No. 630,378. Patented Aug. 8, 1899.

W. B. MANN.

TRIPLE VALVE FOR AIR BRAKES.

(Application filed Oct. 14, 1898.)

(No Model.)

Fig. 1.

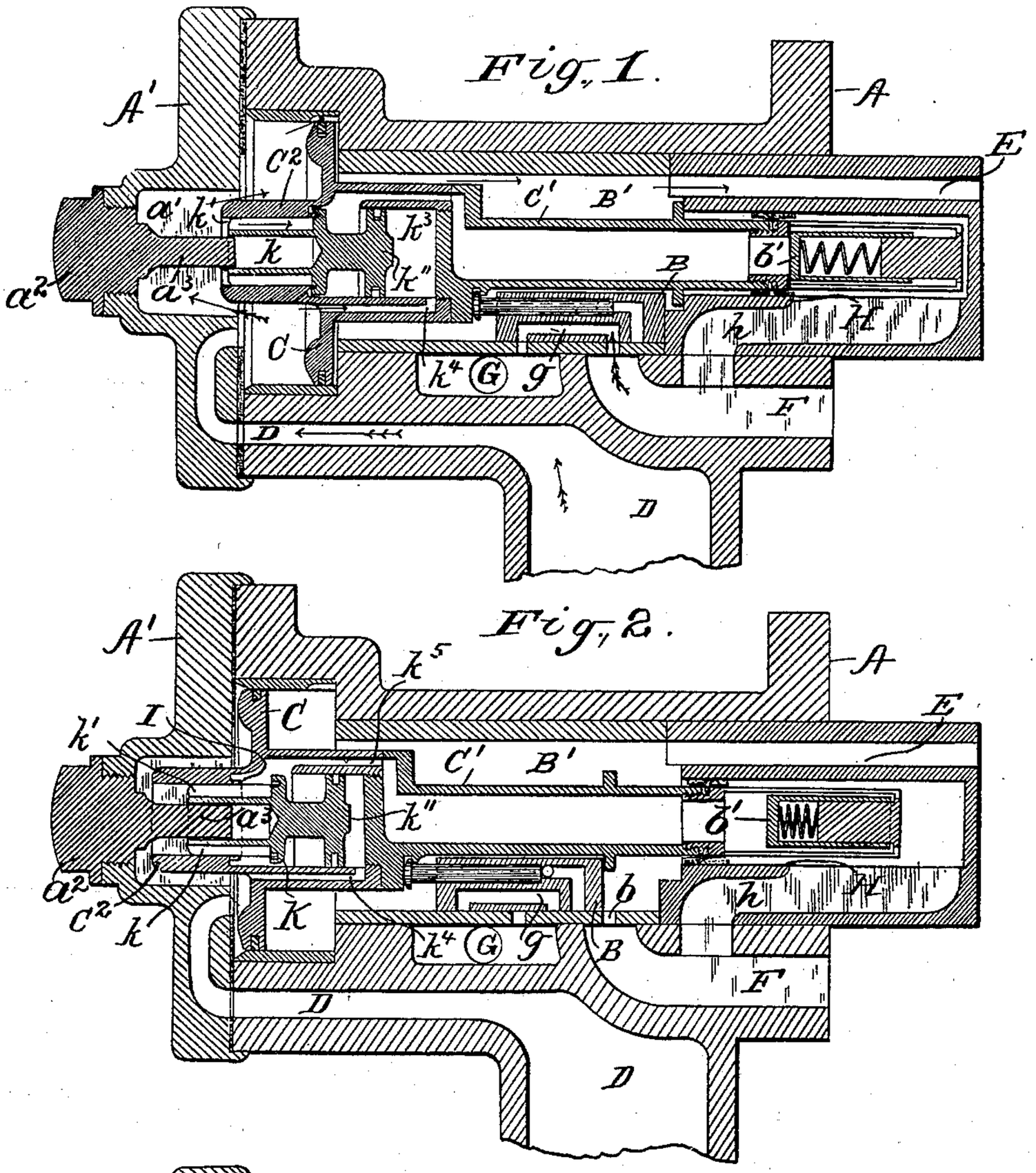
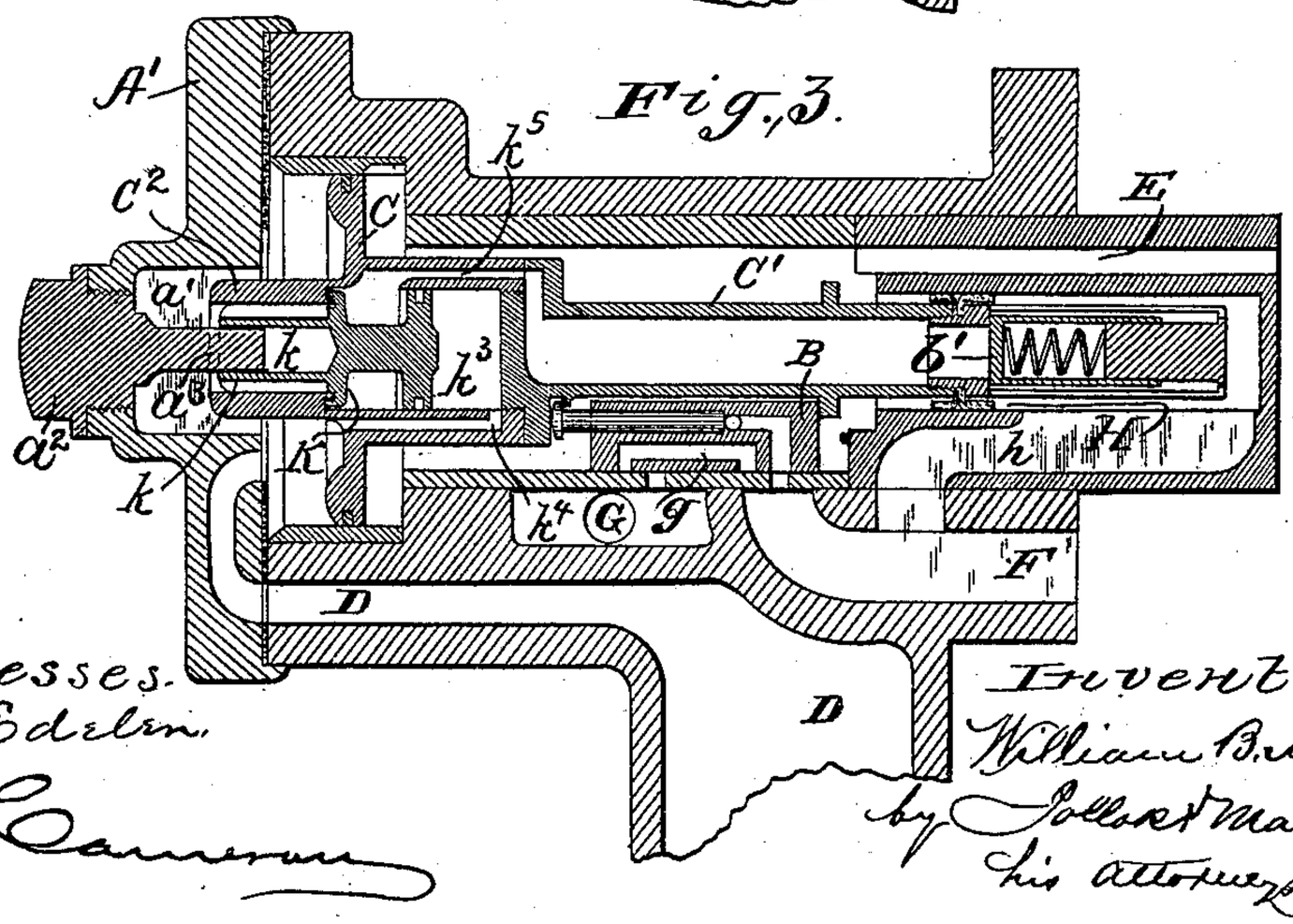


Fig. 2.

Fig. 3.



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UNITED STATES PATENT OFFICE.

WILLIAM B. MANN, OF BALTIMORE, MARYLAND.

TRIPLE VALVE FOR AIR-BRAKES.

SPECIFICATION forming part of Letters Patent No. 630,378, dated August 8, 1899.

Application filed October 14, 1898. Serial No. 693,495. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM B. MANN, of Baltimore, Maryland, have invented a new and useful Improvement in Triple Valves for Air-Brakes, which improvement is fully set forth in the following specification.

My invention relates to triple-valve mechanism employed in connection with air-brake systems on railroads, and more especially to that class of triple valves known as "quick-action" valves.

In order to secure the desired quick action of the triple valves, it has been found necessary to serially vent the train-pipe, preferably at or near each triple valve, by opening a passage leading from the train-pipe either to the atmosphere or to the brake-cylinder. Heretofore in that class of quick-action triple valves which vents the train-pipe into the brake-cylinder through the triple-valve piston the train-pipe air has been conducted into the triple-valve chamber, where it mingled with air from the auxiliary reservoir, the two airs thus combined passing together from the valve-chamber into the brake-cylinder. Now in order to secure the maximum pressure in the brake-cylinder in the shortest space of time the train-pipe air should be conducted to the brake-cylinder in advance of the auxiliary-reservoir air. This not only secures greater pressure in the brake-cylinder, but it also produces the quicker serial venting of the train-pipe, and hence the more nearly simultaneous application of all the brakes on a long train of cars.

The present invention has for its object, therefore, to produce a triple valve in which upon a full traverse of the triple-valve piston train-pipe air shall pass directly through said piston to the brake-cylinder without entering the triple-valve chamber and in advance of auxiliary-reservoir air.

To this end the invention consists of a triple valve of any desired construction and its actuating-piston which, with the valve, moves in a suitable valve-casing, said piston having a hollow stem or rod leading through the triple-valve casing and communicating at one end directly with the brake-cylinder in advance of the port controlled by the triple valve and at the other end with the train-pipe and a valve controlling the passage of air from the train-pipe to the brake-cylinder.

Furthermore, the invention consists of a hollow triple-valve piston stem or rod communicating at one end with the brake-cylinder and at the other end with the train-pipe and a valve controlling said communication, which valve is subjected to differential pressures, alternating first on the train-pipe side and then on the brake-cylinder side of the valve when the triple-valve piston is suddenly given its full traverse in emergency application of the brakes.

The invention also resides in certain details of construction, which will be fully pointed out in the claims.

The same inventive idea may find mechanical expression in various forms, and for purposes of illustration I have shown one of these forms in the drawings forming a part of this specification, in which—

Figure 1 is a longitudinal vertical section of a triple valve and its coöperating elements, showing the parts in the position which they occupy when the brakes are released. Fig. 2 is a similar view showing the parts in the position they occupy when making an emergency application of the brakes; and Fig. 3 is a like view, the parts being shown in the position for service or "graduating" application of the brakes.

In the several figures of the drawings, in which like letters indicate like parts, A is the triple-valve casing; B, the triple valve, which may be of any desired construction; C, the valve-operating piston; D, the passage leading from the train-pipe; E, the passage leading to the auxiliary reservoir, and F the passage to the brake-cylinder.

G is the vent-port leading to the atmosphere and, as shown in Fig. 1, is normally in communication with the brake-cylinder; but when the brakes are to be applied either in emergency or service stops such communication is closed, as shown in Figs. 2 and 3.

The piston C has an opening through its center and a hollow stem C′ extending therefrom through the triple-valve chamber B′ and fitting air-tight in a cylinder H, formed in the end of the valve-casing adjacent to the passage F. On the front or train-pipe side

of the piston C and surrounding the opening therein is a tubular extension C^2, around the inner margin of which and near the opening in the piston C is formed a valve-seat I, upon which is seated a valve K, having a cylinder k, projecting therefrom into the tubular extension C^2 and being preferably guided therein by wings k', which center the cylinder k in the extension C^2 and at the same time allow air to freely pass through said extension and through the piston C when the valve K is unseated. Attached to the opposite side of the valve K from the cylinder k is a piston k'', working in a cylinder k^3, formed in an enlargement of the hollow piston-stem C'. The cylinder k^3 at the rear of piston k'' is in direct communication at all times with the train-pipe through the passage k^4, while the cylinder to the front of piston k'' is at all times in communication with the brake-cylinder through the space k^5 between the hollow piston-stem C' and the cylinder k^3 and through the hollow stem C', past the check-valve b', cylinder H, and passage h leading from said cylinder H to the passage F.

For convenience in construction the head A' of the valve-casing A is formed with a chamber a' therein, which chamber is closed on its outer side by a screw-plug a^2, which has an inward extension a^3 loosely entering the cylinder k on the valve K and forming in connection with said cylinder a kind of dash-pot. It will be observed that the internal cross-sectional area of the tubular extension C^2 is less than the cross-sectional area of the cylinder k^3 and that when the valve K is seated, as shown in Fig. 1, the area of the valve exposed to train-pipe pressure is less than the area of the piston k'' exposed to a like pressure in the cylinder k^3, and consequently the valve K is held on its seat.

The operation is as follows: Suppose the parts to be in position shown in Fig. 1, with the brakes released. Then air at train-pipe pressure of, say, seventy pounds will enter all the spaces and passages of the triple valve and casing, except hollow piston-stem C', cylinder H, and passages h and F, all of which will be exhausted to the atmosphere through port G and the exhaust-duct g of the triple valve. If now the pressure in the train-pipe be suddenly lowered, say, ten pounds for the purpose of securing an emergency application of the brakes, the seventy pounds pressure in the auxiliary reservoir and triple-valve chamber will cause the piston C to quickly make its full traverse to the position shown in Fig. 2, thus operating the triple valve in the well-known way to close the exhaust and open communication from the auxiliary reservoir through the triple-valve chamber and port b to the brake-cylinder. By the sudden movement of the piston C the cylinder k is forced down over the plug a^3 and the air in the cylinder k is so greatly compressed as to overcome the train-pipe pressure on the piston k'' in the cylinder k^3, and the valve is therefore unseated and the train-pipe air passes around the cylinder k^3 through the hollow piston-stem C', cylinder H, check-valve b', and passage h to the passage F, leading to the brake-cylinder. It will be noted that the track of the air from the train-pipe to the brake-cylinder is comparatively unobstructed, while the air from the auxiliary reservoir to the brake-cylinder has to pass through the restricted port b. The result of this is that the volume of the air from the train-pipe reaches the brake-cylinder in advance of the air from the auxiliary reservoir, thereby increasing the volume of air taken from the train-pipe to the brake-cylinder, which results in an increase in the ultimate pressure in the brake-cylinder, as well as a quickening of the serial venting of the train-pipe throughout the train, because the air in passing from the train-pipe into the brake-cylinder encounters little or no pressure from the auxiliary reservoir. Owing to the loose fit of the piston-plug a^3 in the cylinder k, the air therein, which has been momentarily compressed to a point above train-pipe pressure, escapes, thereby establishing an equilibrium of pressure within the cylinder k and the train-pipe. When this equilibrium has been established, the differential pressures on the valve K and the piston k'' will cause the seating of the valve. This differential pressure is due to the fact that the passage k^4 between the cylinder k^3 and the train-pipe is so restricted that the pressure in the train-pipe is more rapidly reduced than is the pressure in said cylinder k^3, which latter pressure has been primarily increased by the opening action of valve K when assuming position shown in Fig. 2.

It will of course be understood that the passage k^4 is not a restricted channel, but is a space extending around the cylinder k^3 and has a cross-sectional area substantially equal to that in the tubular extension C^2 around the plug a^3 when the valve K is open, as shown in Fig. 2, so that the train-pipe air has an unobstructed passage on its way to the brake-cylinder. Should the train break in two or the train-pipe be otherwise broken, the check-valve b' would prevent the escape of air from the brake-cylinder and consequent release of the brakes. When a light spring is employed in the cylinder k^3 behind the piston k'', the check-valve may, if desired, be dispensed with.

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

1. The combination of a train-pipe, auxiliary reservoir, brake-cylinder and triple valve, with a piston having a rod or part engaging said triple valve to operate the same and having a passage through said piston and piston-rod connecting the train-pipe with the brake-cylinder and a differential piston-valve normally closing said passage, substantially as described.

2. The combination of the train-pipe, auxiliary reservoir, brake-cylinder, triple valve, and its operating-piston, with a hollow rod opening at one end to the train-pipe and at the other end to the brake-cylinder, a differential piston-valve controlling the passage of air through said hollow rod and normally having a preponderance of air-pressure on the brake-cylinder side of said valve, and means reversing the preponderance of air-pressure on said valve when the triple-valve piston is given its emergency traverse, substantially as described.

3. The combination of the train-pipe, auxiliary reservoir, brake-cylinder, triple valve and its operating-piston with a hollow piston-rod operatively connecting said piston and triple valve, said rod opening at one end to the train-pipe and at the other end to the brake-cylinder, a valve normally closing said hollow rod to the passage of air, a piston working in a cylinder exposed to train-pipe pressure and normally holding said valve to its seat, and a dash-pot device on the opposite side of said valve one member of which is attached to said valve and the other member to the triple-valve casing, substantially as described.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

WILLIAM B. MANN.

Witnesses:
HARRY C. MATHIEU,
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