T. R. TARN.

VALVE.

APPLICATION FILED DEC. 9, 1907.

905,605. Patented Dec. 1, 1908.

Fig. 1.

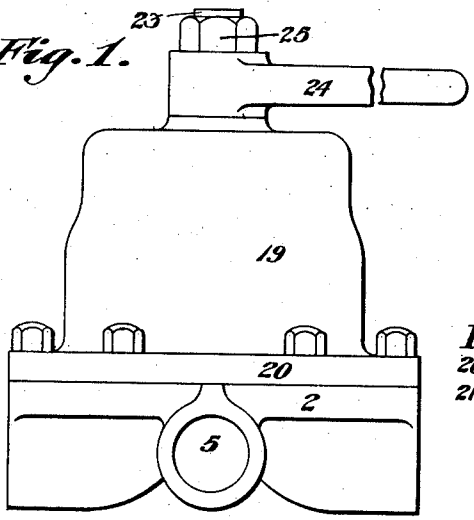


Fig. 3.

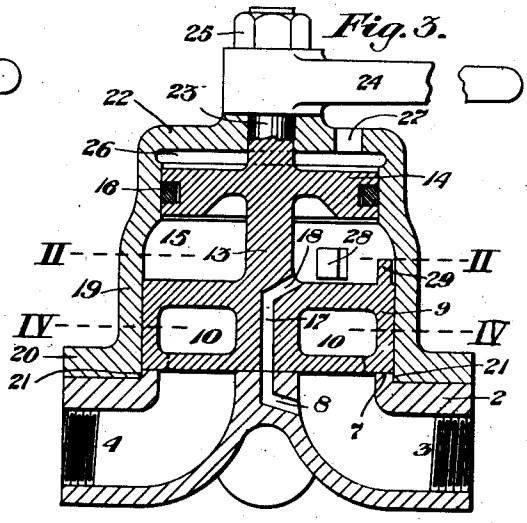


Fig. 2.

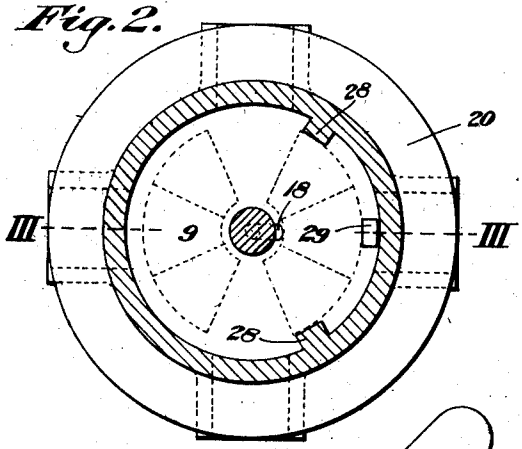


Fig. 4.

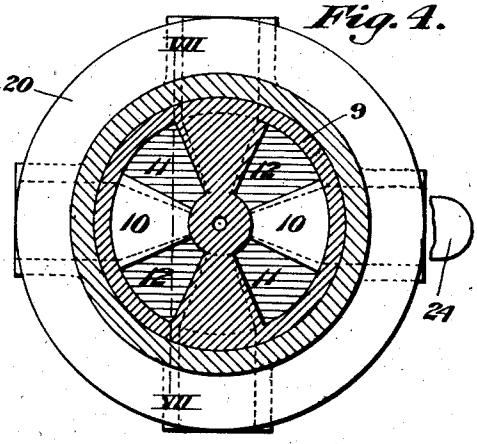


Fig. 5.

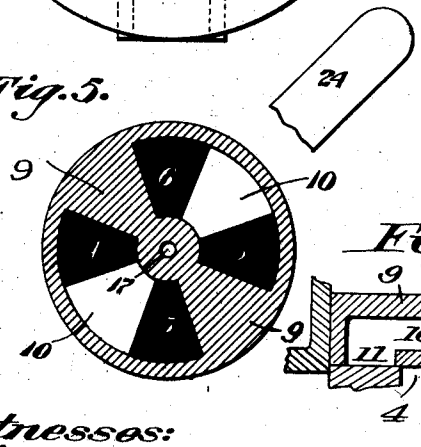


Fig. 6.

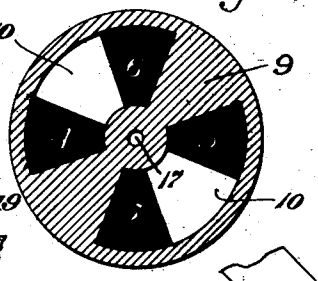


Fig. 7.



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UNITED STATES PATENT OFFICE.

THOMAS REES TARN, OF PITTSBURG, PENNSYLVANIA, ASSIGNOR, BY DIRECT AND MESNE ASSIGNMENTS, TO R. H. JACKSON, OF PITTSBURG, PENNSYLVANIA.

VALVE.

No. 905,605. Specification of Letters Patent. Patented Dec. 1, 1908.

Application filed December 9, 1907. Serial No. 405,706.

To all whom it may concern:

Be it known that I, THOMAS REES TARN, a citizen of the United States, residing at Pittsburg, in the county of Allegheny and 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 drawing.

My invention relates to improvements in disk valves and is designed to provide a construction whereby a disk valve may be mounted upon its seat within a surrounding case to establish communication from a source of supply through the ports of the disk with distributing ports and from said ports through an exhaust opening, the valve being so constructed as to provide at all positions a balancing pressure whereby it may be operated with a minimum of friction and at all times maintain a fluid tight seat.

Generally stated the device comprises a ported circular seat, a casing connected therewith and a rotatable disk valve set upon the seat within the casing provided with a central pressure supply port communicating with the main supply and with the chamber intervening between the disk valve and a supplemental head, with means for exhausting any leakage from the other side of the head, as I shall more fully hereinafter describe.

Referring to the drawings: Figure 1 is a view in side elevation of the valve in its normal position. Fig. 2 is a horizontal sectional view on the line II, II, of Fig. 3. Fig. 3 is a vertical sectional view on the line III, III, of Fig. 2. Fig. 4 is a horizontal sectional view on the line IV, IV, of Fig. 3. Figs. 5 and 6 are diagrammatic views showing the disk set to register with the different ports. Fig. 7 is a sectional view on the line VII, VII, of Fig. 4.

2 is the ported base of the valve, shown as constructed for a four-way valve, provided with the inlet opening 3, exhaust opening 4 and distributing ports 5 and 6 adapted to be placed in communication with said ports 3 and 4 through the ported disk. All of said ports 3, 4, 5 and 6 open on a common plane through the circular face 7 of base 2 and are arranged below said face as shown to connect with radially arranged supply, exhaust and distributing pipes, or in any other suitable manner, depending on the conditions or apparatus with which the valve is to be used.

8 is a port communicating with fluid supply opening 3 and terminating centrally of the annular face 7 so that it will at all times make communication with the centrally located port 17 of the valve disk 9. Said disk 9 is provided at each side of its center with segmental shaped interior passages 10 terminating in opening 11, 12, and 11, 12, respectively, adapted to register with ports 3, 4, 5 and 6, as will be readily understood, to establish the various supply and exhaust circulations in carrying out the functions for which the valve is designed.

The main body portion of disk 9 as shown extends beyond face 7 a sufficient distance to provide a body for passages 10 and ports 11, 12, beyond which by a reduced central extension 13, supplemental piston head 14 is rigidly connected with and maintained beyond the disk, leaving an intervening annular space 15. Piston 14 as shown is preferably provided with one or more packing rings or similar devices 16, and is of a diameter sufficiently less than the diameter of disk 9 to utilize the excess area of the disk for pressure to keep it seated upon the face 7. Pressure communication is at all times maintained in space 15, within the casing, by means of central port 17, extending through the body portion of disk 9 and communicating with chamber 15 by an off-set port 18, as will be readily understood. By this construction pressure is established in said chamber at the different positions which the disk may assume.

19 is the casing secured by flange 20 and bolts to the ported base 2, the casing preferably extending beyond face 7 of the base sufficiently far to provide an annular shoulder 21. The object of this construction is that rotation of the disk 9 on the base will result in even wear throughout its entire surface, and the casing will make a tight sealing connection with base 2. A further feature of advantage is that the assembling of the parts is facilitated, and central alinement secured.

The inner diameter of the casing 19 is made to conform at its lower portion with the diameter of disk 9 and at its upper portion with the reduced diameter of piston 14, being somewhat in-set as shown for such purpose, corresponding to the difference in

area between the face of disk 9 and piston 14 as stated. The casing 19 is preferably made in one piece, having a closing head 22 at one end, through which projects centrally the stem 23 by which the disk is rotated, said stem having secured to its outer portion the operating handle or lever 24, held thereon by nut 25 or in any other suitable manner.

The head 22 is located sufficiently beyond piston 14 to leave an intervening space 26 and is also provided with an outlet opening or port 27, by which any leakage of fluid or vapor beyond the piston is readily exhausted.

It will be seen that by the foregoing construction the disk 9 will be always held to its seat by the excess pressure within chamber 15 due to the greater area of the disk over that of the piston, and such excess area may be regulated to suit the size, pressure or other conditions accompanying the use of the valve. The entire disk with its central portions 13 and 23 and piston 14 may be readily cast in one piece, thereby securing an approximately uniform thickness of metal to insure good results in casting, with resulting lightness and cheapness, although piston 14 may if desired be made separately and secured on the central stem.

Within the casing 19 one or more inwardly extending abutments 28 may be provided at suitable positions to engage one or more corresponding abutments 29 of disk 9, so that the extreme rotation of the disk may be limited or controlled by said abutments making contact. The extreme positions of the disk are indicated in the diagrammatic views, Figs. 5 and 6. The construction of the device is comparatively simple and cheap; the arrangement of ports and the construction of the valve as a whole avoids the presence at the outer side of the valve of the main supply pressure, usually necessary in case of valves wherein the circulation is bodily through the rotating element; the maintenance of the pressure within the chamber 15 and against the major area of disk 9 is positively secured by the port 17 registering with port 8; the parts are few in number, consisting merely of the base, disk and its piston, the shell, and the operating handle, and the device as a whole has been found to give excellent results in long continued use under the usual conditions met with in the use of distributing valves.

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

1. A valve provided with a circular ported seat communicating with a supply opening, a rotatable hollow disk having an upper solid wall and an under wall provided with ports communicating with the hollow interior and mounted on said seat, said disk having a supplemental upper head of less diameter, a surrounding casing, means communicating with the supply opening adapted to establish pressure between the disk and its head, and means for rotating the disk, substantially as set forth.

2. A valve provided with a circular ported seat communicating with a supply opening, a rotatable hollow disk having an upper solid wall and an under wall provided with ports communicating with the hollow interior and mounted on said seat, said disk having a supplemental upper head of less diameter, a surrounding casing, said ported seat having a centrally arranged pressure port communicating with the supply opening and said disk having a centrally arranged port registering with said port and opening into the space between the disk and its head, and means for rotating the disk, substantially as set forth.

3. A valve provided with a circular ported seat, a rotatable disk mounted thereon provided with a supplemental head of less diameter than the disk, a surrounding casing provided with an exhaust port beyond the piston head, means adapted to establish fluid pressure between the disk and its head, and means for rotating the disk, substantially as set forth.

4. The combination of a base having a circular face, supply, exhaust and distribution openings leading through said base to its face, a pressure supply port communicating with the supply opening of the base and with the central portion of said face, a rotatable ported disk having a supplemental piston head of less diameter with an intervening space, and a central supply port registering with the central port in the base and with said space, and means for rotating the disk.

5. In a valve, the combination of a base having a circular face, radially arranged supply, exhaust and distribution ports opening through said face, a casing secured upon said base having a major and a minor internal diameter and an outer exhaust port, a rotatable ported disk mounted upon said ported base within the casing provided with a supplemental piston head and an intervening pressure cavity, said disk and base having centrally arranged registering ports to establish pressure communication from the supply port of the base to the space between the disk and its piston head, with means for rotating the disk, substantially as set forth.

6. In a valve, the combination of a base having a circular shouldered face, radially arranged supply, exhaust, and distribution ports opening through said face, a casing embracing the shouldered face and secured to the base and having a reduced diameter beyond the base, a rotatable ported disk mounted on the base within the casing provided with a piston of less diameter than the disk and an intervening annular opening, means for maintaining constant pressure communication from the supply port of the

base to said intervening annular opening, and means for rotating the disk, substantially as set forth.

7. In a valve, the combination of a base having a circular face, radially arranged supply, exhaust and distribution ports opening through said face, a casing secured upon said base having a major and a minor internal diameter, a rotatable ported disk having a supplemental piston head of reduced area connected with the disk by an integral stem and having an integral operating stem, said disk and base having centrally arranged registering ports communicating with the area above the disk and with the supply port of the base, substantially as set forth.

In testimony whereof I affix my signature in presence of two witnesses.

THOMAS REES TARN.

Witnesses:
C. M. CLARKE,
CHAS. S. LEPLEY.