(No Model.) 2 Sheets—Sheet 1.

W. C. WHITACRE.

ENGINEER'S VALVE.

No. 494,502. Patented Mar. 28, 1893.

Fig. 1.

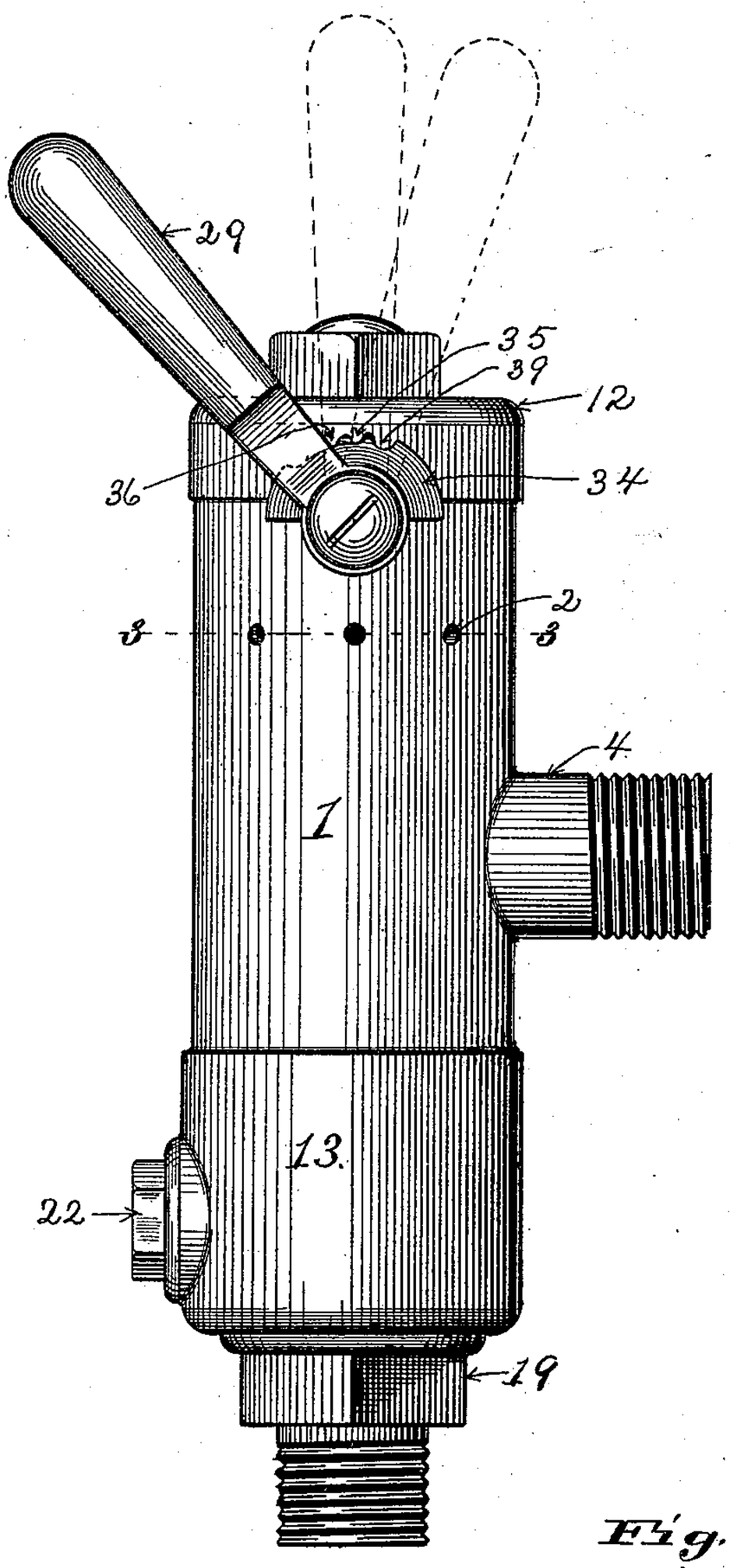


Fig. 2.

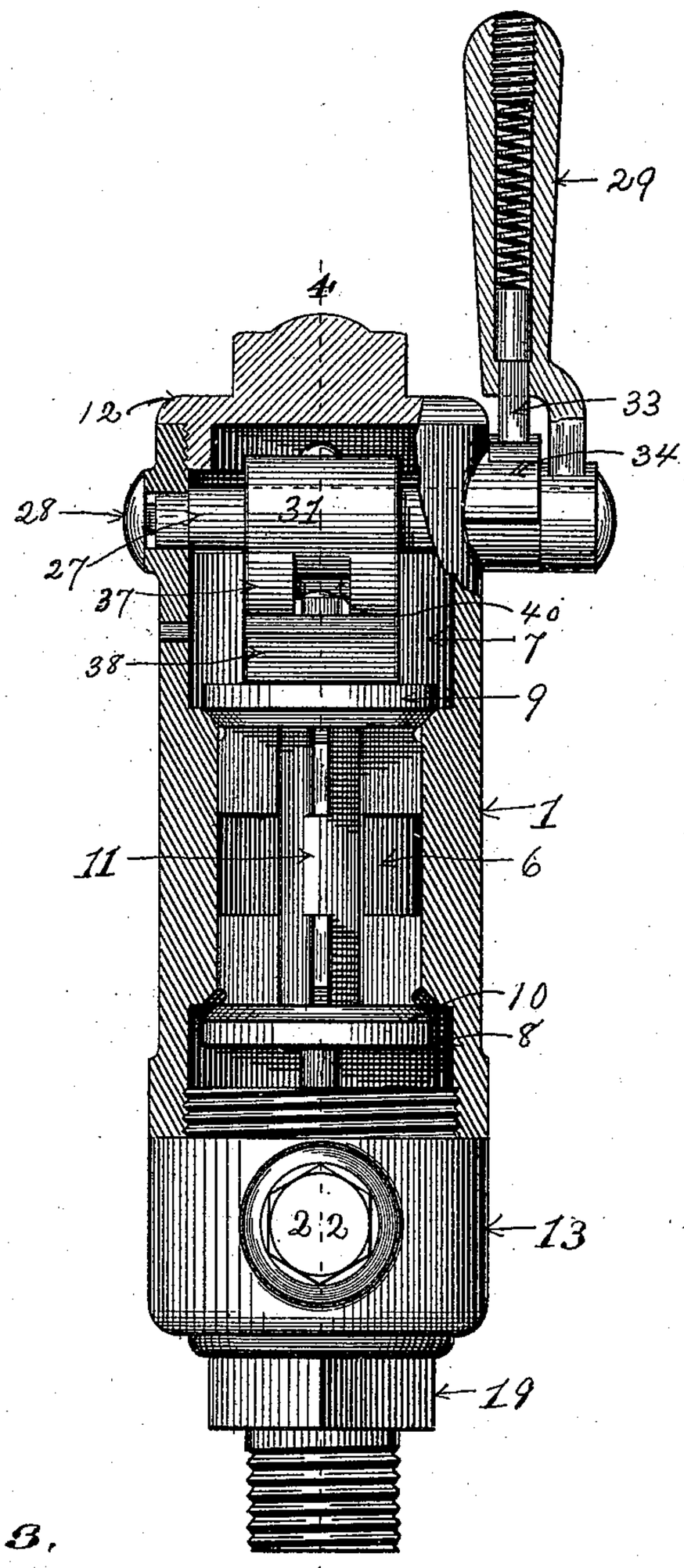
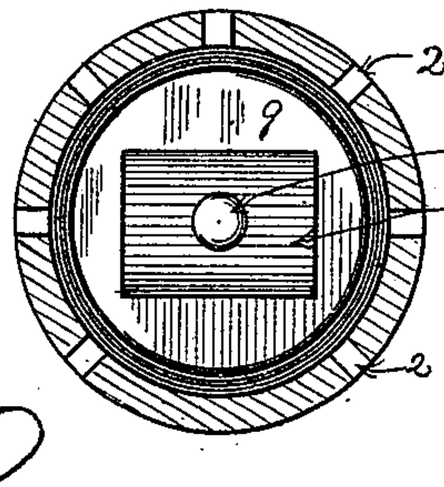


Fig. 3.



Attest:

W. M. Byrne

H. W. Wagner.

Inventor:

William C. Whitacre,

By Alfred Ramel

Atty.

(No Model.) 2 Sheets—Sheet 2.

W. C. WHITACRE.

ENGINEER'S VALVE.

No. 494,502. Patented Mar. 28, 1893.

Fig. 4.

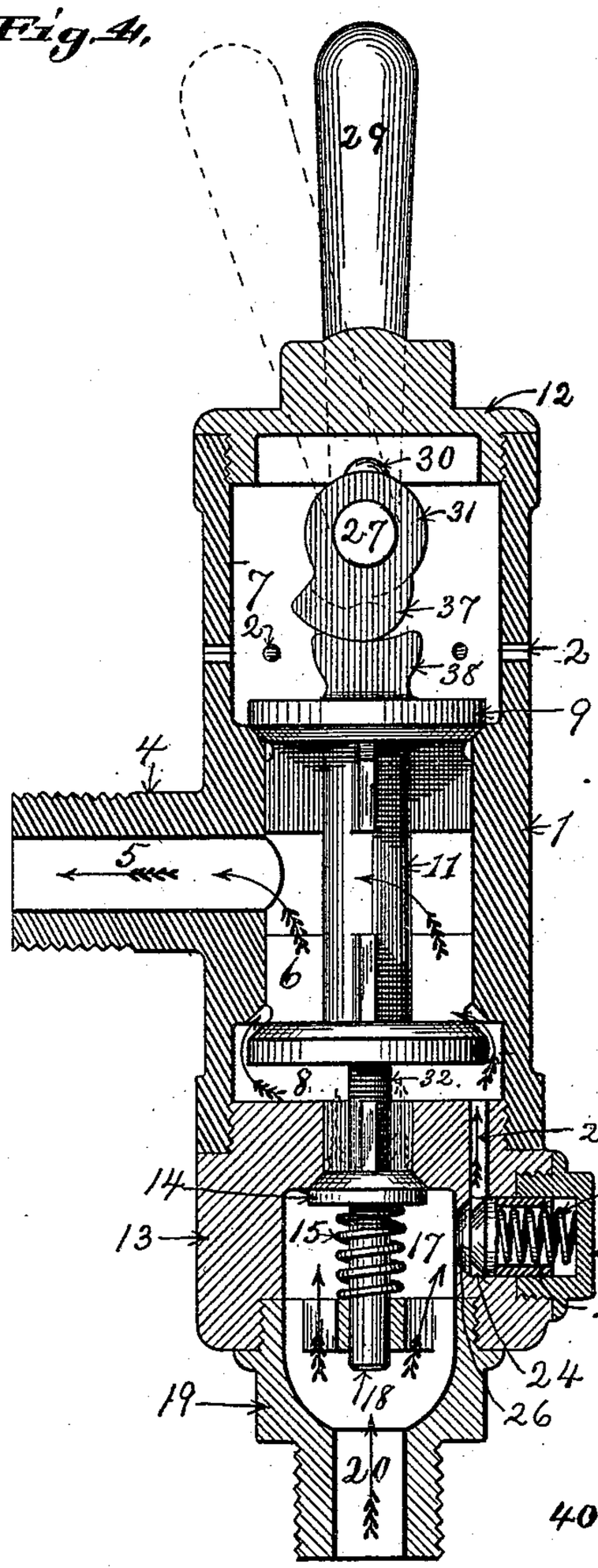


Fig. 5.

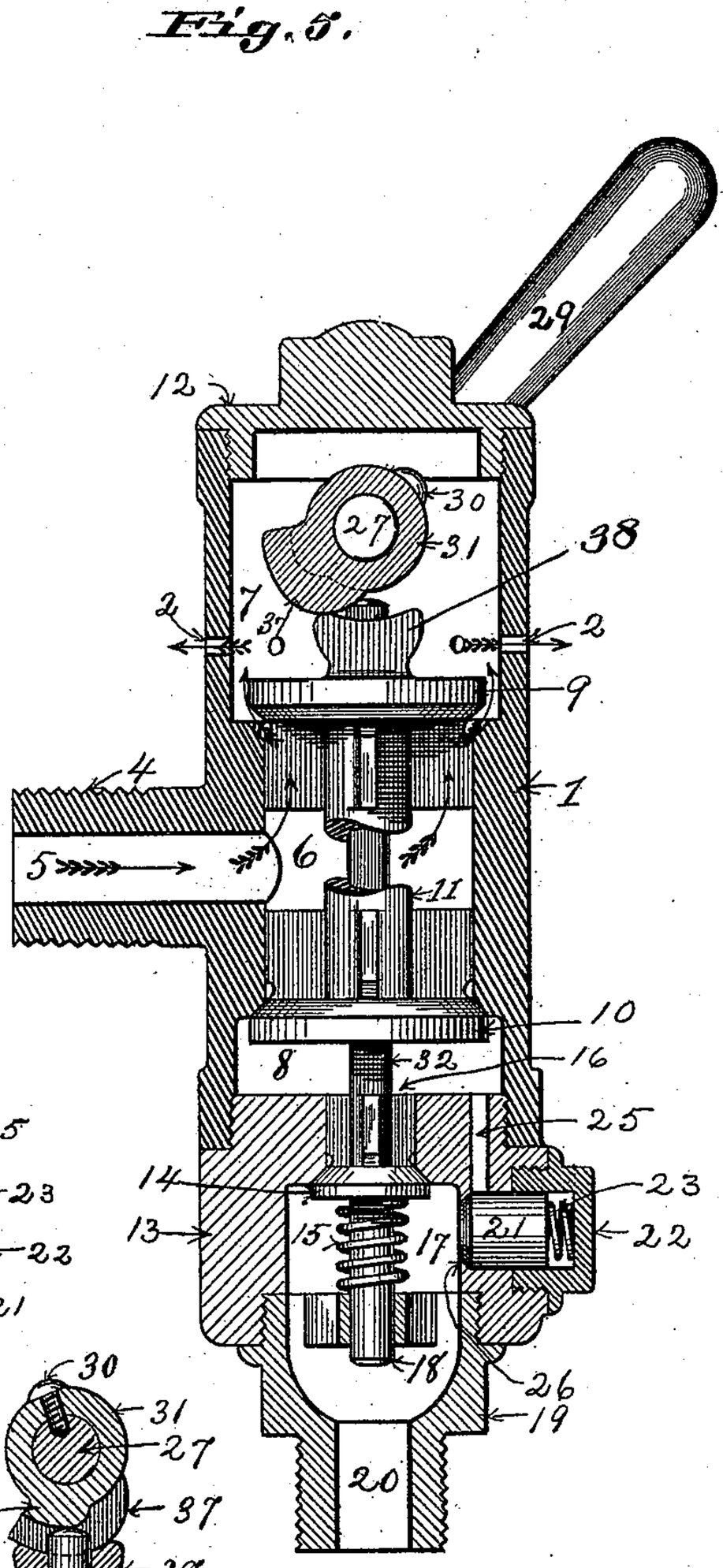
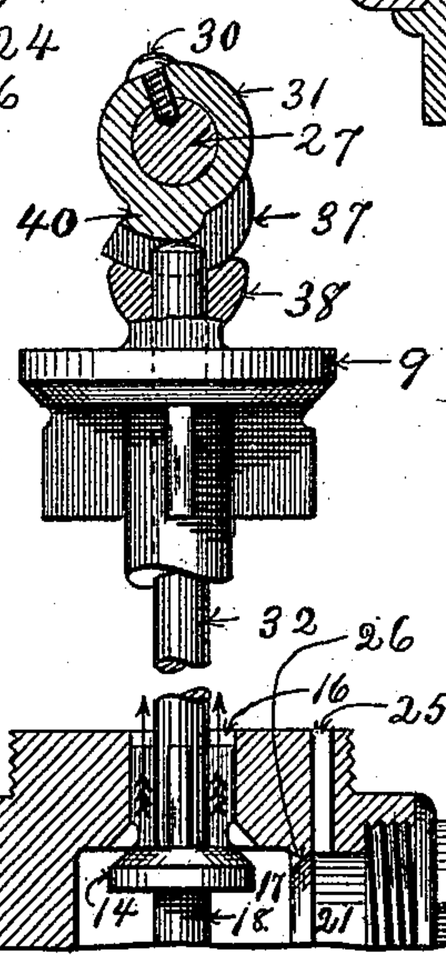


Fig. 6.



Attest:
W. M. Byrne.
H. K. Wagner.

Inventor:
William C. Whitacre,
By Alfred Ramel
Atty.

UNITED STATES PATENT OFFICE.

WILLIAM C. WHITACRE, OF ST. LOUIS, MISSOURI, ASSIGNOR OF TWO-THIRDS TO SHEPARD KNAPP AND JOHN F. BAUMGARTNER, OF SAME PLACE.

ENGINEER'S VALVE.

SPECIFICATION forming part of Letters Patent No. 494,502, dated March 28, 1893.

Application filed April 12, 1892. Serial No. 428,855. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM C. WHITACRE, a citizen of the United States, residing in the city of St. Louis and State of Missouri, have invented certain new and useful Improvements in Engineers' Valves, of which the following is a full, clear, and exact description.

My invention relates to improvements in and to devices, to be used by engineers on locomotives, for controlling the air to the train pipe from the main reservoir in pneumatic air brake systems.

It has for its object to simplify and, consequently, cheapen its construction, and in the valve, as a whole, to make provision, in combination with means for regularly admitting air to the train pipe under a given pressure, for readily turning into the train pipe the full pressure from the main reservoir.

The invention consists in the details of improvement in construction and consequent operation, in such a device, hereinafter described.

In the accompanying drawings, in which like numbers of reference denote like parts in the several views, Figure 1 is a side elevation of the handle side of my new valve. Fig. 2 is a diametrical section, partly in elevation, taken on a line corresponding to the axis of the valve operating cam shaft. Fig. 3 is cross-section taken as on the line 3—3 in Fig. 1. Figs. 4 and 5 are similar vertical diametrical sections, taken as on the line 4—5 in Fig. 2, at right angles to the valve-operating cam shaft; and Fig. 6 is a detail sectional view, taken similar to Figs. 4 and 5, showing the method of operation of the auxiliary full pressure valve, hereinafter described.

1 is the cylindrically formed casing of the main part of the valve, which is open at both ends and has formed, near its upper end, in the side walls thereof, the outlet openings 2. The casing 1 is also formed with a laterally-projecting nozzle 4, to which the end of the train-pipe may be secured. This nozzle 4 is formed hollow, thereby affording a communicating opening or port 5 from the interior of the valve to the train pipe and parts connected therewith. The interior of the valve casing 1 is bored out, or otherwise formed, concentrically to two different diameters, forming the main valve chamber relatively reduced, diametrically, in the middle portion of its length, as at 6, and relatively enlarged at either end, as at 7 and 8. The shoulders formed at either end by the relatively enlarged portions 7 and 8 form a seat for the two winged puppet valves 9 and 10, respectively, which are rigidly connected to a common valve stem, 11. The upper surface of the upper valve 9 is formed with a projection 38 the upper surface of which is formed curved, substantially concentric with the axis of the cam shaft 27, hereinafter described, whereby the longitudinal movement of the valves 9 and 10 is not due to any eccentricity in the contact-face of the projection 38. The upper end of the valve casing is closed by the screw cap 12, and into the lower end is screwed the closing piece 13 which practically forms an extension of the casing 1 and which is formed hollow to a convenient distance from its lower end to form a convenient valve chamber 17 for the spring winged valve 14. The valve 14 is vertically placed and operates, by the spring 15, to close the opening 16 (see Fig. 6) formed through the upper end of the closing piece 13, communicating directly between the valve chamber therein and the main valve chamber 8—6. It is in the lower circumferential edge of this perforation 16 that the seat for the valve 14 is formed. The valve 14 is formed with a longitudinally upwardly extending stem 32 which projects up through a central longitudinal perforation formed therefor in the valve stem 11 and a downwardly extending stem portion 18, around which the valve spring 15 is placed, and which has a guide bearing in a central perforation formed therefor in the upper perforate end of the closing block 19. The block 19 forms the lower extremity of the valve as a whole, to which the pipe connecting it to the main reservoir is connected, and through which the communicating port 20 therebetween is formed. In the side wall of the piece 13 is formed a laterally extending perforation 24 into which is fitted the spring seated cup valve 21. The outer end of the perforation is closed by the screw cap 22, between which and the valve 21 is placed the spiral spring 23. The extreme

inner end of the perforation is diametrically reduced to form a convenient seat 26 for the valve 21. In the side wall of the piece 13 is also formed the longitudinally extending communicating port 25, which forms a passage-way from a point in the perforation 24, back of the valve seat 26, to the main valve chamber 8—6.

Across the upper end of the valve casing 1 is diametrically placed and revolubly secured, by the retaining screw 28, the valve operating cam shaft 27. One end of this shaft projects from the casing and has rigidly secured thereto the valve handle 29. To approximately the middle of the length of the shaft 27 is rigidly secured, by the set screw 30, the duplex or double eccentric cam 31. One of the two eccentric surfaces of the double cam 31, as 40 (see Fig. 6,) is adapted to engage with the central auxiliary valve-operating rod 32, and the other, as 37, with the curved surface of the projection 38 of the main valve 9—10. The handle 29 is provided with a spring governed retaining pawl 33 (see Fig. 2), which engages, in the movement of the handle 29 about its axis, with notches 39, 35, and 36 (see Fig. 1), formed therefor in the circumferential edge of the pawl segment 34 rigidly secured to the side of the valve casing 1.

The principles of operation are as follows:—The normal position of the valve is, as shown in Figs. 2 and 4, with the valve 9 forced home to its seat by the relatively diametrically enlarged portion 37 of the main valve cam engaging with the concentrically curved surface of the projection 38, thereby forcing the connected valves 9 and 10 downward against the accumulated pressure of air in the valve and connected parts. In this position of the handle, it is retained, against shaking, &c., by the pawl 33 engaging in the pawl notch 35. In this position of the main valves 9 and 10, communication is established through the ports 20 and 5 and the communicating duct 25 and reducing valve 21, from the main reservoir to the train pipe. When it is desired to apply the brakes, which, in this instance, is effected by reducing the air-pressure in the train-pipe, and, thus, at the engineer's valve, the coacting parts of the valve must be so placed that communication between the main reservoir, connected to the valve through the lower port 20, and the train-pipe, connected to the valve through the port 5, is prevented, and the air in the train-pipe allowed to escape. This position of the different parts of the valve is shown in Figs. 1 and 5. The handle is thrown to one side—the left, in Fig. 1, the right, in Fig. 5—from its normally vertical position as shown in Fig. 4. In this manner, the radially-reduced portion of the cam 37 is brought into engagement with the upper extension 38 of the valves 9—10, allowing the valves to rise, as impelled by the accumulated pressure in the main reservoir, as well as in the train-pipe, behind and below the same. The valve 10 will be seated closing communication from the main reservoir to the train-pipe. At the same time, the valve 9 is unseated, and the air in the train-pipe is offered an exit through the same and the openings 2 to the exterior atmosphere, as indicated by the arrows in Fig. 5. When it is again desired to admit the normal pressure of the main reservoir to the train-pipe, to release the brakes, the handle is brought to the vertical position, when the conditions indicated in Fig. 4 are again established.

It is evident that the flow of air through the duct 25 is under the control of the reducing valve 21 and that this control is operative to hold back an excess of pressure, in the main reservoir, over what is flowing through the valve 21, [*i. e.* the normal pressure in the train pipe,] the amount depending on the predetermined strength of the spring 23. That is, if the strength of the spring is equal to twenty-five pounds, the flow of the compressed air from the main reservoir to the train pipe, through the valve 21 and duct 25, will only begin when the pressure in the main reservoir has reached twenty-five pounds, the valve operating to hold back at all times this excess. When, for any reason, it is desirable to make use of this excess of pressure in the train pipe and parts connected therewith, a direct passage for the flow of the air from the main reservoir thereto, around the valve 21, is effected through the valve 14 by throwing the handle 29 in the opposite direction, as shown in dotted lines, to the left, in Fig. 4, from that by which the application of the brakes is effected—to the left in Figs. 4, 5 and 6, to the right in Fig. 1, until the pawl 33 rests in the notch 39—by which means the operating offset 40 in the second part of the duplex cam comes into engagement with the upwardly extending stem portion 32 of the valve 14 depressing the same and opening the valve.

The operative feature of improvement of the above described arrangement to store up an excess of pressure in the main reservoir over the pressure normally admitted to the train pipe, and in providing means by which this excess of pressure is readily admitted to the train pipe, is that this excess can be used to positively and quickly operate the triple valves when, from sticking, &c., they refuse to operate with the normal train pipe pressure. It is also effective as an emergency release.

I claim—

1. In an engineer's valve, the combination with the valve casing and ports leading therefrom to the main reservoir and train pipe, a valve between said ports for automatically establishing communication between the main reservoir and the train pipe at a given pressure in the former, valves for controlling direct communication between the several ports, and a handle for operating said valves, substantially as described.

2. In an engineer's valve, the combination with the valve-casing provided with ports lead-

ing therefrom to the main reservoir and to the train-pipe and outlet openings to the external atmosphere, of a valve for controlling communication between the said ports, a valve for controlling communication between the port to the train-pipe and the outlet openings, the said valves being connected together and being provided with an extension adapted to be engaged with a cam, of an eccentric cam, adapted to move the valves longitudinally, a shaft for the cam, and a handle to operate the shaft: substantially as and for the purposes described.

3. In an engineer's valve, the combination with the valve-casing, provided with ports leading therefrom to the main reservoir and to the train-pipe and outlet openings to the exterior atmosphere, valves for controlling communication between the said ports, and between the train-pipe port and the outlet openings, secured to a common valve-stem, a cam, shaft, and handle for operating said valves, and an automatic reduction-valve between said ports, of a short port between the aforementioned ports, and a valve for controlling said port: substantially as and for the purposes described.

4. In an engineer's valve, the combination with the valve-casing provided with ports leading therefrom to the main reservoir and to the train-pipe and outlet openings to the exterior atmosphere, valves for controlling communication between the said ports and between the train-pipe port and the outlet openings, said valves being centered to a common valve-stem, an automatic reducing-valve between the said ports, of a short port between the aforementioned ports, a valve for closing the short port, a double eccentric cam for operating the said controlling valves and the short-port valve, and a cam-shaft and handle for operating the cam: substantially as and for the purposes described.

5. In an engineer's valve, the combination with the valve-casing internally formed to two different diameters, with a relatively enlarged portion at each end, the train-pipe port leading from the relatively reduced middle portion, and the main reservoir port and outlet openings from either of the relatively enlarged end portions, respectively, of valves for controlling communication between the said ports and between the train-pipe port and the outlet openings, said valves being secured to a common valve-stem, and being seated, respectively, in the shoulders formed by the relatively enlarged portions: substantially as and for the purposes described.

6. In an engineer's valve, the combination with the controlling valves 9 and 10, secured to a common hollow valve-stem 11, formed with extension 38, the short port valve 14, the valve-stem 32 of which projects up through the hollow valve-stem 11, double eccentric cam 31, cam-rod 27, and handle 29, substantially as and for the purposes described.

In testimony whereof I affix my signature, in presence of two witnesses, this 6th day of April, 1892.

WILLIAM C. WHITACRE.

Witnesses:
H. K. WAGNER,
W. M. BYRNE.