

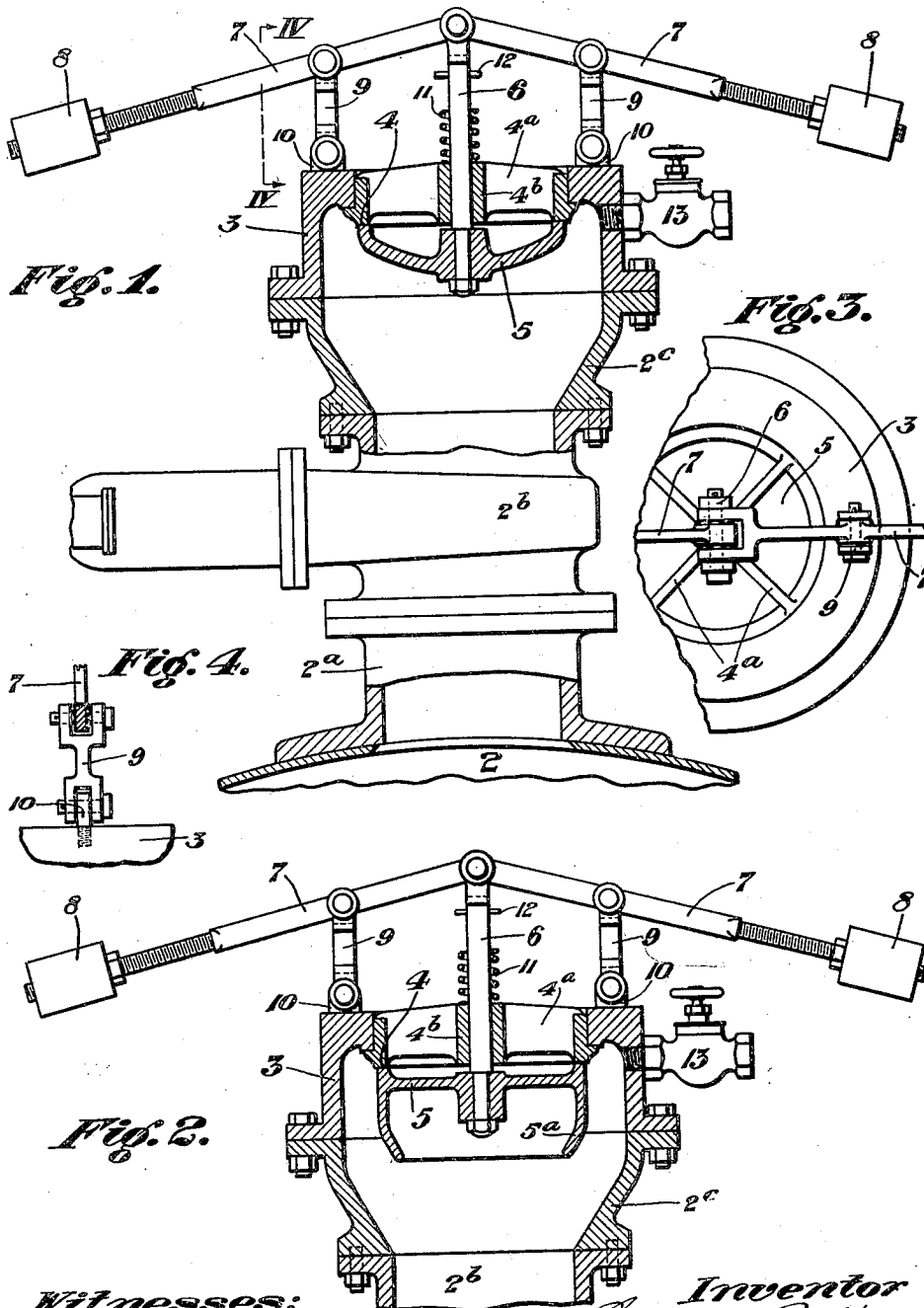
June 3, 1924.

1,496,628

C. B. HAWLEY

VALVE MECHANISM

Filed Oct. 7, 1920



Witnesses:

Edwin Trust
Louis Weinman.

Inventor

Charles B. Hawley
by C. M. Clarke
att'y.

UNITED STATES PATENT OFFICE.

CHARLES BURRIDGE HAWLEY, OF PITTSBURGH, PENNSYLVANIA.

VALVE MECHANISM.

Application filed October 7, 1920. Serial No. 415,431.

To all whom it may concern:

Be it known that I, CHARLES B. HAWLEY, a citizen of the United States, residing at Pittsburgh, in the county of Allegheny and State of Pennsylvania, have invented certain new and useful Improvements in Valve Mechanism, of which the following is a specification.

This invention relates to air supply valves for water mains, pipe lines, penstocks, or tanks.

In the operation of water mains having large capacity, it is desirable to have facilities for automatically admitting air to prevent the formation of a more or less complete vacuum when the water is drawn out or in case the internal pressure should fall below atmospheric pressure. Thus, in a main or other container of large size and capacity, it is possible to create sufficient vacuum by partial emptying to endanger its stability by external air pressure, and my invention has in view to prevent such action.

The present invention has in view to provide a valve which will open in response to a reduction in pressure in the water main below atmospheric pressure and allow air from the atmosphere to enter the main, and which will close when the pressure within the main equals or surpasses the atmospheric pressure.

A further object of the invention is to so construct the valve as to make it adjustable to respond to very slight reductions in pressure, or operative only upon a certain fixed reduction, as the conditions in the main may require.

A further object of the invention is to provide a valve for this purpose which will also be a trap for air which may be entrapped in the main during the process of filling, or which may collect in the valve itself; also to provide a supplemental manually operative vent for use under certain conditions, as hereinafter described.

My invention is shown in the accompanying drawings, in which:

Fig. 1 is a transverse vertical section through a valve constructed in accordance with my invention;

Fig. 2 is a similar view of a modified construction;

Fig. 3 is a partial top view of the valve; and

Fig. 4 is a detail section on line IV—IV of Fig. 1.

In the drawings, 2 indicates in section a portion of a main of large capacity. At 2^a is a vertical coupling member which, if desired, may be provided with a gate valve 2^b. A flared section of conduit 2^c is preferably provided and to this section 2^c is secured the air supply valve.

The valve comprises a base member 3 having an opening in the top thereof provided with an annular valve seat 4. Centered in the opening by means of webs 4^a formed integrally with the valve seat 4 is a valve stem guide 4^b through which passes a vertically movable valve stem 6 carrying on its lower end a valve disk 5. The contacting faces of valve 5 and the seat 4 are carefully ground to form a substantially air tight seal when the valve is seated. Pivottally connected to the upper end of the valve stem 6 are a pair of oppositely extending levers 7, on the outer free ends of which are adjustable weights 8. The weights are preferably threaded to the ends of the levers, as shown, so that a delicate adjustment can be obtained by merely turning the weights in the desired direction. Obviously, however, other means of adjusting the weights could be provided. The levers 7 are pivottally supported intermediate their ends by links 9, which in turn are pivoted to pins 10 secured to the valve base 3.

Surrounding the valve stem 6 is a compression spring 11 adapted to engage pin or shoulder 12 on the valve stem to cushion and limit the downward movement thereof.

By this means any sudden or abrupt downward movement of valve 5 is compensated for while also avoiding undue acceleration of the levers. By varying the clearance space between abutment 12 and top of spring 11, either with or without adjustment of weights 8, the action of the valve may be very accurately adapted to variable conditions as to size, pressure, etc.

In Figs. 1 and 2, I show a manually operated relief valve 13 by which any accumulated or undesired surplus of air may be relieved, so as to re-establish the usual normal conditions within the main 2.

In operation, the weights 8 are adjusted so that they approximately balance the weight of the valve stem and disk. This can best be done when the main is at least partially empty and open to the atmosphere. As

the main fills and the water rises through the vertical coupling 2^a, the air supply valve 5 is closed. The valve disk 5 may be so shaped as to secure the effect of flotation or buoyancy when the water level reaches it, causing the weights 8 to slightly overbalance the valve stem and disk, thus automatically closing the valve. The water or air pressing against the under side of the valve disk tends to hold the valve closed, and any increase in pressure in the main will force the valve more tightly closed. However, any reduction in pressure in the main below atmospheric pressure will cause the outside pressure to force the disk 5 downward and permit air to flow into the main around the valve, thus preventing the formation of a more or less complete vacuum.

If it were desired, it is obvious that the weights 8 could be moved outwardly so that a certain fixed reduction of pressure should result before the valve could open.

Any air that may be entrapped during the process of filling or that may collect in the main or in the vertical coupling and valve chamber, may be vented through the relief valve 13.

In the modification of the valve disk shown in Fig. 2, flotation effect is secured by entrapping air within the depending flange 5^a, as the water rises around the valve disc. The lower edge of the flange 5^a is preferably slightly contracted so as to interfere as little as possible with the flow of air around it, when the valve is open.

If desired, one of the counterbalanced levers 7 may be dispensed with and the stem 6 and its valve may be balanced with a single lever, but for the best results, I prefer to use the duplicate levers, as shown.

What I claim is:

1. In an automatic air supply valve for mains, a hollow base adapted for connection at its lower portion with a conduit whereby to provide an air trap and having an upper open top and a valve seat, a valve adapted to close upwardly against said seat provided with a central operating stem, a bearing therefor, a cushioning spring engaging said bearing, an abutment on said stem adapted to engage the spring, and a counter-weighted lever pivotally mounted on the hollow base and connected with the central stem.

2. In an automatic air supply valve for mains, a hollow base providing an air trap

and having at its top a central air inlet opening, a valve seat therein having a lower face and a central stem bearing, a stem extending through said bearing and provided with a valve adapted to seat upwardly against the valve seat, a pair of oppositely arranged levers pivotally mounted on the base and connected by their inner ends with the valve stem and having outer threaded portions, an adjustable counterweight on each of said levers, and means for cushioning the valve stem on downward movement.

3. In an automatic air supply valve for mains, a hollow base providing an air trap and having at its top a central air inlet opening, a valve seat therein having a lower face and a central stem bearing, a stem extending through said bearing and provided with a lower valve adapted to seat upwardly against the valve seat, a pair of oppositely arranged levers pivotally mounted on the base and connected by their inner ends with the valve stem and having outer threaded portions, an adjustable counterweight on each of said levers, a manually operable relief valve communicating through the side of the base with its interior below the valve seat, and means for cushioning the valve stem on downward movement.

4. In an automatic air supply valve for mains, the combination with a hollow base having a central upper opening provided with a surrounding valve seat and an inwardly converging lower wall, of a valve adapted to engage said seat by its upper face and having a downwardly depending inwardly converging air cushion shell open at the bottom and providing an upwardly enlarging air cavity.

5. In an automatic air supply valve for mains, the combination with a hollow base having a central upper opening provided with a surrounding valve seat and an inwardly converging lower wall, of a valve adapted to engage said seat by its upper face and having a downwardly depending inwardly converging air cushion shell providing with the inwardly converging lower wall of the hollow base an intervening downwardly and inwardly disposed annular circulation space.

In testimony whereof I hereunto affix my signature.

CHARLES BURRIDGE HAWLEY.