No. 621,864. Patented Mar. 28, 1899.

F. W. SMITH.

REDUCING VALVE.

(Application filed Dec. 15, 1897.)

(No Model.)

Fig. 1.

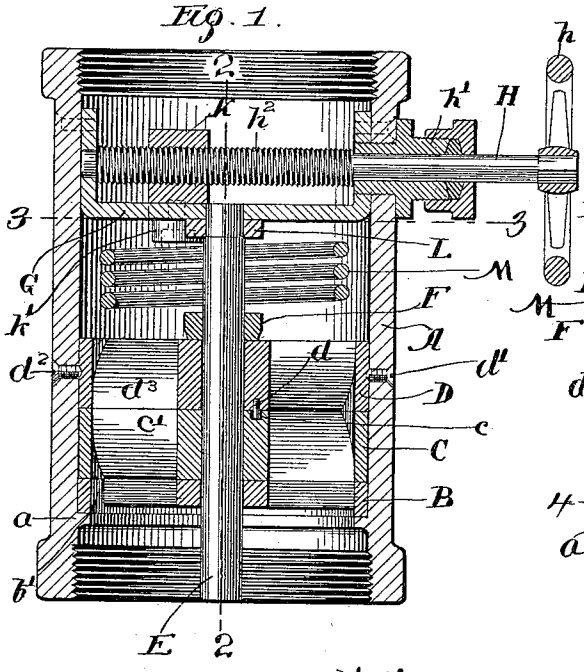


Fig. 2.

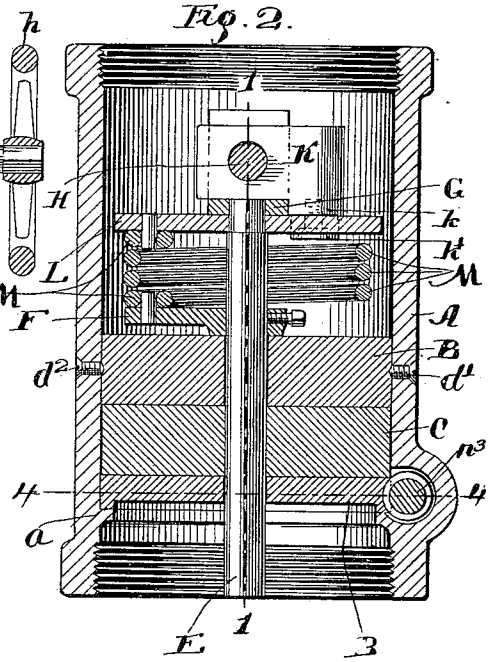


Fig. 3.

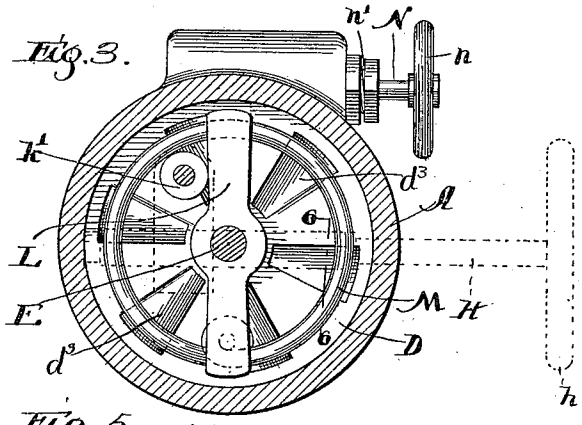


Fig. 4.

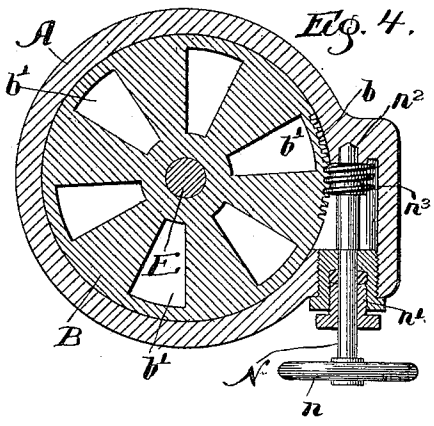


Fig. 5.

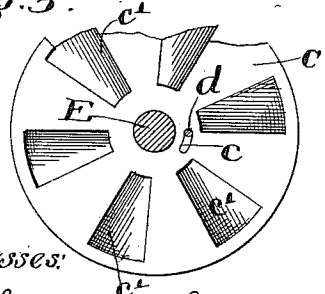
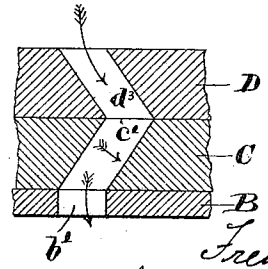


Fig. 6.



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UNITED STATES PATENT OFFICE.

FREDERIC W. SMITH, OF CHICAGO, ILLINOIS.

REDUCING-VALVE.

SPECIFICATION forming part of Letters Patent No. 621,864, dated March 28, 1899.

Application filed December 15, 1897. Serial No. 661,983. (No model.)

To all whom it may concern:

Be it known that I, FREDERIC W. SMITH, a citizen of the United States of America, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Reducing-Valves, of which the following is a specification.

My invention relates to certain improvements in reducing-valves especially designed for use in steam-pipes to lower the pressure of the steam as it passes through.

The purpose of the invention is to make a simple, economical, and durable valve which shall work with the least possible motion of the parts and which shall be easy to regulate and safe and sure in its operation.

To such end the invention consists in certain novel features to be fully described below and pointed out in the claims at the end of this specification.

The invention is illustrated in the drawings by means of six figures, of which—

Figure 1 is a longitudinal diametrical section of the valve in line 1 1 of Fig. 2. Fig. 2 is a similar section at right angles to the former in line 2 2 of Fig. 1. Fig. 3 is a horizontal section in the line 3 3 of Fig. 1, looking downward. Fig. 4 is a horizontal section in line 4 4 of Fig. 2, looking downward. Fig. 5 is a plan of the lower valve-disk, and Fig. 6 is a broken section in line 6 6 of Fig. 3.

Referring to the drawings, A is a suitable pipe or casing in which the working parts of the valve are supported.

B C D are respectively three perforated disks fitted to the lower portion of the casing.

E is a rod or stem passing through the three disks and secured against rotation in the intermediate disk C.

F is an arm secured against rotation upon the stem above the disk D.

G is a bridge secured in place across the casing.

H is an adjusting-rod turned by a hand-wheel h and journaled in the opposite ends of the bridge, a suitable stuffing-box h' being provided to enable the rod to pass out of the casing to bring the hand-wheel within convenient reach. Upon the rod H is a screw-thread h^2, upon which is mounted a block K, held against rotation by engagement with the bridge and movable back and forth upon the screw as the latter is rotated. This block has a downwardly-projecting portion k, upon which is mounted a roller k'. (See Fig. 3.) Beneath the bridge and upon the stem E is pivoted a lever L, one end of which bears against the roller k' and upon the other end of which is secured the upper end of a coiled spring M, held between said lever and the arm F and secured at its other end to the latter.

In the upper face of the disk C, which, as before stated, is fast upon the stem E, is a groove c, (see Fig. 5,) and in this groove is located the lower end of a pin d, (see Figs. 5 and 1,) the upper end of which is fast in the disk D. This pin limits the possible rotation of the disk C with respect to the disk D. The disk D is here shown as held in the casing by means of screws d' d^2. The disk B is held upward by a rib a within the casing, and the latter contains at one side a rod or shaft N, having a hand-wheel n at its outer end and passing into the casing through a stuffing-box n'. The inner end of this shaft is journaled in the casing at n^2 and bears adjacent to said end a worm n^3 in mesh with a series of teeth b upon the outer periphery of the disk B. Said shaft and hand-wheel furnish a means for rotating the disk B with respect to the casing and other parts of the valve. All three of the disks contain corresponding series of openings, the openings b' preferably passing directly through normal to the face of the disk, but the openings c' d^3 passing diagonally or obliquely through the respective disks in opposite directions, so that they form an angle at the point where they meet between the two disks. This is clearly shown in Fig. 6, and the purpose is to direct the steam as it passes downward through the disk D against the sides of the openings in the disk C, causing the impact of the steam to tend to rotate said disk and partially close the openings at the point where the two disks meet by throwing the two ports partially out of register. This tendency is resisted by the spring M, the tension of which is adjusted by means of the hand-

wheel h, operating through the block K, roller k', and lever L.

In the operation of the valve the size of the steam-ports formed by the combined openings b c' d^3 is regulated by means of the disk B and the passage of the steam is governed by means of the spring M, which holds the disk C in its normal position as long as the steam-pressure is constant. As soon as the steam-pressure rises, however, said disk C is rotated out of its normal position by the striking of the steam against it and the steam-ports thereby contracted until the flow of steam is sufficiently cut down to restore the equilibrium.

I claim as new and desire to secure by Letters Patent—

1. In a reducing-valve, a double partition one portion of which is movable with respect to the other, and both portions of which are provided with corresponding openings arranged obliquely with respect to each other and means for yieldingly crowding the movable portion toward a predetermined position whereby the steam in passing through said openings is directed against the walls of the movable portion and tends to move the two openings partly out of register; substantially as described.

2. In a reducing-valve a double partition both parts of which are provided with corresponding openings oblique with respect to each other and one part of which is movable and yieldingly pressed toward its normal position to keep the openings in register; whereby steam or other fluids in passing through the valve are directed against the walls of the movable portion and tend to force the openings in the latter out of register with the corresponding openings in the other portion; substantially as described.

3. In a reducing-valve, the combination with a suitable partition provided with openings through it, of an adjacent rotatable disk provided with a corresponding series of openings and intermediate solid surfaces adapted to close or partially close the openings by the rotation of the disk, one of the sets of openings being oblique whereby the steam or other fluid, as it passes through the openings, strikes against the walls of the disk-openings and the impact thereof tends to rotate said disk and partially close said openings and means for yieldingly pressing the disk toward a predetermined position; substantially as described.

4. In a reducing-valve, a double partition, one portion of which is movable with respect to the other, openings in both portions of said partitions, the openings in the movable portion being oblique with respect to the direction in which the steam enters, and suitable means for yieldingly pressing said movable portion toward a predetermined position whereby the impact of the steam thereon tends to move the two series of openings partly out of register to reduce the volume of steam which can pass through; substantially as described.

5. The combination with a cylindrical casing, of a disk-shaped partition secured therein so as to be normally stationary and containing a series of openings, a rotatable disk containing a series of oblique openings corresponding thereto, a spring tending to rotate the latter disk, and a stop adapted to hold the openings in register against the force of said spring, but to permit rotation in the opposite direction, the oblique openings being so arranged that the impact of the steam upon the sides thereof tends to rotate the same in a direction opposite to the tension of the spring; substantially as described.

6. In a reducing-valve the combination with a suitable casing adapted to afford a passage for a fluid, of two substantially parallel partitions arranged transverse to the direction of the flow of the liquid and provided with corresponding series of openings and intermediate imperforate portions, one of said disks being normally stationary with respect to the casing and the other being movable thereupon to bring the two series of openings into or out of register, a spring arranged to hold said openings in register and a series of oblique walls upon corresponding sides of the openings in the movable disk adapted to receive the impact of the fluid and to move said disk in the proper direction to bring the imperforated portions of the movable disk over the openings in the stationary disk; substantially as described.

7. The combination with the casing, A, of the stationary disk, D, and the adjacent rotatable disk, C, said disks being provided with corresponding openings arranged obliquely with respect to each other and the disk, C, being provided with a spring tending to keep the openings in register; substantially as described.

8. The combination with the casing, A, of the stationary disk, D, having a series of openings, the rotatable disk, C, having a corresponding series of openings arranged obliquely with respect thereto and provided with a spring adapted to keep said openings in register and the adjustable disk, B, also provided with a corresponding series of openings and a means of adjusting said disk adapted to bring said openings into or out of register with those of the disk, C; substantially as described.

9. The combination with the casing, A, of the stationary disk, D, provided with a series of openings, the rotatable disk, C, adjacent thereto and provided with a series of corresponding openings arranged obliquely with respect to the first, the adjustable disk, B, adjacent to the first two disks and also provided with a series of corresponding openings and means for adjusting said disks to bring said openings into or out of register, the stem,

E, suitably journaled and secured in the disk, C, against rotation, the spring, O, connected with said stem and tending to rotate the same and to bring the openings in the disk, C, into register with those adjacent thereto and a suitable means of adjustment adapted to vary the tension of said spring; substantially as described.

In witness whereof I have hereunto set my hand this 26th day of November, A. D. 1897.

FREDERIC W. SMITH.

Witnesses:
EDGAR VAN BUSKIRK,
WILLIAM HAAG.