(No Model.)

E. J. TOOF.

REGULATOR VALVE.

No. 597,445. Patented Jan. 18, 1898.

Fig. 1

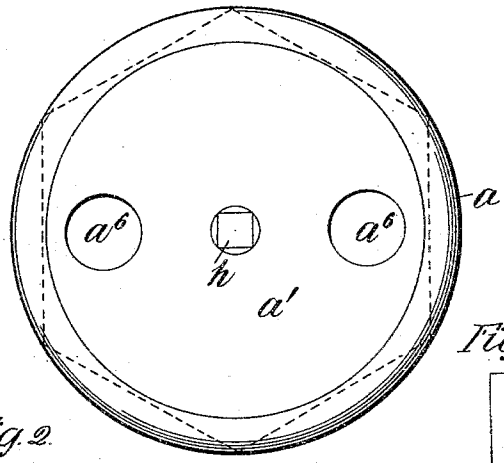


Fig. 3

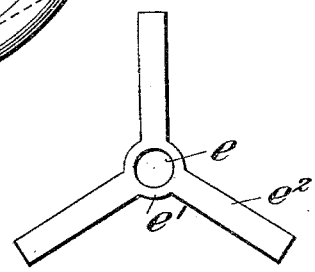


Fig. 2

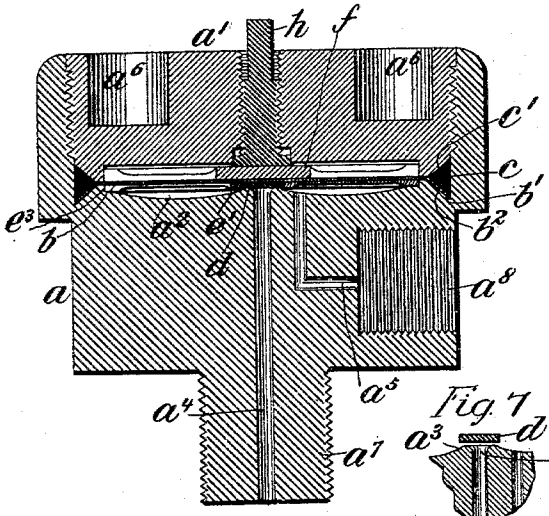


Fig. 4

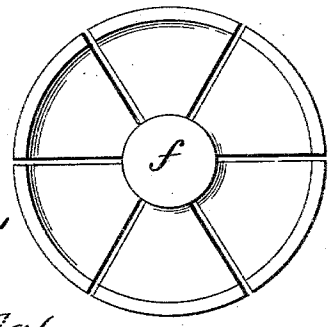


Fig. 7

Fig. 5

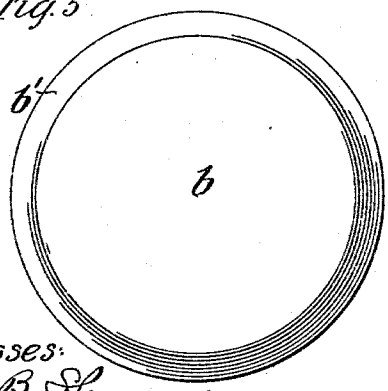
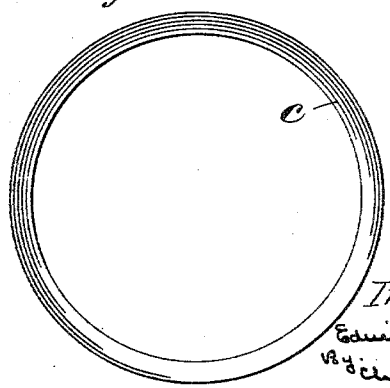


Fig. 6



Witnesses:
Chas. B. Shumway
Fred. W. Dana

Inventor
Edwin J. Toof
By Chas. F. Dana
his atty

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

EDWIN J. TOOF, OF NEW HAVEN, CONNECTICUT.

REGULATOR-VALVE.

SPECIFICATION forming part of Letters Patent No. 597,445, dated January 18, 1898.

Application filed February 24, 1896. Serial No. 580,304. (No model.)

To all whom it may concern:

Be it known that I, EDWIN J. TOOF, a citizen of the United States, and a resident of the city and county of New Haven, State of Connecticut, have invented new and useful Improvements in Regulator-Valves, of which the following description, taken in connection with the drawings herewith accompanying, is a specification.

My invention relates to that class of valves adapted more particularly for regulating gases under high pressure, although applicable for regulating either fluids or gases under any pressure, the object of my present invention being to provide a valve of this class, of cheap and simple construction, by which gases under any pressure may be readily and accurately regulated, and in which the chamber containing the valve-seat and through which the gas passes from the receiving to the discharge passage is completely closed from exterior communication, so as to prevent any possibility of escape or leakage of the gas. This object I secure by the combination and arrangement of the parts forming my invention, as hereinafter set forth in detail, and pointed out in the claims.

Referring to the drawings, Figure 1 represents a plan view of a valve embodying my invention; Fig. 2, a central vertical section through the same; Figs. 3, 4, 5, and 6, detail views of certain of the parts forming the valve; and Fig. 7, a portion of the valve in section, containing the receiving and discharge passages and the valve-seat formed at the upper end of said receiving-opening and also showing a part of the valve proper arranged above the valve-seat.

To explain in detail, a represents the body of the valve, which is provided with a cylindrical-shaped opening or recess formed in its upper side, having its wall screw-threaded, so as to receive a detachable head-piece a', which is adapted to be screwed into said opening. The inner or bottom wall of said opening is provided with a circularly-arranged groove or depression a^2 therein, forming the valve-chamber and having a central raised portion a^3, which latter is provided with a valve-seat d' therein arranged at the upper end of the receiving or inlet passage a^4 of the valve. The gas passes into said chamber a^2 from the inlet-passage in a manner as will be described and passes therefrom through the outlet-passage a^5. In order to prevent any escape or leakage of the gas when passing through the chamber a^2 from the inlet to the outlet passage, except through the latter, I provide a diaphragm b, (shown in detail in Fig. 5,) which in the present instance shown is formed of thin sheet metal preferably of a character best adapted to withstand the chemical action of the gases, which diaphragm is formed with its outer edge bent or pressed downward at an angle thereto, forming a rim, as at b'. The said diaphragm thus formed is placed in the cylindrical opening in the upper side of the body a before the detachable head-piece a' is screwed into the same, with its turned-down or angular edge b' resting upon a like-shaped surface b^2 of an angular groove formed in the inner wall of said cylindrical-shaped opening and at the extreme outer edge of the same, as shown. When the diaphragm b has been thus placed, a ring c, preferably formed of a soft metal or composition that will give under heavy pressure, is then placed in said groove over the edge of the diaphragm therein, after which the head a', having its lower edge or corner beveled, as at c', to extend at right angles to the groove containing the rim of the diaphragm, is then screwed down into place and against said ring c, causing the latter to closely conform to the space in which it is confined and thus make sure connection between the edge of said diaphragm and the body a of the valve as though they were formed in one integral part. It will be understood that the head a may be turned to produce the greatest pressure upon the said ring c, the same, as herein shown, being provided with two openings a^6 a^6 therein to receive a wrench or other means employed to turn the same.

A valve d, consisting in the present instance shown of a piece of leather or other similar flexible material, is movably supported in relation to the valve-seat d' and immediately below the center of the diaphragm, which latter is more or less yielding at such point, within a seat or opening e, formed in a ring e', which latter, as herein

shown and in detail in Fig. 3, is provided with arms e^2, extending therefrom, with their outer ends engaging with a shoulder e^3, formed in the body of the valve, so as to hold the ring e and the valve d supported therein in their proper position.

A plate or disk f (shown in detail in Fig. 4) is supported on the upper side of the diaphragm b within a suitable opening or seat formed in the head a' to receive the same, and a vertically-movable adjusting screw or rod h is located in a central screw-thread opening in the head a', with its inner end engaging the said disk f at the center thereof and in a central line above the valve d and having its opposite end projecting above the head a' in a position where it may be readily and conveniently engaged.

In operation the adjusting-stem h is raised, so as to allow the valve d to be raised above its seat by the pressure of the gas, as shown in Fig. 7, and allow the latter to enter through the inlet-passage a^4 into the chamber a^2 and out through the outlet-passage a^5, and the amount of gas received into said chamber may be regulated by turning the adjusting-stem h, so as to adjust the position of the valve d relative to its seat, whereby the space between the same will be increased or diminished and the flow of gas be regulated accordingly.

By means of my improved construction, as described, it will be understood that the pressure of the gas can be most accurately adjusted by reason of the valve d being constructed of flexible material, as described, so as to readily conform to its seat, and the adjusting-stem h being supported in direct line above the same the said valve may be forced tightly into its seat, so as to shut off the gas entirely or said stem be moved to allow the valve to be gradually raised from its seat and regulate the flow of gas accordingly.

The disk f, arranged on the upper side of the diaphragm, is employed to support and strengthen the latter when subjected to gas under very high pressure; but it will be obvious that the same may be dispensed with, if desired, without in any way affecting the action or operation of any of the parts. In case such disk is dispensed with the enlarged inner head of the adjusting-rod h would act directly upon the diaphragm.

It will also be observed in this construction that the means for adjusting the valve, being the stem h, is located above and at the exterior of the valve-chamber a^2, there being no connection whatever with the latter except through the proper channel-ways, being the inlet and outlet passages.

The body a of the valve, as herein shown, is provided with a threaded stem a^7 as a means for detachably connecting the same with the supply tank or pipe leading from the same and with a threaded opening a^8 to receive the pipe connecting with the burners.

Having thus set forth my invention, what I claim as new, and desire to secure by Letters Patent of the United States, is—

1. In a regulator-valve, the combination of a frame or body provided with a chamber having one of its walls formed by a movable or yielding diaphragm, inlet and outlet passages communicating with said chamber, a valve supported in said chamber between its seat formed at the end of the inlet-passage and said diaphragm, means for loosely supporting said valve independent of the diaphragm in a central position relative to its seat, a plate or disk located upon the upper side of said diaphragm to support and reinforce the same, and an adjusting-screw engaging with said disk to act upon the diaphragm and adjust the position of the valve, substantially as described and for the purpose set forth.

2. In a regulator-valve, the combination of a frame or body provided with a chamber having one of its walls formed by a movable or yielding diaphragm and in which there is no exterior communication except through the inlet and outlet passages communicating with the same, a removable head-piece having a screw-threaded connection with said frame within an opening therein and provided with an annular rib on its lower side adapted to clamp said diaphragm at its outer edge, the said rib and the frame at a point adjacent to the outer edge of said diaphragm being cut away to provide an angular space or groove between the same into which the said outer edge of the diaphragm extends, a packing-ring of soft metal located within said angular space and supported therein under pressure, a valve located in said chamber, and means for adjusting said valve, substantially as described and for the purpose set forth.

3. In a regulator-valve, the combination of a frame or body provided with a chamber having one of its walls formed by a movable or yielding diaphragm, inlet and outlet passages communicating with said chamber, a valve supported in said chamber between its seat formed at the end of the inlet-passage and the said diaphragm, the plate e having an opening therein for loosely supporting the valve in a central position relative to its seat, a plate or disk located upon the upper side of said diaphragm to support and reinforce the same, and an adjusting-screw engaging with said disk to act upon the diaphragm and adjust the position of the valve, substantially as described and for the purpose set forth.

4. In a regulator-valve, the combination of a frame or body provided with a chamber having one of its walls formed by a movable or yielding diaphragm, a removable head-piece having connection with said frame within an opening therein and provided with an annular rib on its lower side adapted to clamp said diaphragm at its outer edge, the

said rib and the frame at a point adjacent to the outer edge of said diaphragm being cut away to provide an angular space between the same into which the said outer edge of the diaphragm extends, a packing-ring located within said angular space and supported therein under pressure, a valve located in said chamber, and means for adjusting said valve, substantially as described and for the purpose set forth.

EDWIN J. TOOF.

Witnesses:
CHAS. F. DANE,
A. L. HAYES.