J. B. KNUDSEN.

AIR BRAKE VALVE.

APPLICATION FILED OCT. 4, 1911.

1,037,929.

Patented Sept. 10, 1912.

3 SHEETS—SHEET 1.

Fig. 1.

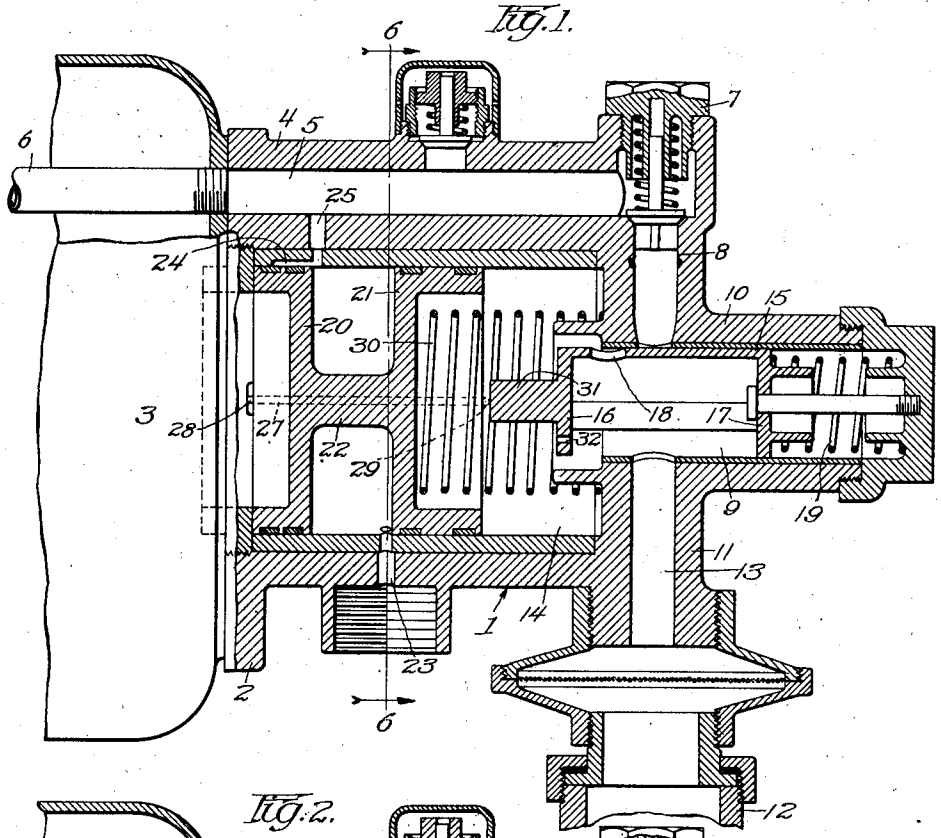
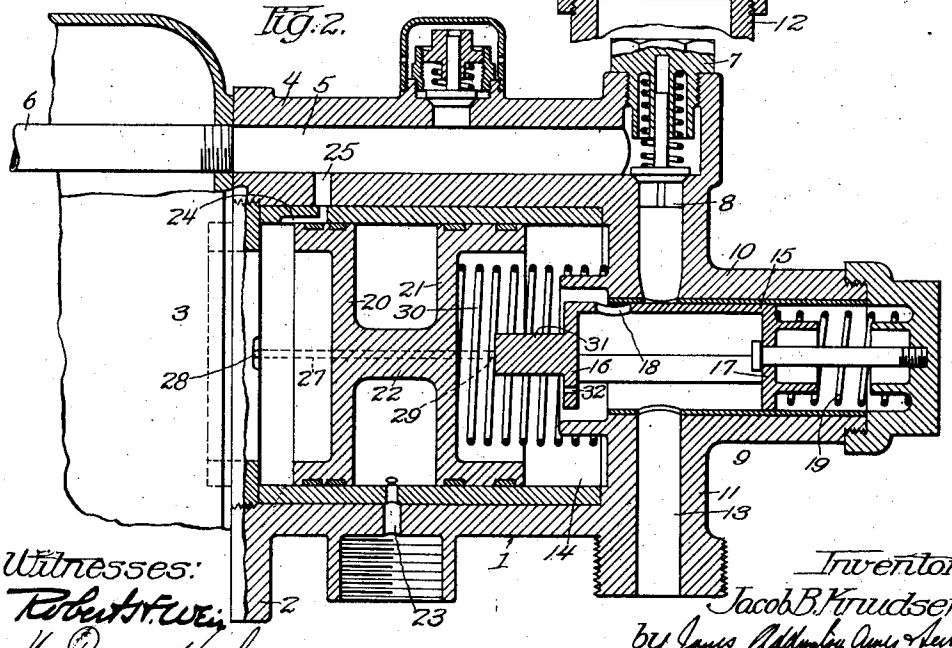


Fig. 2.



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3 SHEETS—SHEET 2.

Fig. 3.

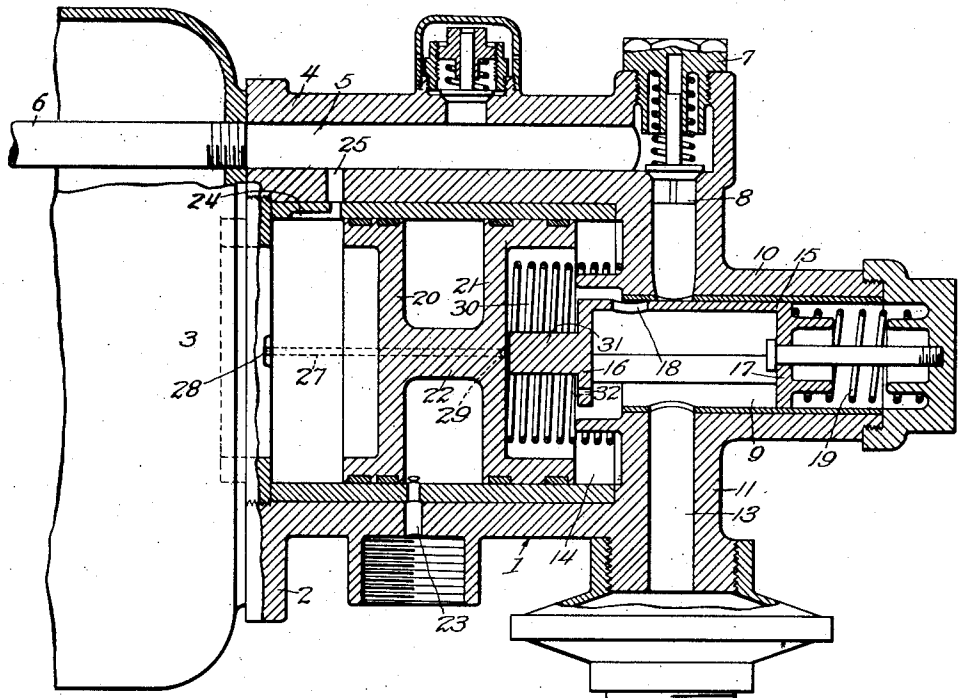
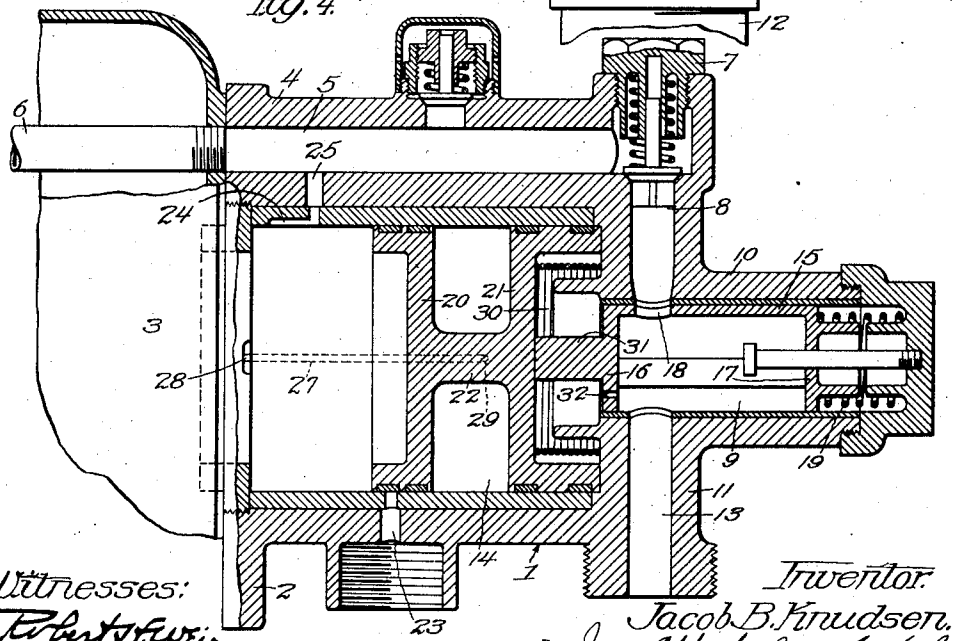


Fig. 4.



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3 SHEETS—SHEET 3.

Fig. 5

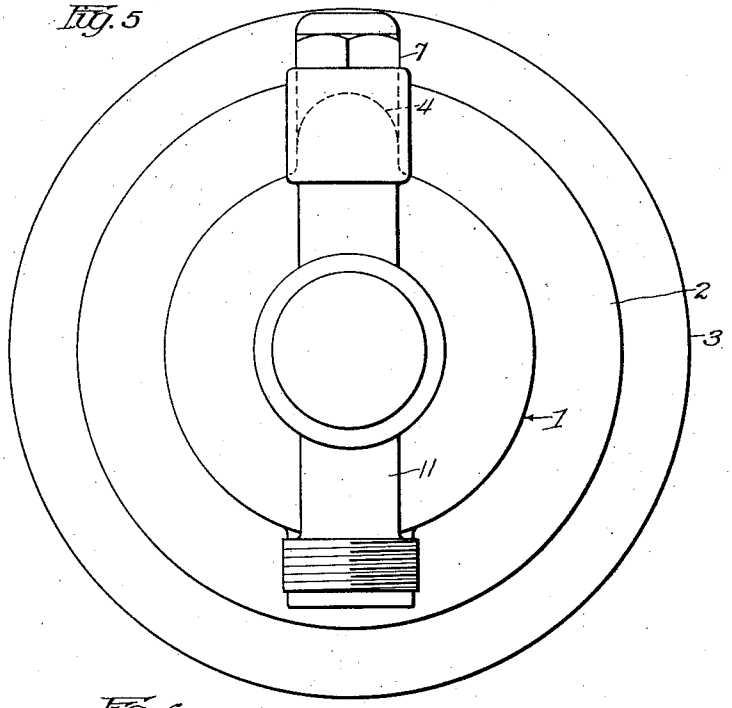
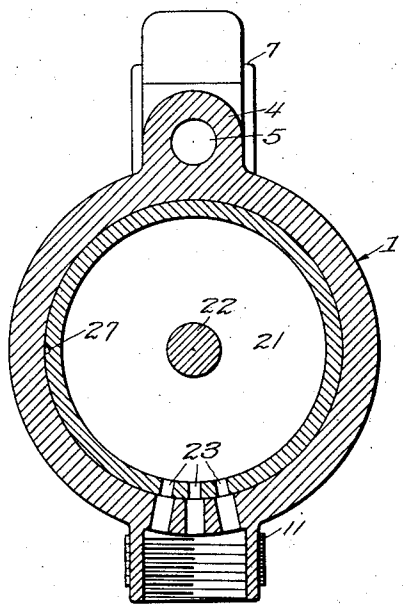


Fig. 6.



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UNITED STATES PATENT OFFICE.

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AIR-BRAKE VALVE.

1,037,929. Specification of Letters Patent. Patented Sept. 10, 1912.

Application filed October 4, 1911. Serial No. 652,749.

To all whom it may concern:

Be it known that I, JACOB B. KNUDSEN, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented new and useful Improvements in Air-Brake Valves, of which the following is a full, clear, concise, and exact description, reference being had to the accompanying drawing, forming a part of this specification.

My invention relates to improvements in air brake valves, and has for its object the construction of an improved and simplified valve for controlling the admission of air to the brake cylinders of railway cars and the like, which may be constructed of a small number of parts, which may be readily operated and which may be cheaply manufactured.

For the purpose of disclosing my invention I have illustrated one embodiment thereof in the accompanying drawings.

In said drawings—Figure 1 is a longitudinal sectional view of my valve, showing the same in release position; Fig. 2 is a similar view showing the valve in partial service position; Fig. 3 is a similar view showing the valve in service position; Fig. 4 is a similar view showing the valve in emergency position; Fig. 5 is a front elevation of the valve; and Fig. 6 is a sectional view taken on the line 6—6 of Fig. 1.

The main body or casing 1 of the valve is provided with a flange 2 by means of which it may be secured to the auxiliary reservoir 3 of the air brake. A pipe-like extension 4 preferably cast integrally with the casing is provided with a passage 5 which communicates with the brake cylinder pipe 6, and through a valve 7 with a passage 8 leading to a chamber 9 formed in an integrally cast extension 10 on the casing 1. A second pipe-like extension 11 is formed on the casing and is connected by a suitable union with the train pipe 12. This extension is provided with a passage 13 also leading to the chamber 9 and the chamber 9 in turn communicates with the piston chamber 14. A valve 15 in the chamber 9 comprising a semi-cylindrical member provided with a pair of circular heads 16 and 17 and having an opening 18, normally closes the chamber 9 against communication with the passage 8. This valve is held in normal or closed position by a coiled spring 19 interposed between the head 17 and the end of the extension 10.

The piston chamber is divided into three sections, namely, the train pipe section, the intermediate section and the auxiliary reservoir section, by a double headed piston comprising the two piston members 20 and 21 connected together by the restricted neck 22. The intermediate section of the chamber 14 is provided with exhaust ports 23, and the auxiliary reservoir section is provided with ports leading to the passage 5 and comprising longitudinally extending grooves 24 in the interior of the casing which communicate with radially extending openings 25 leading to the passage 5.

A feed port 27 comprising a longitudinal bore in the casing which meets the radial bores 28 and 29 connects the train pipe section of the chamber 14 with the auxiliary reservoir section thereof. The double headed piston is maintained in its normal position by a coiled spring 30 interposed between it and the end of the chamber, and the valve member 15 is provided with a nose or extension 31 formed on the head 16 which under certain predetermined conditions is engaged by the piston head 21 to move the valve to an open position.

In operation, with the parts in normal or released position as illustrated in Fig. 1, the ports 25 are closed by the piston head 20 so that air cannot escape from the auxiliary reservoir to the brake cylinders. The pressure in the train pipe is balanced by the pressure which has leaked into the auxiliary reservoir through the feed port so that all the parts are in a position of equilibrium. When it is desired to slightly apply the brakes the engineer by operating his brake valve reduces the pressure in the train pipe slightly so that the pressure in the auxiliary reservoir will be greater, thereby moving the double headed piston so that the piston head 20 slightly uncovers the extension 24 of ports 25 and a small amount of air is admitted to the brake cylinders. As the air, however, passes out of the auxiliary reservoir, the pressure in the train pipe will overcome the pressure in the auxiliary reservoir and the double headed piston will again move back to release position, closing the ports 25 against communication with the

auxiliary reservoir and opening them into communication with the intermediate section of the chamber so that the air will escape through the escape ports 23, again releasing the brake. When it is desired to throw the brakes to service position or to apply the brakes for stopping, the engineer again operates his brake valve to reduce the pressure to a greater extent in the train pipe so that the pressure in the auxiliary reservoir will move the double headed cylinder to the position illustrated in Fig. 3, wherein the head 20 is shown as completely uncovering the ports 25 admitting the full pressure from the auxiliary reservoir to the brake cylinder and setting the brakes. When it is desired to release the brakes, the engineer will of course admit pressure into the train pipes sufficient to force the double headed cylinder back to release position, wherein the ports 25 will be opened to communicate with the intermediate section of the cylinder and thereby with the exhaust ports 23. The air will leak through the feed port 26 until the pressure in the auxiliary reservoir equals that in the train pipe.

In event it is desired to throw the valve to emergency position for a quick stop, the engineer operates his brake valve to quickly reduce the pressure in the train pipe, whereby under the influence of the pressure in the auxiliary reservoir the double headed cylinder will be driven forward in the chamber 14 until the cylinder head 21 strikes the nose 31 on the head 16 and moves the valve 15 to the position illustrated in Fig. 4, wherein it will be noted that the opening 18 coincides with the passage 8, and the remaining pressure in the train pipe immediately passes by way of the passage 8 and passage 5 directly to the brake cylinder. At the same time the ports 25 are opened to the auxiliary reservoir so that the air pressure in the auxiliary reservoir may also flow to the brake cylinders. To restore the parts to release position from the position illustrated in Fig. 4, air is again admitted to the train pipe and either by leaking past the head 16 or passing by way of small leak ports 32 formed in the head 16, the pressure on the piston head 21, gradually overcomes the pressure on the piston head 20 and the piston is moved back to release position or the position illustrated in Fig. 1.

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

1. In a device of the character described, the combination with a valve casing having a chamber formed therein communicating at one end with an auxiliary reservoir and at the other end with a train pipe, said chamber having ports leading therefrom to the brake cylinder and exhaust ports, a double-headed piston operating in said chamber and when the valve is in release position arranged to close the ports leading to the brake cylinder against communication with the auxiliary reservoir, a by-pass communicating with said chamber on each side of said piston and arranged to be closed when said piston is moved to service position and independent normally closed connection between the train pipe and brake cylinder pipe.

2. In a device of the character described, the combination with a valve casing having a chamber formed therein, a piston operating in said chamber and comprising a pair of piston heads connected together by a restricted member, said chamber being arranged to be connected with the auxiliary reservoir, ports connecting said chamber with the brake cylinder and ports leading from said chamber to the atmosphere, said ports being so arranged that when the piston is in release position the brake cylinder port is opened to that portion of the chamber having the exhaust ports formed therein and when the piston is moved to service position the brake cylinder ports are opened to that portion of the cylinder communicating with the auxiliary reservoir and an independent normally closed connection between the train pipe and brake cylinder pipe.

3. In a device of the character described, the combination with a valve casing having a chamber formed therein, of a double-headed piston operating in said chamber and dividing the chamber into three sections, the train pipe connected section, the auxiliary reservoir section and the intermediate section, ports in said chamber communicating with the brake cylinder and a second set of ports communicating with the atmosphere, one of the heads of the piston being so arranged that when the piston is in release position the brake cylinder ports communicate with the intermediate portion of the chamber and when the piston is in service or lap position the brake cylinder ports are closed to the intermediate portion of the chamber and are opened to the auxiliary reservoir section and an independent normally closed by-pass extending between the train pipe and the brake cylinder pipe.

4. In a device of the character described, the combination with a valve casing having a chamber formed therein, a connection between said chamber and the train pipe, a direct connection between the train pipe and the brake cylinder, a port formed in said casing and connecting the brake cylinder with said chamber, a double-headed piston operating in said chamber and dividing the same into three sections—the train pipe section, the intermediate section and the auxiliary reservoir section, exhaust ports formed in said chamber in the intermediate section, said direct connection between the train pipe

and the brake cylinder being normally closed by a valve arranged to be opened by direct engagement of the piston.

5. In a device of the character described, the combination with a valve casing having a chamber formed therein, of a double-headed valve piston operating in said chamber and dividing the chamber into three sections—the train pipe section, the intermediate section and the auxiliary reservoir section, a port for said chamber leading to the brake cylinder and arranged to communicate with either the auxiliary reservoir section or the intermediate section, depending upon the position of the piston, an exhaust port communicating with said intermediate section and an independent normally closed by-pass extending between the train pipe and brake cylinder pipe.

6. In a device of the character described, the combination with a valve casing having a chamber formed therein, of a double-headed piston operating in said chamber and dividing the chamber into three sections—the train pipe section, the intermediate section and the auxiliary reservoir section, brake cylinder ports formed in said casing arranged to connect the brake cylinder with either the intermediate section or the auxiliary reservoir section of said chamber, depending upon the position of said piston, exhaust ports connecting said intermediate section with the atmosphere, a by-pass arranged when the valve is in release position to connect said train pipe section with the auxiliary reservoir section and an independent normally closed by-pass extending between the train pipe and the brake cylinder pipe, and means operated by the piston for opening said by-pass.

7. In a device of the character described, the combination with a valve casing, of a chamber formed therein and communicating with the auxiliary reservoir, the train pipe and the brake cylinder, a double-headed piston valve operating in said chamber and arranged to control the communication between said chamber and the brake cylinder, a direct connection between the train pipe port and the brake cylinder port, a valve controlling said connection normally closed and arranged to be opened by direct engagement between said double-headed piston and said valve.

8. In a device of the character described, the combination with a casing having a chamber formed therein, a port leading from said chamber to the brake cylinder, a second port leading from said chamber to the atmosphere, a double-headed piston operating in said chamber and arranged to open the brake cylinder port to the auxiliary reservoir or to open the brake cylinder port to the atmosphere, a by-pass connecting the two ends of said chamber around the piston, said by-pass being adapted to be closed by said piston when the brake cylinder port is opened to the auxiliary reservoir, an independent by-pass between the train pipe and the brake cylinder pipe, and a valve for maintaining said by-pass normally closed and arranged to be operated by said piston.

9. A valve arranged to be interposed between the train pipe the auxiliary reservoir and the brake cylinder of an air brake system, said valve having a direct path for the passage of the air from the train pipe to the brake cylinder normally closed by a valve member, and a second passage from the train pipe to the auxiliary reservoir and thence to the brake cylinder, said passage being controlled by a second movable valve member which when moved in one position closes the passage from the auxiliary reservoir to the brake cylinder and leaves the passage from the train pipe to the auxiliary reservoir opened and when moved to a second position opens the passage from the auxiliary reservoir to the brake cylinder and closes the passage from the train pipe to the auxiliary reservoir, said first mentioned valve being arranged to be opened by being directly engaged by the second mentioned valve member.

In witness whereof, I have hereunto subscribed my name in the presence of two witnesses.

JACOB B. KNUDSEN.

Witnesses:
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