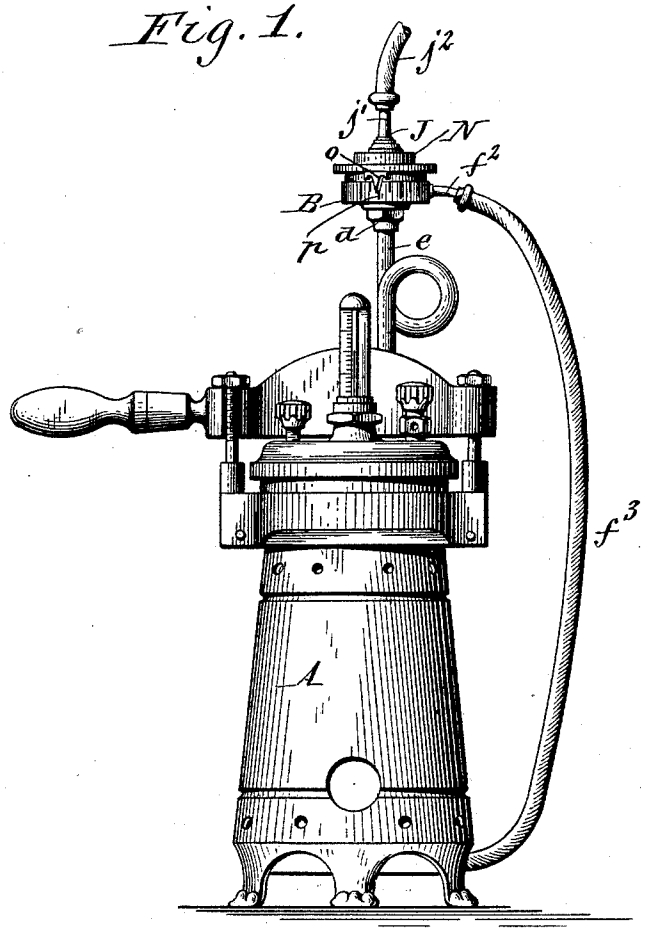
(No Model.) 2 Sheets—Sheet 1.

T. G. LEWIS.

GAS REGULATOR.

No. 519,845. Patented May 15, 1894.

Fig. 1.



WITNESSES:
Emil Neuhart
Theo. L. Popp

Theo. G. Lewis INVENTOR.
By Wilhelm & Bonnell
ATTORNEYS.

THE NATIONAL LITHOGRAPHING COMPANY,
WASHINGTON, D. C.

(No Model.) 2 Sheets—Sheet 2.

T. G. LEWIS.

GAS REGULATOR.

No. 519,845. Patented May 15, 1894.

Fig. 2.

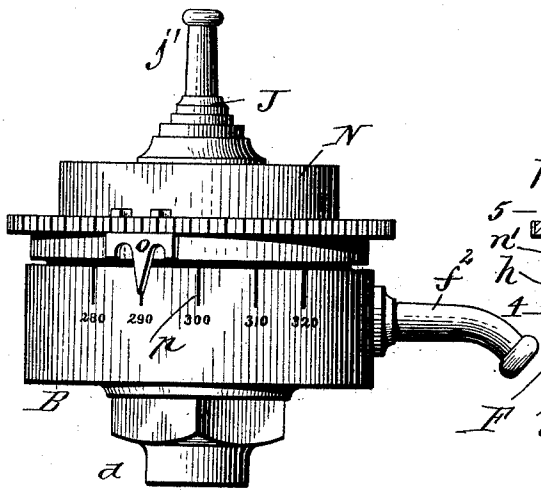


Fig. 3.

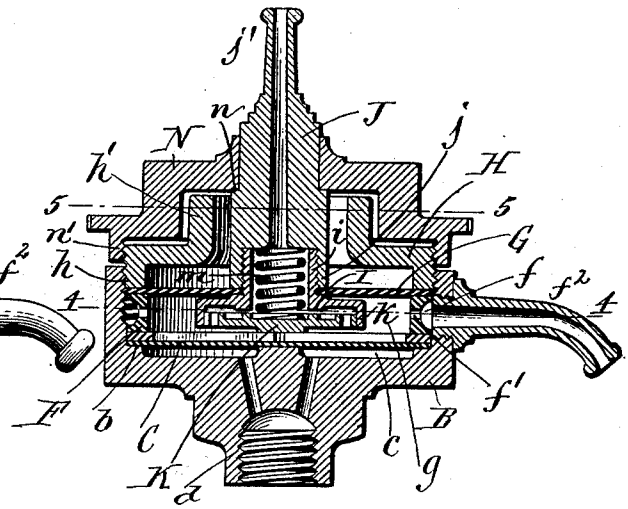


Fig. 4.

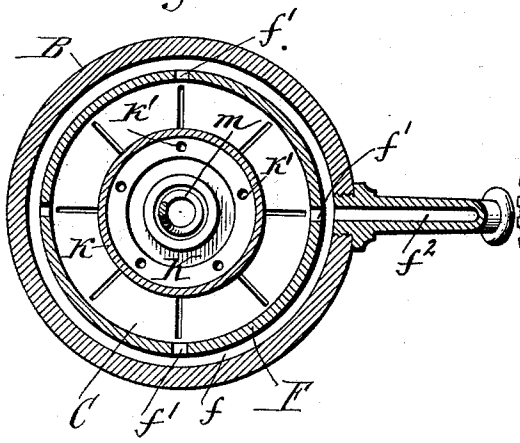


Fig. 5.

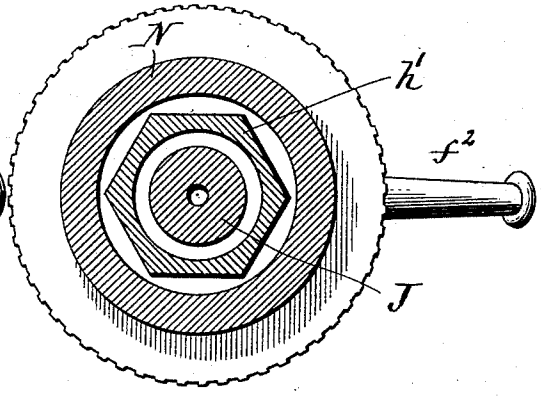
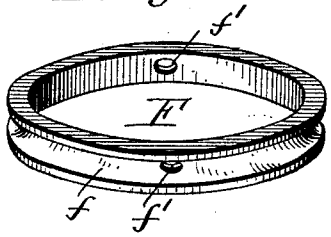


Fig. 6.



WITNESSES:

Emil Neuhart.

Theo. L. Popp.

Theo. G. Lewis

INVENTOR.

By Wilhelm & Bonner.

ATTORNEYS.

THE NATIONAL LITHOGRAPHING COMPANY,
WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

THEODORE G. LEWIS, OF BUFFALO, NEW YORK, ASSIGNOR TO THE BUFFALO DENTAL MANUFACTURING COMPANY, OF SAME PLACE.

GAS-REGULATOR.

SPECIFICATION forming part of Letters Patent No. 519,845, dated May 15, 1894.

Application filed February 15, 1894. Serial No. 500,204. (No model.)

To all whom it may concern:

Be it known that I, THEODORE G. LEWIS, a citizen of the United States, residing at Buffalo, in the county of Erie and State of New York, have invented a new and useful Improvement in Gas-Regulators, of which the following is a specification.

This invention relates to that class of gas regulators which are particularly designed for regulating the supply of gas to vulcanizers, and in which the gas valve is controlled by a flexible diaphragm which is acted upon by the steam pressure, and the valve seat is adjustable toward and from the valve to regulate the gas supply in accordance with the desired steam pressure.

The object of my invention is to produce a gas regulator of this character which is simple and reliable and which can be conveniently and accurately adjusted.

In the accompanying drawings consisting of two sheets:—Figure 1 is an elevation showing my improved gas regulator attached to a vulcanizer. Fig. 2 is an elevation of my gas regulator, on an enlarged scale. Fig. 3 is a vertical section thereof through the gas outlet nipple. Figs. 4 and 5 are horizontal sections in lines 4—4 and 5—5, Fig. 3, respectively. Fig. 6 is a detached perspective view of the supporting ring interposed between the flexible diaphragms.

Like letters of reference refer to like parts in the several figures.

The application of my improved regulator to a vulcanizer is illustrated in Fig. 1 in which A represents a vulcanizer of any suitable construction provided with a gas burner, the gas supply to which is regulated by my improved regulator.

B represents the lower portion or body of the casing of my improved regulator. The body is provided with an internal annular ledge or shoulder *b*. C is the lower flexible diaphragm which rests with its marginal portion upon said shoulder and forms with the bottom of the body a steam chamber *c*. The bottom of the body is provided with a nipple *d* through which the steam enters the steam chamber and which is connected with the steam space of the vulcanizer by a pipe *e*.

F represents a supporting or spacing ring resting upon the marginal portion of the lower diaphragm C and provided with an annular groove or gas passage *f* in its outer side and with a number of radial openings *f'* extending from the inner side of the ring to the groove *f*.

f^2 represents a gas outlet nipple arranged in the side of the body and having its inner end communicating with the annular gas passage of the ring while its outer end is connected with the burner of the vulcanizer by a tube, f^3.

G represents the upper flexible diaphragm which yieldingly supports the valve seat and connecting parts and rests with its marginal portion upon the ring F, thereby forming with the lower diaphragm and the ring, a gas chamber *g*.

H represents a clamping ring which bears upon the marginal portion of the upper diaphragm and presses the latter firmly upon the supporting or spacing ring F, and presses the latter upon the lower diaphragm and the latter upon the shoulder of the body, so as to form perfectly tight joints and prevent gas or steam from leaking around the edges of these parts. The periphery of this clamping ring is provided with an external screw thread *h* which engages in an internal screw thread formed in the upper portion of the body. For the purpose of conveniently applying a wrench to this ring it is preferably provided with a flat sided hollow head *h'*.

I represents the valve seat secured to the under side of the upper diaphragm and provided with a screw-threaded nipple or hollow shank, *i*, which passes upwardly through an opening formed centrally in this diaphragm.

J represents a hollow regulator stem, which controls the position of the valve seat and which passes loosely through the central opening of the clamping ring. This stem is provided at its lower end with an internally screw-threaded socket *j*, which receives the externally screw threaded hollow shank of the valve seat. The regulator stem and the valve seat are screwed together and firmly drawn against opposite sides of the upper diaphragm, after which they are soldered to said diaphragm to prevent leakage of gas at that point.

The upper end of the regulator stem is provided with a gas inlet nipple j' to which the gas supply tube j^2 is connected.

K represents a disk valve which is adapted to close against the valve seat I and whereby the flow of gas from the central passage of the stem to the gas chamber is controlled. This valve is guided in an annular depending flange k formed on the marginal portion of the valve seat and rests upon the lower diaphragm, so that, as the latter is raised and lowered by the fluctuations in the steam pressure, the valve will be carried toward and from its seat. The valve fits loosely within the annular flange and is provided with a row of openings k' which allow the gas to pass freely from the cavity of the regulator stem into the gas chamber. The lower portion of this cavity is enlarged and contains a spring m which bears upon the valve and causes the latter to promptly recede from its seat when the lower diaphragm moves downwardly. When the steam pressure is normal, the valve is open and the gas flows from the passage in the regulator stem past the valve, thence into the gas chamber, thence through the radial openings of the supporting ring and into the external annular passage thereof and thence through the gas outlet nipple to the burner. When the steam pressure rises above the normal, the lower diaphragm is raised which causes the valve to be lifted and brought closer to its seat, thereby reducing the flow of gas into the gas chamber.

N represents an adjusting cap which is capable of being vertically adjusted on the body and which engages with the regulating stem so as to cause a similar adjustment of the latter, whereby the upper diaphragm is deflected and the valve seat is adjusted with reference to its valve for regulating the steam pressure in the vulcanizer. This cap is provided with a central opening through which the upper portion of the regulator stem projects and bears upon an annular shoulder n formed on the stem. The lower portion of the cap is provided with an internal screw-thread n' which engages with the upper portion of the external screw-thread formed on the clamping ring. For this purpose the screw-threaded portion of the clamping ring is made of such height that a sufficient portion thereof projects above the body to accommodate the adjusting cap after the clamping ring has been tightly screwed down upon the upper diaphragm. Upon turning the adjusting cap so as to bear down upon the valve stem the upper diaphragm is deflected downwardly and the valve seat carried nearer the valve, which enables the valve to close more quickly, thereby reducing the gas supply to the burner. When the adjusting cap is turned in the reverse direction, the upper diaphragm is released and raises the regulator stem and valve seat, whereby the flow of gas to the burner is increased. The upper diaphragm serves the double function of a spring for raising the valve seat and of a top for the gas chamber.

o represents a depending pointer secured to the marginal portion of the adjusting cap and traversing a scale p arranged circumferentially on one side of the body.

The range of rotary movement of the cap, in order to produce the desired range of vertical movement of the regulator stem and valve seat, is about one-third of a revolution, so that the vertical movement is very slight and not suitable for indicating the position of the valve seat, while the rotary movement is considerable and permits the different positions to be easily indicated and observed.

The gas outlet nipple extends outwardly across the path of the pointer, near that end of the scale which indicates the highest pressure, so that the pointer strikes the nipple before it has passed so far beyond the scale that a dangerous pressure would be reached. This limits the upward movement of the valve seat and prevents the operator from inadvertently adjusting the regulator to a dangerously high pressure. It is obvious that the operation of the regulator would be the same if gas were admitted through the outlet nipple and discharged through the inlet nipple.

I claim as my invention—

1. The combination with the casing having a steam inlet and a gas outlet, of two flexible diaphragms arranged in said casing, and between which the gas chamber is formed, a valve carried by one of said diaphragms, and an adjustable valve seat carried by the other diaphragm and provided with a gas inlet, substantially as set forth.

2. The combination with the casing having a steam inlet, and a gas outlet, of two flexible diaphragms arranged in said casing and between which the gas chamber is formed, a valve carried by one of said diaphragms, an adjustable valve seat carried by the other diaphragm and provided with a gas inlet, and a supporting ring interposed in the casing between said diaphragms and provided with a surrounding gas passage communicating with the gas outlet and with a gas passage communicating with the gas chamber, substantially as set forth.

3. The combination with the casing provided with a gas outlet and a steam inlet, of a flexible diaphragm forming with the bottom of the body a steam chamber, a supporting ring resting upon the margin of said diaphragm and provided with a gas passage communicating with the gas outlet, a flexible diaphragm resting with its margin on the supporting ring, a clamping ring secured to the body and bearing upon the margin of the last mentioned diaphragm, a valve carried by the first mentioned diaphragm, and an adjustable valve seat carried by the last mentioned diaphragm and having a gas inlet, substantially as set forth.

4. The combination with the casing provided with a gas outlet and a steam inlet, of

two flexible diaphragms arranged in said casing and between which the gas chamber is formed, a valve carried by one of said diaphragms, a hollow regulator stem rigidly secured to the other diaphragm, and provided with a valve seat and a gas inlet and an adjusting device engaging with said regulator stem, substantially as set forth.

5. The combination with the casing provided with a gas outlet and a steam inlet, of two flexible diaphragms arranged in said casing and between which the gas chamber is formed, a valve carried by one of said diaphragms, a valve seat arranged on the gas side of the other diaphragm and provided with a screw-threaded shank passing through said diaphragm, a hollow regulator stem provided with a gas inlet applied to the opposite side of said diaphragm and having a socket which receives said shank and a screw cap connected with said regulator stem, substantially as set forth.

6. The combination with the casing having a gas chamber and a steam chamber, of a flexible diaphragm separating said chambers, a valve controlled by said diaphragm, an adjustable regulator stem provided with a valve seat, means whereby said stem is held against rotation, a rotary adjusting cap engaging with said stem, a pointer arranged externally on said cap and a peripheral scale on the casing which is traversed by said pointer, substantially as set forth.

7. The combination with the casing provided with a gas chamber and a steam chamber, of a flexible diaphragm separating said chambers, a valve controlled by said diaphragm, an adjustable regulator stem provided with a valve seat, means whereby said stem is held against rotation a rotary adjusting cap engaging with said stem, a pointer arranged externally on said cap, a peripheral scale on the casing which is traversed by said pointer, and a stop secured to the casing and adapted to come in contact with the pointer and limit the receding movement of the valve seat, substantially as set forth.

Witness my hand this 13th day of February, 1894.

THEODORE G. LEWIS.

Witnesses:
JNO. J. BONNER,
THEO. L. POPP.