

No. 789,855.

PATENTED MAY 16, 1905.

F. HENNEBÖHLE.
RELIEF AND BACK PRESSURE VALVE.

APPLICATION FILED JUNE 20, 1904.

Fig. 1.

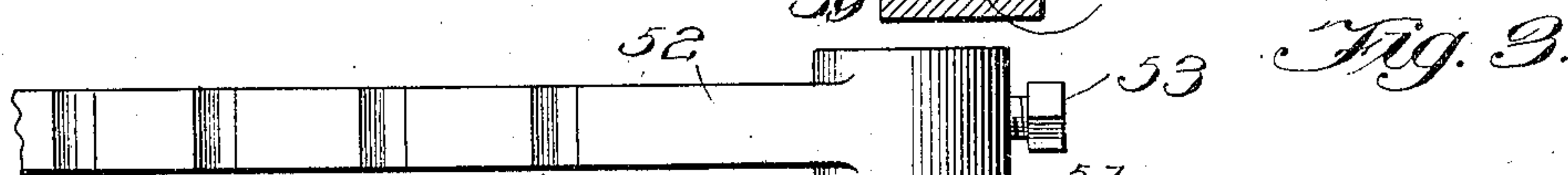
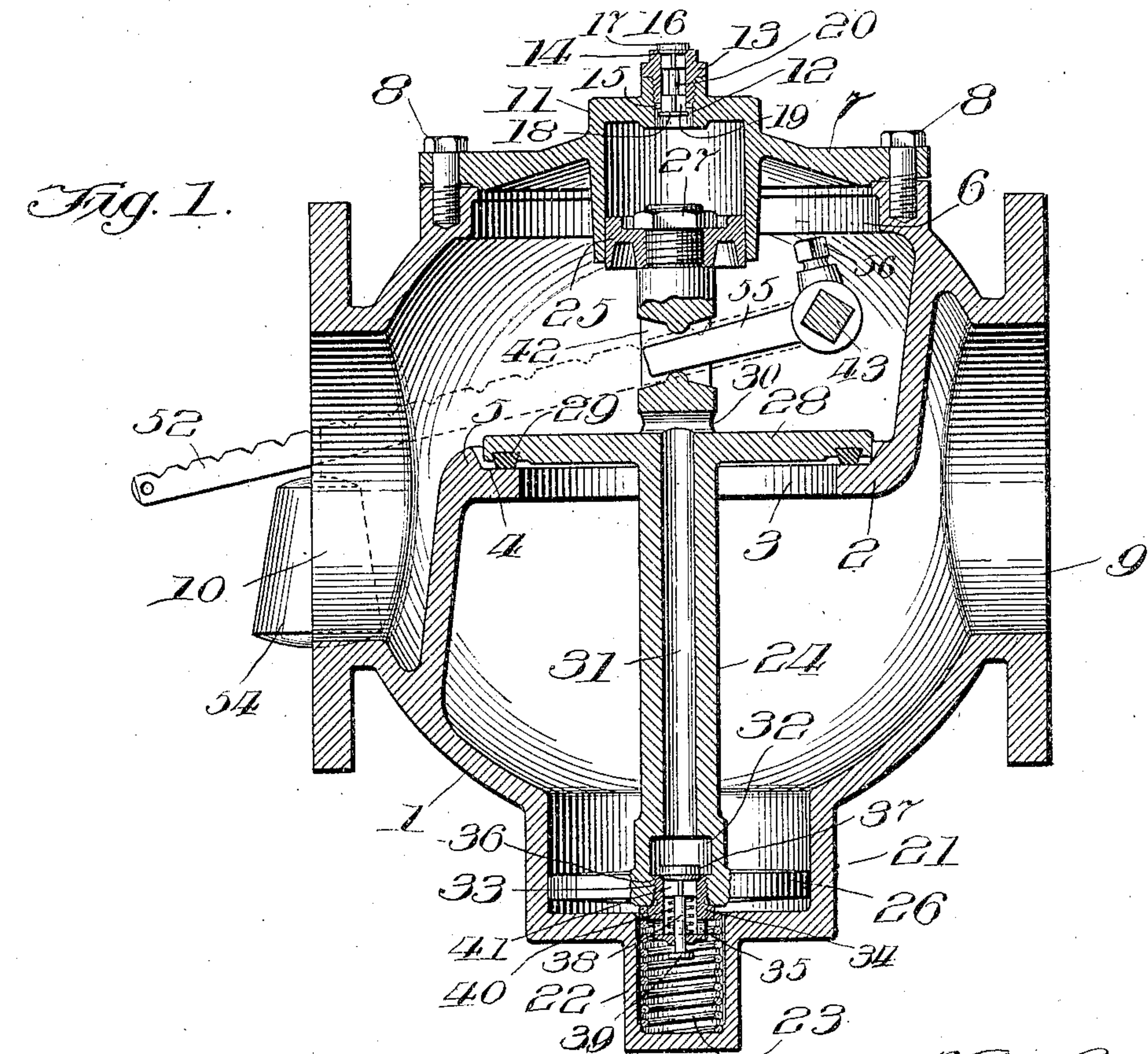
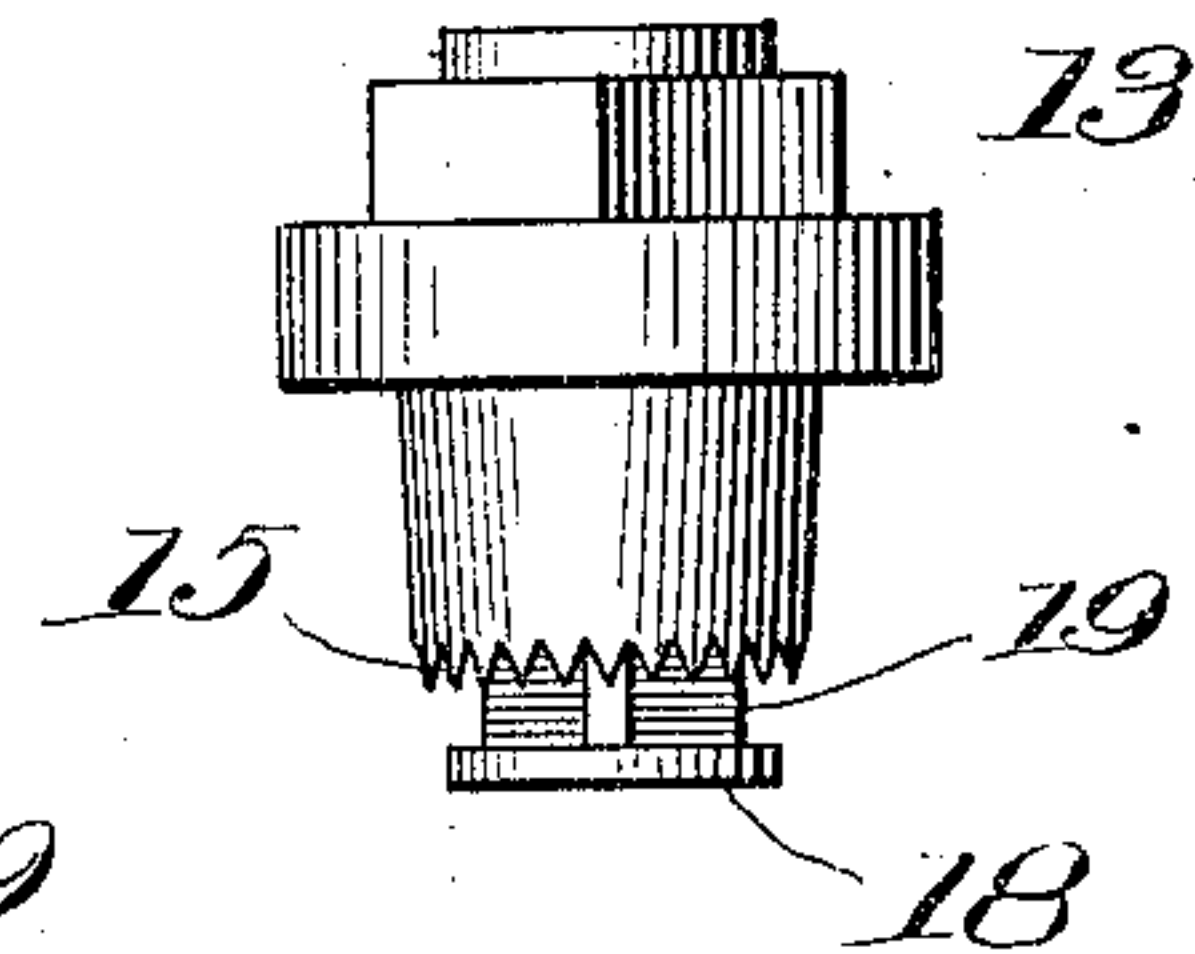


Fig. 2.

Fig. 3.



Witnesses:

George L. Chindahl,
H. S. Gaidner

Inventor:

F. Henneböhle,
by Luther L. Miller,
attorney

UNITED STATES PATENT OFFICE.

FRANK HENNEBÖHLE, OF CHICAGO, ILLINOIS.

RELIEF AND BACK-PRESSURE VALVE.

SPECIFICATION forming part of Letters Patent No. 789,855, dated May 16, 1905.

Application filed June 20, 1904. Serial No. 213,269.

To all whom it may concern:

Be it known that I, FRANK HENNEBÖHLE, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Relief and Back-Pressure Valves, of which the following is a specification.

One of the objects of this invention is the production of an improved automatic relief-valve for condensing steam-engines.

A further object of the invention is the production of a relief-valve which by a simple adjustment may be employed as a back-pressure valve when it is desirable to use the exhaust-steam for heating purposes, for dry-rooms, &c.

In the accompanying drawings, Figure 1 is a central sectional view taken through a valve embodying the features of this invention. Fig. 2 is an enlarged detail view showing the operating-shaft and the weight-lever, parts of both of which are broken away. Fig. 3 is an enlarged detail view of the bushing 13.

In the construction of a valve embodying the features of this invention I provide a casing 1, globular in general outline, the interior of which casing is divided by the usual partition 2, having a valve-opening 3 therein. The valve-seat 4 is formed on the upper face of the partition 2 around the opening 3, and said seat has a raised annular rib 5 at its outer side to provide means for holding water for a water seal for the valve-closure when such seal is desirable. In the upper portion of the casing 1 an opening 6 is formed, which opening is adapted to be closed by means of a cap 7, secured to the casing by tap-screws 8, passing through suitable openings in said cap and into coinciding screw-threaded openings in the casing 1. In its opposite sides the valve-casing is provided with the two flanged openings 9 and 10, the former an inlet-opening, which in practice is connected with the condenser, the latter an outlet-opening communicating with the exhaust-pipe. The cap 7 has a central cylinder 11 opening at its lower end into the interior of the casing 1, and at its upper end said cylinder is provided with a central opening 12, which latter opening is screw-

threaded to receive a bushing 13. The upper end of the bushing has an inclined valve-seat 14 and the lower end is radially notched, as at 15. A check-valve 16, having a closure-disk 17 and a stop-disk 18, lies within the bushing 13 and is guided therein by the wings 19, fixed with relation to the stem 20 of said check-valve. The closure-disk 17 is beveled to fit the inclined seat 14 at the upper end of the bushing 13, while the stop-disk 18 is adapted to lie over the notches 15.

In the lower side of the valve-casing 1 and diametrically opposite to the cylinder 11 a cylinder 21 is formed, which cylinders 11 and 21 are alined with each other and with the valve-opening 3, and both open directly into the interior of the valve-casing 1. In the lower end of the cylinder 21 and central therewith a cylindrical spring-casing 22 is formed, which casing is adapted to receive an expansion coil-spring 23 for a purpose to be explained later herein.

The valve-stem 24 has at its upper end a piston 25, adapted to lie within the cylinder 11, and at its lower end a similar but somewhat larger piston 26, fitting somewhat loosely within the cylinder 21. At its upper end the valve-stem 24 is screw-threaded, the piston 25 being secured to the stem by means of a nut 27. The piston 26 is formed integral with the stem 24 or is secured thereto in any suitable manner. Between the pistons 25 and 26 the valve-stem 24 carries a valve-closure 28 somewhat larger than the opening 3, which closure is provided with a seating-ring 29 of soft metal, adapted to lie in contact with the annular face 4 of the opening 3 when the valve is closed. Directly above the closure 28 the valve-stem 24 is provided with the transverse opening 30, and communicating with said opening with an axial opening 31, extending to the lower end of said stem and opening into the spring-casing 21 beneath the piston 26. Just above the piston 26 this axial opening is enlarged in an annular chamber 32, and beneath said chamber the opening is screw-threaded, as at 33. A bushing 34, externally screw-threaded at its upper end, is adapted to engage the screw-threaded portion 33 of the valve-stem 24 and be held thereby

in the lower end of said stem. This bushing near its lower end is provided in its sides with an opening 35, communicating with the spring-casing 22, and at its upper end is provided with the inclined valve-seat 36 for receiving the check-valve 37, the stem 38 of which valve extends downwardly through the spring-casing and is provided at its lower end with a head 39 to limit the upward movement of said valve. The weight of this check-valve 37 is partially sustained by a coil-spring 40, formed from small wire, which spring is not strong enough to lift the valve 37 from its seat. The stem 38 is also provided within the bushing with guide-wings 41. A little distance above the valve-closure 28 the stem 24 is provided with a transverse opening 42, adapted to receive an arm extending from the operating-shaft to be next described. This operating-shaft 43 extends transversely through the casing 1. Its body portion is square, but its ends are made cylindrical to provide the bearing portions 44 and 45. The former of these bearing portions is comparatively short, being adapted to lie within the bearing-bushing 46, seated in a screw-threaded opening 47 within the casing 1. The bearing portion 45 at the opposite end of the shaft 43 is somewhat longer, extending through the bushing 48, seated within a screw-threaded opening 49 in the casing 1. The bushing 48 is provided with a stuffing-box 50 of usual construction, adapted to receive packing or, as herein shown, the rubber washer 51. Outside of the stuffing-box the shaft 43 carries a weight-lever 52, secured to said shaft by means of a set-screw 53. The weight-lever is notched in its upper edge to receive a weight 54. Between its ends the operating-shaft carries an arm 55, fixed upon said shaft by means of a set-screw 56, which arm extends within the opening 42 in the valve-stem 24.

This valve is intended to be placed between the condenser and the atmosphere. When it is to be used as a back-pressure valve, the weight 54 is placed in such position upon the weight-lever 52 as to hold the valve-closure 28 against its seat with the desired force. Pressure in the inlet side of the valve-casing 1 is exerted against the under face of the closure 28 and against the upper face of the piston 26. As the piston 26 fits its cylinder somewhat loosely, steam within the valve-casing leaks by said piston into the space beneath it, upwardly past the check-valve 37, through the passages 31 and 30 into the outlet side of the valve-casing. When the pressure in the inlet side of the casing is sufficient to lift the weight 54, the closure 28 is opened. Its opening movement, however, is checked by means of the cylinder 11 and the piston 25. The air-pressure in said cylinder lifts the check-valve 17 from its seat 14 and moves the disk 18 into contact with the notched lower end of the bushing 13. The

air in the cylinder 11 now escapes slowly through the notches 15. When the excess of pressure in the inlet side of the casing 1 subsides, the closure 28 resumes its seat, closing the valve-opening 3. The downward movement of the valve-stem 24 is cushioned by the spring 23, whereby the soft-metal facing-ring 29 of the closure 28 is prevented from striking the seat 4 with force. When the valve is to be used as a relief-valve, the weight 54 is removed from the weight-lever 52. When the partial vacuum on the inlet side of the casing 1 is destroyed and back pressure exists, the valve-closure 28 is opened, as hereinbefore described.

My invention is not restricted to the precise construction and arrangement shown and described herein, as such construction and arrangement may be modified or varied by those skilled in the art without departing from the spirit and scope of my invention.

I claim as my invention—

1. In a valve, in combination, a valve-casing having an inlet and an outlet; a valve-seat within said valve-casing; two alined cylinders at opposite sides of said valve-casing; a valve-stem; a closure on said stem for said valve-seat; a piston on said valve-stem for each of said cylinders for checking the movements of said closure; and means tending to hold said closure seated.

2. In a valve, in combination, a valve-casing having an inlet and an outlet; a valve-seat within said valve-casing; two alined cylinders at opposite sides of said valve-casing; a valve-stem; a closure on said stem for said valve-seat; a piston on said valve-stem for each of said cylinders for checking the movements of said closure; an operating-shaft; an arm on said shaft for moving said valve-stem; a weight-arm on said shaft; and a removable weight on said arm.

3. In a valve, in combination, a valve-casing having an inlet and an outlet; a valve-seat within said valve-casing; two alined cylinders at opposite sides of said valve-casing; a valve-stem; a piston on said valve-stem for each of said cylinders; a closure on said stem for said valve-seat, said stem having a passage therein communicating between the opposite sides of said closure; a check-valve for said passage; and means tending to hold said closure seated.

4. In a valve, in combination, a valve-casing having an inlet and an outlet; a valve-seat within said valve-casing; two alined cylinders at opposite sides of said valve-casing, one of said cylinders being provided with a check-valve; a valve-stem; a piston on said valve-stem for each of said cylinders; a closure on said stem for said valve-seat, said stem having an axial opening communicating between the outlet side of the valve-casing and the rear side of one of said pistons; and means tending to hold said closure seated.

5. In a valve, in combination, a valve-casing having an inlet and an outlet; a valve-seat within said valve-casing; a valve-stem; a closure on said stem for said valve-seat, said stem having a passage therein communicating between the opposite sides of said closure; a check-valve for said passage adapted to permit the passage of pressure from the inlet to the outlet side of said casing and to prevent its return; and means tending to hold said closure seated.

6. In a valve, in combination, a valve-casing having an inlet, an outlet, and a cylinder on the inlet side of said casing; a valve-seat within said valve-casing; a valve-stem; a closure on said stem for said valve-seat; a piston on said stem adapted to permit the passage of pressure past it, within said cylinder, said stem having a passage therein communicating between the outer sides of said closure and piston; a check-valve for said passage adapted to permit the passage of pressure from the inlet to the outlet side of said valve-closure, and means tending to hold said closure seated.

7. In a valve, in combination, a valve-casing having an inlet and an outlet; a valve-seat within said valve-casing; a valve-stem; a closure on said stem for said seat; an air-cylin-

der; a piston on said valve-stem fitting within said cylinder for checking the movement of said closure; a check-valve for said cylinder adapted to permit the gradual escape of air from said cylinder upon a movement of said closure in one direction; and means tending to hold said closure seated.

8. In a valve, in combination, a valve-casing having an inlet and an outlet; a valve-seat within said valve-casing; two aligned cylinders at opposite sides of said valve-casing; a valve-stem; a piston on said valve-stem for each of said cylinders, one of said pistons being adapted to permit the passage of pressure past it, the cylinder containing the other piston being provided with a check-valve; a closure on said stem for said valve-seat, said stem having a passage therein communicating between the upper side of said closure and the under side of the piston adapted to permit the passage of pressure past it; a check-valve for said passage; and means tending to hold said closure seated.

FRANK HENNEBÖHLE.

Witnesses:

L. L. MILLER,

GEORGE L. CHINDAHL.