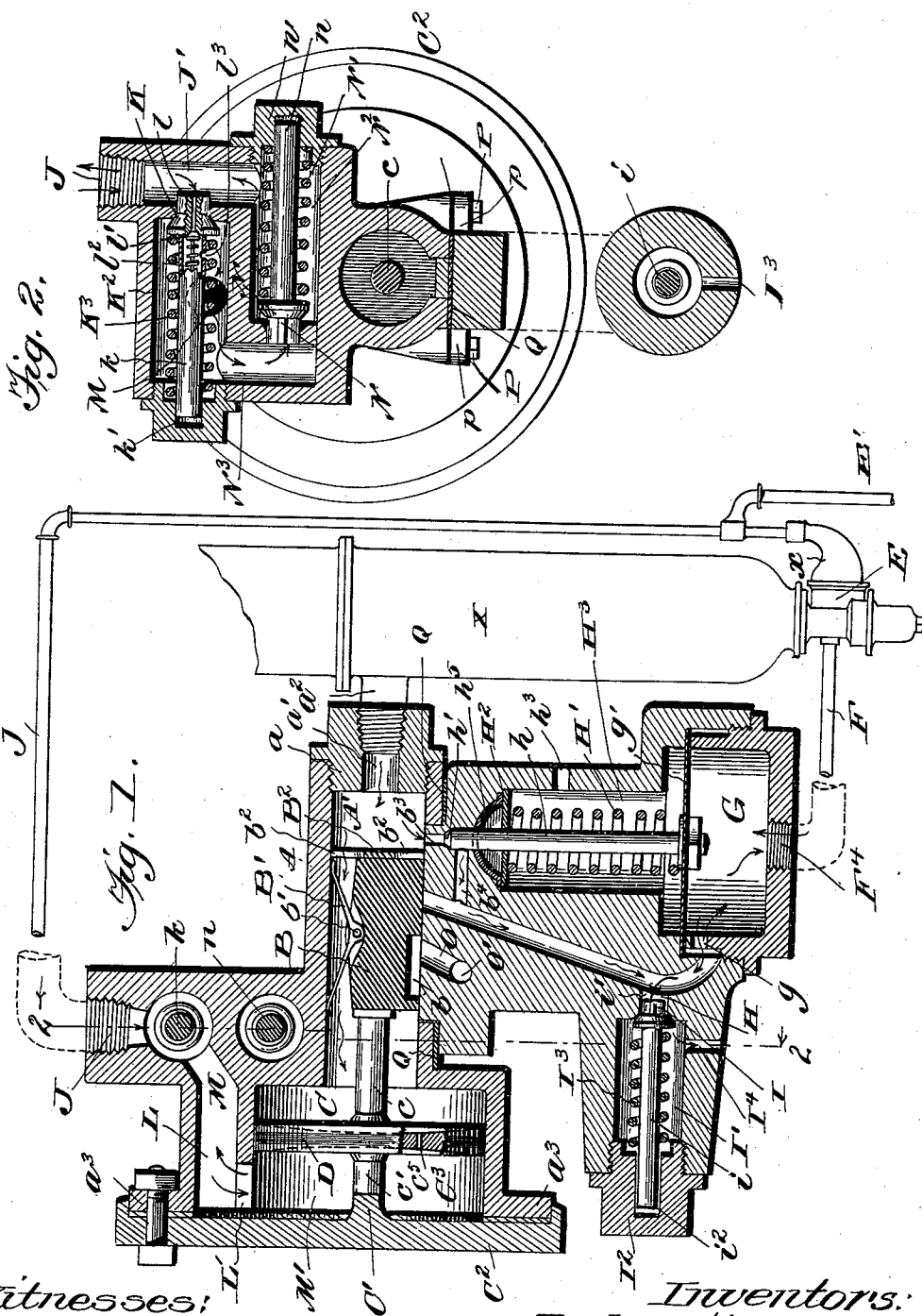


(No Model.)

J. A. STARRETT & E. F. WELSH.
VALVE.

No. 578,274.

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UNITED STATES PATENT OFFICE,

JACOB A. STARRETT AND EDWIN F. WELSH, OF WILMERDING, PENNSYLVANIA, ASSIGNORS OF ONE-EIGHTH TO WILLIAM F. KIMMICK, OF SAME PLACE.

VALVE.

SPECIFICATION forming part of Letters Patent No. 578,274, dated March 2, 1897.

Application filed December 14, 1896. Serial No. 615,648. (No model.)

To all whom it may concern:

Be it known that we, JACOB A. STARRETT and EDWIN F. WELSH, citizens of the United States, residing at Wilmerding, in the county of Allegheny, State of Pennsylvania, have invented certain new and useful Improvements in Valves, of which the following is a specification, reference being had therein to the accompanying drawings.

10 This invention relates to certain new and useful improvements in pressure-valves for air-brakes.

It has for its objects, among others, to provide a simplified and cheapened construction of this class of valves whereby better results are attained at a minimum expense and with less liability of parts becoming deranged or inoperative. Our improvement embodies but few parts, those readily assembled and compact in their assembled form.

20 Other objects and advantages of the invention will hereinafter appear in the following description, and the novel features thereof will be particularly pointed out in the appended claims.

The invention is clearly illustrated in the accompanying drawings, which, with the letters of reference marked thereon, form part of this specification, and in which—

30 Figure 1 is a substantially central section through our improvements, with portions in diagram and the auxiliary reservoir and triple valve and connections in elevation, with portions broken away, these latter parts being shown upon a greatly-reduced scale for convenience of illustration; and Fig. 2 is a section on the line 2 2 of Fig. 1, looking in the direction of the arrows.

Like letters of reference indicate like parts throughout the two views.

Referring now to the details of the drawings by letter, A designates the body portion or casting or casing of the device, having the chamber A', in the end of which is removably held the nipple or neck a, having the passage a', which is designed for connection by branch a² with the auxiliary reservoir X.

B is a slide-valve mounted to reciprocate in the chamber A', having upon its under side the port b and held to its seat upon the bot-

tom wall of said chamber by the spring B', secured, as at b', in a socket or concavity in the upper face of the valve and its ends bearing against the upper wall of the chamber, as clearly seen in Fig. 1.

B² is a plate upon the end of the valve, as indicated, to serve as a guide therefor in its reciprocations, and this is provided with openings b² to afford communication between the port a' and the chamber C, as indicated by arrows in Fig. 1.

D is a piston mounted to move steam and air tight in the chamber C, being connected with the valve by the stem c, while the opposite side of the piston carries the boss or projection c', adapted to engage the stop C' upon the inner face of the cap C² to limit the movement of the piston toward the left in Fig. 1. This cap is removably secured in position, and a packing-ring or washer C³ is provided, which is held between the inner face of the said cap and the outer face of the flanges a³ of the case or chamber, as indicated. The piston has an equalizing-port c⁵.

E is the triple valve, of known construction, having suitable connection E' with the train-pipe.

F is a connection from this triple valve with the chamber G, which has connection through the port g and port H with the chamber I', as indicated in Fig. 1. Within this chamber G is the diaphragm g', and to this diaphragm is connected the valve-stem h, carrying the valve h', controlling the port b³ from the chamber A' and the port b⁴ into the port H, all as clearly seen in Fig. 1.

H' is a spring around this valve-stem and confined between the diaphragm and a plate or washer H², as clearly shown in Fig. 1. The area of this diaphragm is sufficient to overcome the pressure on the point of the valve h' and the tension of the spring H'.

h³ is an exhaust leading from the chamber H³, as indicated.

I is the retaining-valve. It is carried by the valve-stem i, mounted in a chamber I' at right angles to the chamber H³, as shown, and this valve closes the port i', which communicates with the port H. The end of the stem works in an opening i² in the removable

cap I² on the end of this chamber, and around the stem is a spring I³, which is of greater tension than the spring H' on the valve h'.

I⁴ is an exhaust-port from the chamber I'.

5 J is a port connected with the train-pipe by suitable pipe j. This port communicates with the chamber J', as indicated best in Fig. 2.

10 K is a valve closing a port which affords communication between the chamber J' and the chamber K², in which the valve-stem k of said valve works, the other end of the stem being guided in a socket in the cap k', as seen best in Fig. 2.

15 K³ is a spring around the stem of said valve, serving to normally hold it to its seat. This valve K has a passage l therethrough, which is controlled by the valve l' and forced to its seat by a spring l², the stem k of the valve K being made hollow for a portion of its length, as indicated in Fig. 2, and having an outlet-
20 port l³, communicating with the chamber K².

M is a port affording communication between the chamber K² and the port L, which by passage L' communicates with the chamber M' upon the side of the piston opposite
25 the chamber C, as clearly indicated in Fig. 1.

30 N is a valve carried by the valve-stem n, guided in a slot in the cap n' and forced to its seat by a spring N' around said stem. This valve closes the port which affords communication between the chamber N² and the port N³, as seen in Fig. 2. The chamber N² communicates also with the chamber J', as indicated.

35 O is an exhaust-port from the chamber A' and communicating with the port O', opening into the atmosphere.

40 The two sections of the body portion or casing of the valve are detachably united in any suitable manner, as, for instance, by means of the bolts P, which pass through lugs p on the adjacent faces of the two sections, as seen in Fig. 2, and the seat is formed on the lower section, as shown, so that it can
45 be fitted up externally instead of internally, so that facing or truing of the seat is avoided, and when the two parts are in position with the gasket Q therebetween, as indicated, a perfectly tight joint is provided and one
50 where ready access may be had thereto to renew the gasket or for other purposes, as may be required.

55 With the parts constructed and arranged substantially as above set forth and described the operation is as follows: With the opening of the engineer's valve the air enters the train-pipe, passes through the triple valve at the connection x, and is fed through the small
60 port in the triple valve into the auxiliary reservoir X. At the same time it passes into the pressure-valve at J and is fed by the feed-valve l', located in the valve K, as shown, and passes through the port M and through the ports L L', filling the chamber M'. Reservoir-
65 pressure at the same time enters the pressure-valve at a² through the ports a' and into the chamber C, thus equalizing the pressure on

each side of the piston D. Upon reduction of air in the train-pipe the feed-port in the triple valve is closed, and also the feed-valve 70 l' in the pressure-valve is closed, and valve N is forced open by the air in the chamber M', which is of greater pressure than the reduced pressure in the train-pipe. After the valve N opens the pressure is reduced in the chamber M' by passing out through the port L', 75 the port L, port M, port N³, chamber N², and ports J' and J to the train-pipe. The pressure in the chamber M' being thus reduced, reservoir-pressure in chambers A' and C 80 forces the piston D to the left until its projection c' engages the stop C', thus placing the valve in position as shown in Fig. 1, or what is termed "application position." By the use of a release graduating-port in the engineer's 85 valve the triple valve is now released by pressure thrown into the train-pipe from the main reservoir on the engine. The spring K' on the valve K, being of a tension to resist the graduating-release, prevents the opening of 90 the valve K and leaves the pressure-valve in the position seen in Fig. 1. The triple-valve system now being released, the cylinder-pressure is placed in communication with the pressure-valve from the triple exhaust, filling the 95 chamber G and the port H. The valve I, which is the retaining-valve, has its spring of such a tension as to resist ten or more pounds pressure. All pressure in excess of the tension of this spring passes through the port i' 100 and exhausts through the port I⁴ to the atmosphere, the pressure retained in the cylinder acting as the braking power. The area of the diaphragm g', as above stated, is of an area to overcome the pressure on the point of the 105 valve h' and the tension of the spring.

Should leakage occur in the cylinder, pressure in the chamber G reduces below the tension of the spring H' on the valve h', thereby permitting the spring to open said valve, causing the reservoir-pressure to enter the port 110 b³ and port b⁴ into the port H to chamber G, thus taking up leakage, and the pressure thus formed in the chamber G under the diaphragm g' thereof closes the valve h' and at the same 115 time closes communication between the chamber A' by way of ports b³ and b⁴. This action of the diaphragm is repeated every time that leakage occurs, being automatic in its action.

120 To release the valve, the engineer's valve is placed in full release position. The air enters the train-pipe from the main reservoir in excess of ordinary train-pipe pressure and passes into the port J, overcoming the spring K' on the valve K, and passes through the 125 port M into the chamber M' and forces the piston D to the right against the wall of the chamber C, opening communication of port H and exhaust-port O O' and closing communication between the chamber H' and the 130 port b³ by reason of the port b in the under side of the slide-valve B, thus opening free exhaust from the brake-cylinder through the triple exhaust G, port H, port b, and ports O

and O' in the pressure-valve to the atmosphere. The port H³ opening to the atmosphere prevents top pressure from accumulating on top of the diaphragm G'. The plate 5 or washer H² bears against and holds in position a cup-washer h⁵, and through this plate and washer passes the stem h of the valve h', the cup-washer insuring a tight joint and preventing leakage at this point or pressure 10 accumulating on top of the diaphragm. The spring K³, which serves to hold the valve K to its seat, is of such a tension as to resist the graduating-release.

The valve N', which acts upon the valve N, 15 is of such a tension as to normally hold it to its seat.

Modifications in detail may be resorted to without departing from the spirit of the invention or sacrificing any of its advantages. 20 Having thus described our invention, what we claim as new, and desire to secure by Letters Patent of the United States, is—

1. In a valve mechanism of the class described, the combination with a piston and a 25 slide-valve connected to move therewith, of a retaining-valve, a port leading from the chamber in which the slide-valve works, a connection between the port and the chamber of the retaining-valve, and a regulating-valve arranged in a chamber having communication 30 with said port and with the chamber in which the slide-valve works; substantially as described.

2. In a valve mechanism of the class described, the combination of a piston and a 35 slide-valve mounted to move therewith, and having a port upon its under face, of a chamber connected with the triple valve, a port affording communication between said chamber and the chamber of the slide-valve, a 40 chamber connected with said port, and having a retaining-valve therein, and a port affording communication between said port and the chamber of the slide-valve; substantially 45 as described.

3. The combination with the piston and the slide-valve connected to move together, of an auxiliary reservoir connected with the chamber 50 in which said valve works, a chamber connected with the triple valve, a port connecting said chambers, a by-port connecting said port and valve-chamber, and a valve connected to a diaphragm in the chamber connected with 55 the triple-valve exhaust and controlling said by-port; substantially as set forth.

4. The combination with the piston and the slide-valve connected to move together, of an auxiliary reservoir connected with the chamber 60 in which said valve works, a chamber connected with the triple valve, a port connecting said chambers, a by-port connecting said port and valve-chamber, a valve connected to a diaphragm and controlling said by-port, and a chamber connected with the first-men- 65 tioned port, and provided with a retaining-valve; substantially as described.

5. The combination with the piston and the slide-valve mounted to move together, and the valve having a port upon its under face, 70 of an auxiliary reservoir connected with the valve-chamber, a chamber connected with the triple valve, a diaphragm in said chamber, a valve connected with the diaphragm and controlling a port from the valve-chamber, a port 75 connecting said chambers, and connected with the port from the valve-chamber, an exhaust-port from said valve-chamber, and a retaining-valve disposed at right angles to said port; substantially as described.

6. The combination with the main chamber 80 and the piston and slide-valve, of an auxiliary reservoir connected with said chamber, the oppositely-disposed valves controlling the passage between the chamber on the left of 85 the piston and the train-pipe, and a connection between the same and the train-pipe; substantially as described.

7. The combination with the main chamber and the piston, and slide-valve, of an auxiliary reservoir connected with said chamber, 90 the oppositely-disposed valves controlling the passage between the chamber on the left of the piston and the train-pipe, a connection between the same and the train-pipe, and a retaining-valve arranged parallel with the stem 95 of the piston; substantially as described.

8. The combination with the valve-chamber and the piston and slide-valve connected to move together, of the auxiliary reservoir connected to said chamber upon one side of the 100 piston, a connection with the train-pipe upon the opposite side of the piston and oppositely-disposed valves controlling the passage from the train-pipe to said chamber; substantially 105 as described.

9. The combination with the valve-chamber and the piston and slide-valve connected to move together, of the auxiliary reservoir connected to said chamber upon one side of the 110 piston, a connection with the train-pipe upon the opposite side of the piston, and oppositely-disposed valves controlling the passage from the train-pipe to said chamber, one of said valves being provided with a supplementary 115 feed-valve; substantially as described.

10. The combination with the valve-chamber and the piston, and slide-valve mounted to move together, of the guide on the end of 120 said valve having openings, the auxiliary reservoir, a connection between the same and the chamber at one end of said valve, and connection between the train-pipe and the 125 other end of said chamber and oppositely-disposed valves controlling the passage from the train-pipe connection to the chamber on the left side of the piston; substantially as described.

11. The combination with the main casting having valve-chamber, the auxiliary reservoir connected to one end of said chamber, the 130 piston and valve connected to move together in said chamber, the valve having a port upon

its under side, the connection with the train-pipe, the valve having a feed-valve, the connection between its chamber and one side of the piston, the oppositely-disposed valve, the exhaust-port from the valve-chamber communicating with the port in the slide-valve, the chamber connected with the triple valve, a port between the same and the valve-chamber, and a retaining-valve controlling a port connected with said port; substantially as described.

12. The combination with the cylinder and triple valve, of a valve controlling the release of fluid from the train-pipe, a movable piston normally exposed to fluid under pressure and controlling the release-valve, and a passage for releasing fluid under pressure from one side of the movable piston, and a valve-controlled passage and by-port upon the opposite side of the piston and a retaining-valve and chamber communicating with said port; substantially as described.

13. The combination with the train-pipe, cylinder, and triple valve, of the main chamber of the valve a chamber connected with the triple-valve exhaust and the passage-way connecting said main chamber with the chamber connected with the triple-valve exhaust, and an automatic regulating-valve interposed

between said exhaust and the main chamber of the valve; substantially as described.

14. The combination with the chamber with its slide-valve, of the auxiliary reservoir connected with said chamber, the triple valve, a connection with the exhaust thereof, a chamber communicating with said connection, and an automatic, regulating-valve interposed between the exhaust connection and the said chamber; substantially as described.

15. The combination with the chamber and its slide-valve of the auxiliary reservoir connected with said chamber, the triple valve, a connection with the exhaust thereof, a chamber communicating with said connection, an automatic regulating-valve interposed between the exhaust connection and the said chamber, and a port connecting said chambers with a by-port leading from said port and controlled by said valve; substantially as described.

In testimony whereof we affix our signatures in presence of two witnesses.

JACOB A. STARRETT.
EDWIN F. WELSH.

Witnesses:

J. M. LARIMER,
W. H. SEMMENS.