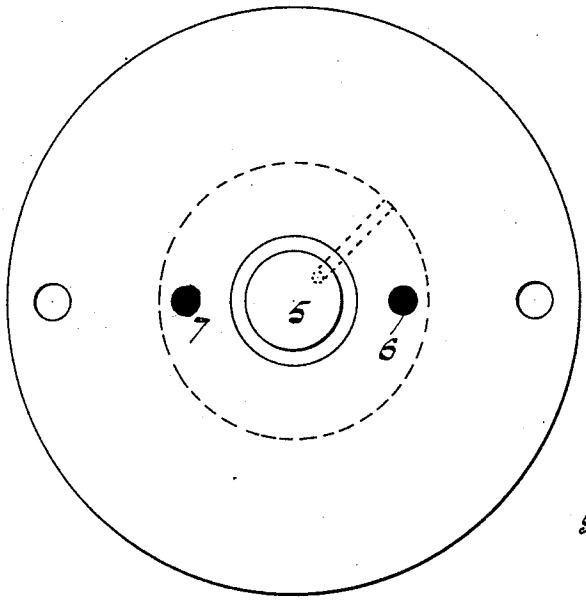

Fig. 2.

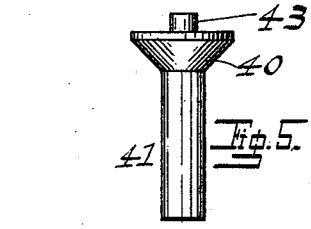

Fig. 5.

Fig. 6.

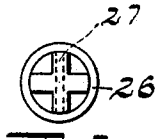

Fig. 7.

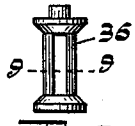

Fig. 8.

Fig. 9.

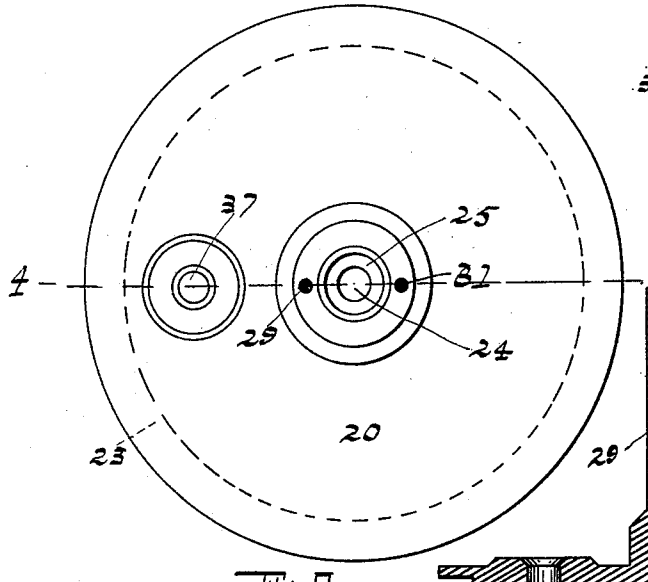

Fig. 3.

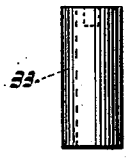

Fig. 10.

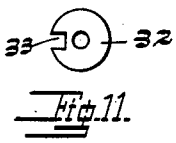

Fig. 11.

Fig. 12.

Fig. 4.

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UNITED STATES PATENT OFFICE.

HERBERT M. LOFTON, OF SAVANNAH, GEORGIA.

TRIPLE VALVE FOR AIR-BRAKES.

SPECIFICATION forming part of Letters Patent No. 519,679, dated May 8, 1894.

Application filed July 23, 1892. Serial No. 441,523. (No model.)

To all whom it may concern:

Be it known that I, HERBERT M. LOFTON, a citizen of the United States of America, and a resident of Savannah, in the county of Chatham and State of Georgia, have made certain new and useful Improvements in Triple Valves for Air-Brakes; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to figures of reference marked thereon, which form a part of this specification.

This invention relates to the class of air-brake elements known as triple valves, their function being automatically to perform the three movements or changes of air-direction which are necessary to the operation of air-brakes upon the proper manipulation of the engineer's valve; the object of this invention being to render this class of devices more simple, durable, and easily repaired, the details of all of which will be hereinafter fully described.

In the accompanying drawings, Figure 1 is a vertical section of the device showing the interior arrangement of the operative elements and the form thereof and of the casing, and the location of the ports and passages, the smaller parts however not being sectioned. Fig. 1ª is a small view showing the braking-cylinder and the auxiliary reservoir cast in one piece or casting, the position of the triple valve thereon, and by broken lines the ports leading to the said reservoir and cylinder from the triple valve. Fig. 2 is a plan of the securing flange, showing the position of the embouchure of the passages leading therefrom and by broken lines the ultimate exhaust-port. Fig 3 is a plan of the main piston of the triple valve the figure showing the position of the check valve therein, the two passages in said stem outside the central passage, said central passage and the valve-seat therein. Fig. 4 is a section of Fig. 3 vertically on the line 4—4 therein, further and more plainly illustrating the construction of said piston. Fig. 5 is a detail of the exhaust valve. Fig. 6 is a side elevation of the check valve seated in the upper part of the stem of the piston. Fig. 7 is an inverted plan thereof. Fig. 8 is a detail in elevation of the check valve seated in the said piston. Fig. 9 is a horizontal section thereof, centrally of the reduced middle portion. Fig. 10 is a detail in side elevation of the plunger seated in the opening through the piston into the hollow stem thereof. Fig. 11 is a plan thereof, showing the notch for passage of air and the hole for insertion of stem of the small valve secured thereto. Fig. 12 is a detail in side elevation of the said small valve.

In the figures, like reference marks are employed in the designation of corresponding elements of construction in all the views.

1 is the main casing which may be of any desirable exterior conformation, but should have flanges at the top whereby it may be suspended from the proper part of the car or brake. The lower portion of this casing has a large cylindrical chamber 2, and a smaller one 3 in about the middle portion a small hole 42 connecting with the chamber 4 at the top of the casing 1, said chamber 4 opening outwardly at the top and being conical in its bottom. A screw-threaded cap 5 closes the upper end of said chamber 4, and as the upper portion is square for the application of a wrench it may also be utilized as a guide in properly seating the valve upon the braking cylinder, auxiliary reservoir, or other element to which it is secured. A passage 6 leads from the upper end of the chamber 2 upwardly and out at the top of the device substantially as shown in Fig. 1, a second passage 7 opening into the cylindrical chamber 3 and passing upwardly through the casing and out at the top. The passage 6 is in practice connected with the auxiliary reservoir, and the passage 7, with the air-brake cylinder. A passage 8 connects the chamber 4 with the passage 7, and a passage 9 leads from the side of the conical bottom of the said chamber 4 to the outer atmosphere. A passage 10 opening at both ends into the chamber 2 is made in the casing around said chamber, one end of said passage opening into the said chamber a short distance above the other end, the position of both openings being arranged in such a manner as will tend to the result presently to be described. A

valve seat 30 is made in the metal around the lower end of the cylindrical chamber 3.

A cap 11 is secured to the open lower end of the casing 1, said cap having a recess therein, marked 12 in Fig. 1, said recess having a vent 13 at the bottom thereof for the purpose of drawing off the water, &c., therefrom a plug 18 closing same normally. A lug 14 projects upwardly from the floor of said recess, and in the center thereof, a distance such as will allow it to form an abutment for the plunger 32 for the purpose set forth in the hereinafter description of the operation of the device. A passage 15 leads into the recess 12 from the exterior air, which passage is in practice connected with the train pipe, and for this purpose the lug 16 is cast on the side of the cap 11 and the said passage 15 passes outwardly through this lug, which is externally screw threaded on its distal extremity for the purpose of connection to the train pipe. A packing gasket 17 is employed if necessary between the cap 11 and the casing 1.

As best shown in Figs. 3 and 4, a piston 20 is made having a stem 21 thereon, a packing ring 22 seated in a suitable groove 23 in the periphery of said piston serving to fit it into the cylindrical chamber 2 wherein said piston has movement vertically. The stem 21 of said piston is tubular, having an opening 24 entirely through it longitudinally, and annular flange 25 about the middle portion thereof reducing it in size and the top side of said flange forming a bearing for a valve as will be presently described. The upper end of the opening 24 is flared forming in the surrounding metal a seat for a check valve 26 which is seated thereover, having a slot 27 in its stem which engages a pin 28 set in the stem 21 transversely of the opening 24, whereby the movement of the said check valve in an upward direction is properly restricted. A passage 29 passes from the top of said stem 21 therein opening therefrom at a slight distance above the valve 30 thereon, and a passage 31 of like character and position opens from the side of said stem a distance slightly farther above the said valve than the passage 29 opens. A plunger 32 having a groove 33 therein is seated in the opening 24 at its lower end projecting beyond the piston in a downward direction; the stem 34 of the valve 35 being screwed into the upper end thereof, said valve being seated normally upon the upper side of the annular flange 25 the stem 34 passing downwardly through the opening therein, whereby said valve opens by upward pressure only. A spring 44 bearing on the under side of the flange 25 and against the upper end of the plunger 32 retains the said valve 35 seated normally. A check-valve 36 is seated in the aperture 37 in the piston, said valve having on its upper end a stop-lug 38 which is of such a length that when the valve 30 is closed as shown in Fig. 1, the said check valve will be open at both ends, being held upwardly by the air-pressure in the chamber 2 under the piston, said lug 38 contacting with the upper wall of the chamber and preventing said pressure from closing the valve (36).

A valve 40 having a stem 41 fitting closely the hole 42 is seated over the conical bottom floor of the chamber 4, closing, when down, the passage 9 for a purpose shown in the description of the operation of this device. The lower end of the stem 41 contacts with the top of the check valve 26 except when the piston carrying the stem in which is seated said check valve is depressed, a spring 45 seated over a lug 43 on said valve and in a cavity in the lower side of the plug 5 causing said valve 40 to follow the movements of the said check valve 26 and assisting the air-pressure in keeping said valve 40 closed.

The operation of this device is as follows:— In Fig. 1 the parts are shown in the position they will assume after the air has entered through the passage 15 and pressed the piston 20 upwardly until the valve 30 thereon has seated itself and is closed. In doing this the air entering the chamber 2 through the opening 15 has before pressing on the piston 20 closed the valve on the under end of the check valve 36, upon which the piston will move upwardly until the valve 30 seats itself and the stem 38 on the check-valve 36 contacts with the top end of the chamber 2 forcing open the said valve as shown in said Fig. 1, whereupon the air may go through the said valve, the part of the said chamber above the piston therein and the passage 6 to the auxiliary reservoir. The air will continue to pass through the said valve and the passage 10 in the casing 1, until equilibrium shall be established, and said valve will then close by gravity, the passage 10 carrying sufficient air only to preserve said equilibrium, the check valve opening when more air is needed than will pass the passage 10. Thus it is seen that the air pressure in the train pipe and auxiliary reservoir is the same.

The operation in service application of brakes is as follows:—A small amount of air is drawn from the train pipe reducing the pressure therein (say) as is usual in practice, seven pounds which reduces the pressure in the chamber 2 below the piston, which will cause the said piston to descend and hold the valve 36 closed. The descent of the piston will open the valve 30 and bring the embouchure of the passage 29 below the metal closing same, and at the same time allow the valve 40 to close over the opening of the passage 9 which is the ultimate exhaust passage. The downward movement of the piston will stop as soon as the tension of the spring 44 is brought into play to resist same by the contacting of the lower end of the plunger 32 and the top of the lug 14. This brings the passage 10 entirely above the piston, thus cutting off communication around the piston. The air from the auxiliary reservoir will then

enter the braking cylinder through the passage 6, upper part of chamber 2, passage 29, chamber 3 and passage 7. After the pressure in the auxiliary reservoir shall have been reduced slightly below that in the train pipe, the greater pressure on the under side of the piston 20 will force said piston upwardly until the check valve 26 contacts with the end of the stem 41 of the valve 40, which valve is held closed by the pressure of the air and the spring 45 against its upper end, which contact will stop the upward movement of the said piston, but by this time the embouchure of the passage 29 will be above the seat of the valve 30 and hence communication will be cut off between the chamber 2 (upper part thereof) and the braking cylinder. This will establish an equilibrium of air-pressure in the train pipe and the auxiliary reservoir and it is hence plain that the elements of the triple valve will remain in this position until it is seen fit to release the brake, which is done by increasing the air-pressure in the train pipe which will force the piston 20 upwardly still farther by overcoming the action of the spring 45 and the air-pressure of the valve 40, thereby opening the same and allowing the air to pass from the braking cylinder through passages 7 and 8, chamber 4 and passage 9. The elements are now in the first described position and ready for the application of the brakes either as a service or an emergency stop.

The operation for an emergency stop is as follows:—The elements being in the position shown in Fig. 1, the engineer will exhaust (say) ten pounds pressure from the train pipe and thus cause the piston 20 by reason of the difference in pressure on its two sides to rapidly descend opening the passage 29, and the motion continuing after the abutment of the plunger 32 and the lug 14, by reason of the difference in pressure in the cylinder 2 above and below the piston overcoming the pressure of the spring 44, said spring will be compressed (the plunger entering farther into the piston-stem) and the valve 35 will be opened, allowing air from the under side of the piston in the chamber to enter through the notch 33 into the chamber 24 and open the check valve 26, passing through same to the chamber 3, thence to the braking cylinder through the passage 7. As the pressure in the train-pipe is still further reduced by this filling of the braking cylinder, the piston 20 will continue to move downwardly which will bring the embouchure of the passage 31 below the metal surrounding the stem of the piston, whereby air from the auxiliary reservoir will be admitted in sufficiently large quantities through the passages 29 and 31, to close the check valve 26 against the reduced pressure in the train pipe, thus preventing any leakage of air back into the said train pipe, and bringing the air-pressure in the auxiliary reservoir into play to further fill the braking cylinder. To release the brakes, the air-pressure in the train-pipe is increased sufficiently to cause a reverse movement of the parts.

If during a service stop an emergency arises, instantaneous application of the brakes may be made by the proper additional drawing of air from the train pipe to cause the additional downward movement of the piston 20.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent of the United States, is—

1. In a device of the class specified, the casing having the cylindrical chamber 2 and the chamber 3 therein, the latter being diametrically smaller than the chamber 2, a passage connecting the lower end of the chamber 2 with the train-pipe, a passage connecting the upper end of the chamber 2 with the auxiliary reservoir, and a passage connecting the upper end of the chamber 3 with the braking cylinder, a piston moving in the chamber 2 and carrying a hollow stem projecting into the chamber 3, said stem being provided with a passage 29 opening out at the top and passing downwardly to a side opening in such a position that it will be closed by the metal forming the side of the chamber 3 when the piston is elevated, and a second passage 31 opening from the side of the stem above the opening of the first named passage closed by the side of the chamber 3 normally and adapted to be uncovered by the depression of the piston and subsequent withdrawal of the stem from the chamber 3 farther than will open the first named passage, whereby communication is opened through both passages 29 and 31 freely between the auxiliary reservoir and brake-cylinder and a spring-pressed plunger seated in the under side of the piston and adapted to resist slightly the downward movement of said piston after the uncovering of the first named passage, substantially as and for the purpose specified.

2. The casing, having a cylindrical chamber 2 and the chamber 3 therein, the latter being diametrically smaller than the former, a passage connecting the lower end of the chamber 2 with the train-pipe, a passage connecting the upper end of the chamber 2 with the auxiliary reservoir, and a passage connecting the upper end of the chamber 3 with the braking cylinder, a piston moving in the chamber 2 and carrying a stem projecting into the chamber 3, said stem being provided with a passage opening out at the top and passing downwardly to a side opening in such a position that it will be closed by the elevation into the chamber 3 of the stem, a chamber 4 in the casing above said chamber 3, and a hole between said chambers 3 and 4, opening into each, a passage from the said chamber 4 into the passage connecting the braking-cylinder with the upper end of the chamber 3, an exhaust port passing from the said chamber 4 to the open air, and a valve adapted to close over same and having its stem projecting through

the aforesaid hole into the smaller cylinder and contacting with the stem of the main piston so that said piston in rising will open said valve over the exhaust port, substantially as and for the purpose specified.

3. The casing, having a cylindrical chamber 2, the chamber 3 therein, the latter being diametrically smaller than the former, a passage connecting the lower end of the chamber 2 with the train pipe, a passage connecting the upper end of the chamber 2 with the auxiliary reservoir, and a passage connecting the upper end of the chamber 3 with the braking-cylinder, a piston moving in the chamber 2 and having a stem projecting into the chamber 3, said stem being provided with a passage opening out at the top and passing downwardly to a side opening in such a position that it will be closed by the metal forming the side of the chamber 3 when the said piston is elevated, a cylindrical opening leading upwardly through the piston and the stem thereof, a valve seated over the top end thereof, a valve-seat in the middle portion of said cylindrical passage, a plunger seated in said cylindrical passage and projecting downwardly therefrom, and provided with a groove along its side, a valve seated over the seat in the passage and connected with the said plunger by a rod, the exhaust passage, and a valve adapted to close the same on the depression of the piston, substantially as and for the purpose specified.

4. The casing having the cylindrical chamber 2 and chamber 3 therein, the latter being diametrically smaller than the former, a passage connecting the lower end of the said chamber 2 with the train-pipe, a passage connecting the upper end of the said chamber 2 with the auxiliary reservoir, and a passage connecting the upper end of the chamber 3 with the braking-cylinder, a piston moving in the chamber 2 and having a stem projecting into the chamber 3, said stem being provided with a passage opening out at the top and passing downwardly to a side opening in such a position that it will be closed by the metal forming the side of the chamber 3 when the said piston is elevated, a cylindrical opening leading upwardly through the piston and the stem thereof, a valve seated over the top end thereof, a valve seat in the middle portion of the said cylindrical passage, a plunger seated in said cylindrical opening and projecting downwardly therefrom and provided with a groove along its side, a valve seated over the seat in the opening and connected with the said plunger by a rod, a spring surrounding said rod and seated between the bottom side of the valve-seat and the top end of the plunger and operating to close the said valve, the exhaust passage, and a valve adapted to close the same, substantially as and for the purpose specified.

In testimony whereof I hereunto affix my signature in presence of two witnesses.

HERBERT M. LOFTON.

Witnesses:
A. J. DIERK,
C. MOEHLENBROCK.