F. M. PATTERSON.

VALVE.

APPLICATION FILED MAY 21, 1907.

997,321.

Patented July 11, 1911

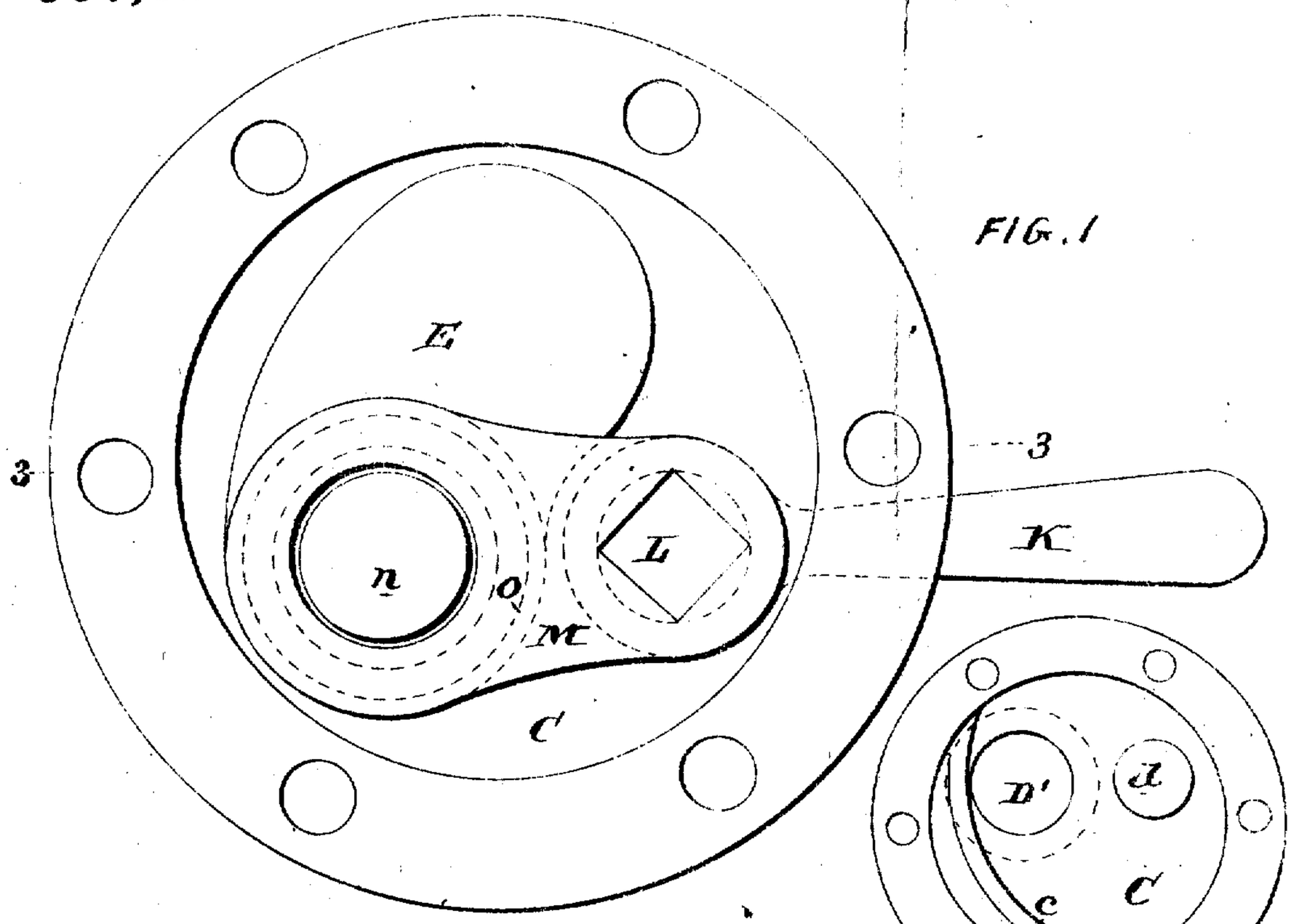

FIG. 1

FIG. 2

FIG 3

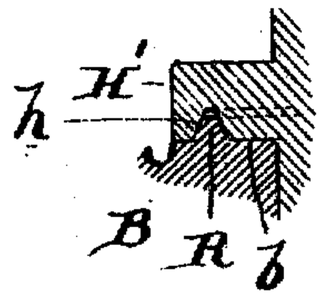

FIG. 4

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VALVE.

997,321. Specification of Letters Patent. Patented July 11, 1911.

Application filed May 21, 1907. Serial No. 374,917.

To all whom it may concern:

Be it known that I, FRANKLIN M. PATTERSON, of the city and county of Philadelphia and State of Pennsylvania, have invented an Improvement in Valves, of which the following is a specification.

My invention has reference to valves and consists of certain improvements which are fully set forth in the following specification and shown in the accompanying drawings which form a part thereof.

The object of my invention is to provide a simple and efficient construction of valve which shall maintain itself in perfect operative condition by the normal operation of the valve in its commercial application.

My invention consists of a casing having a through passage-way with which the induction and eduction pipes are connected, and provided with a valve-seat and lateral extension thereof, combined with a valve adapted to form a sliding coöperation with the seat, a pivoted arm for moving the valve, a spindle for operating the arm extending through the casing and forming therewith a water-tight joint, means for guiding the pivoted arm, and springs between the pivoted arm and valve and between the spindle and arm whereby both the valve and spindle are adapted to have a motion away from the arm to take up the wear automatically.

My invention also comprehends details of construction which, together with the features above specified, will be better understood by reference to the drawings, in which:—

Figure 1 is an elevation of my improved valve with one-half of the casing removed, showing the interior construction; Fig. 2 is an inverted plan view of a portion of the valve casing; Fig. 3 is a cross section of the valve on line 3—3 of Fig. 1; and Fig. 4 is a sectional view of a detail.

B and C are two parts constituting the casing A, and these are secured together by means of bolts T or in any other suitable manner. The part B consists essentially of a disk-shaped plate having the transverse eduction port D opening through a valve-seat E slightly raised above the inner surface of the plate. The eduction port D is preferably screw-threaded for the reception of a pipe and is also provided with an annular flange *f* whose internal diameter is approximately equal to the diameter of the pipe or tube which would be screwed into the port D. Secured within the port D above the flange *f* is a hard steel bushing F which is forced into position and is adapted to take up the wear of the water or other material which may be caused to flow through the port D. This bushing F is preferably of slightly less thickness than the depth between the valve-seat E and the flange *f*, so that the upper edge of the bushing does not quite reach the level of the valve-seat. In this manner, the valve-seat E, being of cast iron, may be permitted to wear uniformly under the action of the valve N and may be leveled when desired by a file or otherwise when it becomes worn, without interference from the exposed upper edge of the bushing F. The casing is preferably cylindrical, and the inlet and eduction ports are preferably located to one side of the center, so that the valve-seat E may extend in a segmental manner to one side of the eduction port, as indicated in Fig. 1, to permit the valve N to be moved laterally away from the port in opening it and yet at all times to support the valve N in a proper manner.

The valve-seat E is to one side of an aperture W in the plate D through which a spindle H extends and which it snugly fits, the said spindle being adapted, through means to be described, to move the valve over the valve-seat. The outer end of the spindle H is formed with a square head J adapted to receive the square socket portion of a hand-wrench or lever, and by which the spindle is adapted to be rocked in opening or closing the valve. The inner end of the spindle is provided with a flange H′ and above the flange with the square or polygonal portion L. The flange H′ rests in contact with an inner bearing face *b* of the plate B surrounding the spindle and with which it makes a liquid-tight joint. To insure a very tight joint between the parts H′ and *b* I provide the latter with the rib R preferably V-shaped and the former with an annular V-shaped groove *h* into which the rib fits. The construction is such that the wearing of the parts R *h* insures a tightness of the joint at all times.

Fitting over the polygonal end L of the spindle H, is an arm M adapted to be moved over the valve-seat E. The free end

of this arm M is provided with a large aperture which may be brought into alinement with the induction and eduction ports, as shown in Fig. 3 and approximates the induction port in area. The valve N has a flattened surface which rests upon the valve-seat E, and has an upwardly directed cylindrical hub *n* which loosely fits the aperture in the free end of the arm M. A coiled spring O, preferably formed of flat sheet metal coiled upon itself, is interposed between the arm M and the valve N and shielded within an annular recess *m* in the arm, so that at all times there is a downward pressure from the arm M upon the valve N to cause it to snugly fit to its seat. Surrounding the polygonal portion of the spindle H and interposed between the arm M and the flange H′ is a second spring P of a similar character to spring O, the object of which is to normally cause the flange H′ of the spindle H to be forced against its seat *b* to prevent leakage. The arm M above the spindle H rests directly against a bearing *d* in the part C of the casing and holds the arm M against the thrust of the spring P. The polygonal part L of the spindle does not quite reach the bearing *d* so that the spring P presses the arm M against the bearing, but the spindle itself does not touch it, and therefore only receives coöperation with the bearing *d* through the arm M and the spring P.

The bonnet or part C of the casing is cylindrical and forms an inclosing cap over the valve mechanism, and is also provided with the induction port D′, by which the medium to be controlled is permitted to pass to the valve. This induction port is preferably provided with screw-threads for connection with the supply pipe.

With the parts in the position shown in the drawings, and with the water or other medium entering the induction port D′ under pressure, it acts upon the exposed surface of the valve N to force the said valve firmly to its seat E and at the same time it also operates upon the inner exposed surface of the spindle H to force its flange H′ tightly down upon the bearing surfaces R *b*. As the exposed face *n* of the valve N which fits the aperture in the arm M approximates the induction port in area and is located immediately opposite that port inside of the casing, it receives the impact of the entering liquid and the valve N is thereby forced instantly upon the seat about the eduction port. When the wrench or handle portion is rocked, the spindle H is also rocked, and likewise causes the arm M to swing radially and carry the valve N with it. By causing the valve to travel laterally to the solid part of the valve seat E, the valve port is opened and presents a through passage-way with all the advantages of a gate valve. When the valve opens the eduction port, the pressure upon it becomes greatly reduced, and excessive friction upon the valve-seat E becomes eliminated. The arm M is at all times spring pressed against the bearings *c* and *d*, whereby it not only operates as a means to shift the valve N, but also as a means constituting an abutment against which the springs O and P press in their operation to hold the parts N and H′ down to their seats. When the medium being controlled is under pressure, the springs O and P are not necessary to insure the liquid-tight joints between the parts N, E and H′, *b*, respectively; but when there is no pressure or material pressure within the bonnet, the springs then perform their function of making water-tight joints to prevent leakage. This would be particularly evident when employing my improved valve as a blow-off valve for a steam boiler in which there would be no material pressure on the valve when there was no steam pressure.

In will be seen from this construction of valve that there is no stuffing-box necessary for the spindle H. There are no set screws required for adjusting the arm M, and consequently no excessive pressure will come upon the valve N should the seat E become worn on a slight incline, owing to the fact that there is more pressure upon the valve when over the eduction port at the time of opening than there is upon the valve when moved laterally with respect to the said eduction port. By employing springs in the manner described, the liquid-tight joints are maintained without excessive wear upon the parts constituting the joints, and no special care is required on the part of the engineer in the practical employment or adjustment of the valve in use.

The valve-seat E is preferably of no greater width than the diameter of the valve N, so that every portion of it is traversed by the said valve N in opening and closing the valve. In this manner, the wear on the valve and on the valve seat will be uniform, and consequently the valve as a whole will remain in operative condition for a long period. When it is desired to level the valve-seat E or valve N, it is only necessary to separate the parts B and C of the casing A and to remove the valve N and smooth it upon the file or other flat surface should it become abraded or unevenly worn, and also to smooth the flat surface constituting the valve-seat E with a smooth-cut flat file. It is therefore evident that the valve may be repaired when necessary without removing it from the place of use, and obviating the necessity of all expensive machine work or delays in repairing incident to shipping of the valve to and from a repair shop. Should the valve-seat E become so greatly worn as to approximately be lowered to the level of the steel bushing F, the said bushing

may be pressed out and ground down; after which the said bushing is pressed back into position again. Ordinarily the bushing needs no attention. By means of the bushing no excessive wear comes upon the edges of the valve-seat by the passing water or other medium controlled by the valve when being discharged from the eduction port.

While I prefer the construction shown as being excellently adapted for the purpose of my invention, the details may be modified without departing from the spirit of the invention.

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

1. In a valve, the combination of a case having induction and eduction ports in line and a valve-seat surrounding the eduction port, with a spindle extending through the case to one side of the ports and having a collar forming a ground joint with the inner surface of the case, a valve operating arm mechanically connected with the spindle so as to rock with it but adjustable upon the spindle in the direction of its axis, a valve loosely connected to the free end of the valve operating arm, and a spring surrounding the valve and between it and the arm whereby the valve is continually pressed upon its seat and the arm is forced against the inner wall of the case as a guide.

2. In a valve, the combination of a case having induction and eduction ports in line and a valve-seat surrounding the eduction port, with a spindle extending through the case to one side of the ports and having a collar forming a ground joint with the inner surface of the case, a valve operating arm mechanically connected with the spindle so as to rock with it but adjustable upon the spindle in the direction of its axis, and having its free end provided with an aperture and an annular groove surrounding the aperture, a valve having a stem fitting the aperture so as to be loosely connected to the free end of the valve operating arm, and a spring surrounding the valve-stem and arranged in the annular groove and between the valve and the arm whereby the valve is pressed upon its seat and the arm is continually forced against the inner wall of the case as a guide.

3. In a valve, the combination of a case having induction and eduction ports in line and a valve-seat surrounding the eduction port, with a spindle extending through the case to one side of the ports and having a collar forming a ground joint with the inner surface of the case, a valve operating arm mechanically connected with the spindle so as to rock with it but adjustable upon the spindle in the direction of its axis, a valve loosely connected to the free end of the valve operating arm, a spring surrounding the valve and between it and the arm whereby the valve is pressed upon its seat and the arm is forced against the inner wall of the case as a guide, and a spring carried by the spindle to press the valve operating arm against the case as a bearing.

4. In a valve, the combination of a case having induction and eduction ports in line and a valve-seat surrounding the eduction port, a valve adapted to slide laterally over the said seat, a spindle arranged to one side of the ports and journaled in the case, a valve operating arm loosely connected with the spindle so as to be rocked with it and adjustable in the direction of the axis of the spindle, and a spring surrounding the spindle for pressing the valve operating arm against a bearing in the case and away from the spindle.

5. In a valve, the combination of a case having induction and eduction ports in line and a valve-seat surrounding the eduction port, a valve adapted to slide laterally over the said seat, a spindle arranged to one side of the ports and journaled in the case and having a collar forming a ground joint bearing with the case, a valve operating arm loosely connected with the spindle so as to be rocked with it and adjustable in the direction of the axis of the spindle, and a spring surrounding the spindle and resting upon the collar for pressing the valve operating arm against a bearing in the case and away from the spindle and the collar of the spindle tightly upon its bearing.

6. In a valve, the combination of a case having induction and eduction ports in line and a flat valve-seat around the eduction port, a flat valve for the valve-seat, a spindle journaled in the case to one side of the ports, a valve operating arm for moving the valve connected with the spindle, and a hardened metal bushing within the eduction port and extending to within a short distance of the valve-seat so as to protect the edge of the seat but out of contact with the valve when closed.

7. In a valve, the combination of a case having induction and eduction ports in line and a valve-seat around the eduction port, a valve for the valve-seat, a spindle journaled in the case to one side of the ports and making a ground joint therewith, a valve operating arm for moving the valve connected with the spindle, a spring carried by the arm for pressing it against the case adjacent to the induction port and the valve against the valve-seat at the eduction port, and a hardened metal bushing within the eduction port and extending to within a short distance of the valve-seat so as to protect the edge of the seat but out of contact with the valve when closed.

8. In a valve, the combination of a case with means for operating the valve consist-

ing of a rocking spindle, an arm rocked by the spindle and movable relatively to the spindle in the direction of its axis, a valve loosely sustained in the free end of the arm, a spring between the arm and valve, and a second spring for pressing the arm away from the spindle, the several parts being inclosed within the case so as to be supported and guided between the two walls thereof.

9. In a valve, the combination of a case having induction and eduction ports and a valve seat, a rocking arm guided against the case, a valve guided against the valve-seat and moved by the rocking arm, spring devices for pressing the rocking arm against the case and away from the valve-seat, and a rocking spindle extending through the case for operating the rocking arm.

10. In a valve, the combination of a case having induction and eduction ports and a valve-seat, a rocking arm guided against the case, a valve guided against the valve-seat and moved by the rocking arm, a spring device for pressing the rocking arm against the case and away from the valve-seat, a spring to press the valve upon its seat and away from the rocking arm, and a rock shaft for operating the rocking arm.

11. In a valve, the combination of a case having induction and eduction ports and a valve-seat, a valve for the valve-seat, a rocking arm having a loose connection with the valve and guided against a fixed guide, a spring carried with the rocking arm for continually pressing the valve upon its seat, and a spindle for rocking the rocking arm.

In testimony of which invention, I have hereunto set my hand.

FRANKLIN M. PATTERSON.

Witnesses:
R. M. HUNTER,
R. M. KELLY.