J. G. LEFFINGWELL.

Gas Regulator.

No. 30,415. Patented Oct. 16, 1860.

Fig. 2.

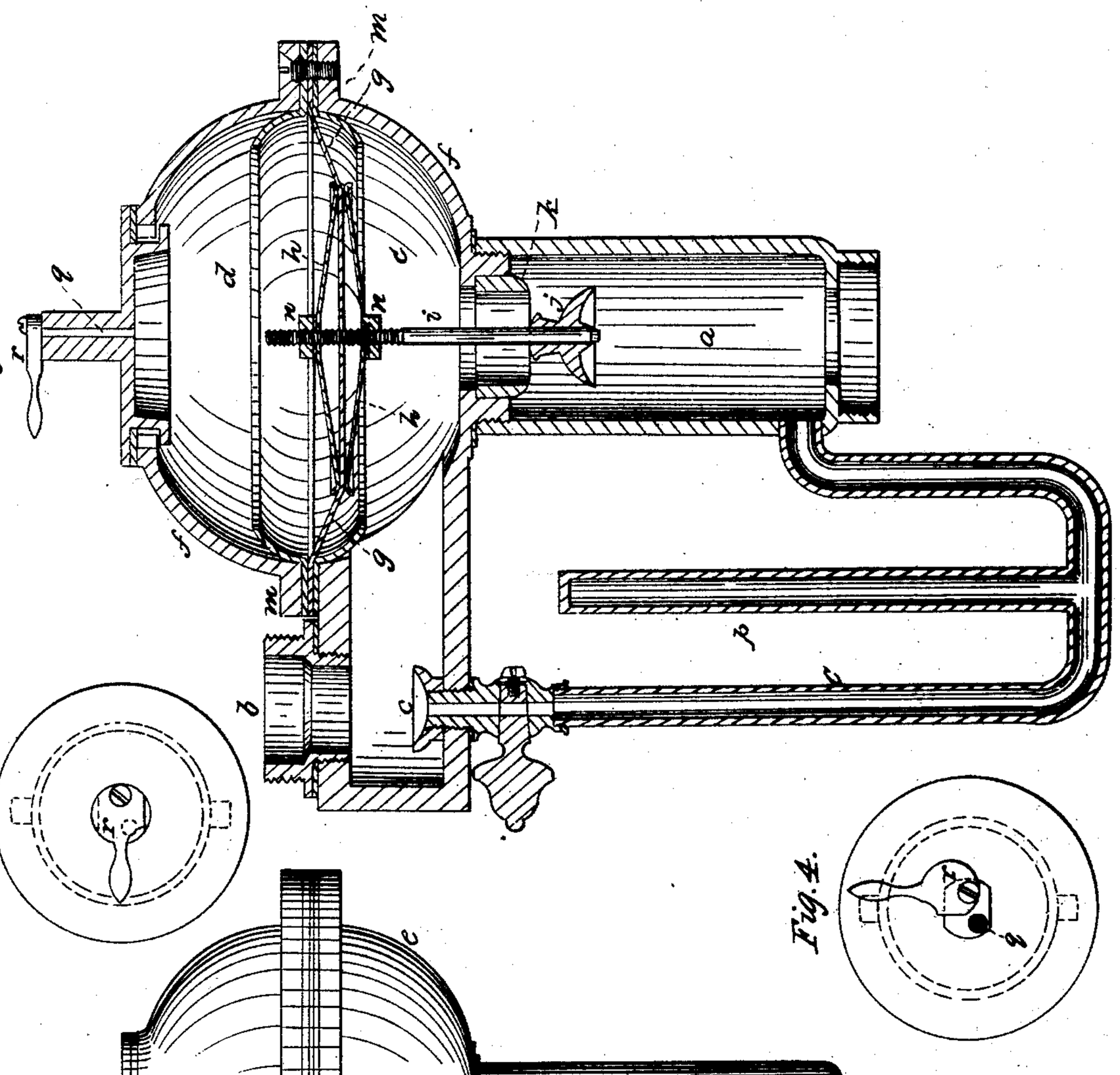

Fig. 3.

Fig. 4.

Fig. 1.

Witnesses:
William Frost
John Broadbent

Inventor:
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UNITED STATES PATENT OFFICE.

JOHN G. LEFFINGWELL, OF NEWARK, NEW JERSEY.

GAS-REGULATOR.

Specification of Letters Patent No. 30,415, dated October 16, 1860.

To all whom it may concern:

Be it known that I, JOHN G. LEFFINGWELL, formerly of the city of St. Louis, in the State of Missouri, and now of the city of Newark, in the State of New Jersey, have invented certain new and useful Improvements in Gas-Regulators; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings and to the letters and marks thereon.

My invention relates to that class of gas regulators wherein an elastic diaphragm is used in connection with cups or sections of spheres, the gas being on the one side of the diaphragm and atmospheric air, more or less compressed or attenuated, being on the other side of the diaphragm.

The drawings forming part of this specification show a gas regulator, Figure 1 being a side view or a view in elevation; Fig. 2 a view by vertical section; and Figs. 3 and 4 views of the top plate with the means for controlling the admission and escape of air to and from the chamber above the diaphragm.

In each of the figures where like parts are shown like letters and marks are used to indicate them.

(*a*) marks the induction pipe to the regulator; (*b*), the eduction pipe conveying the gas to the burners; (*c*), the lower chamber of the regulator, and (*d*), the upper chamber; (*e*), the lower section or cup, and (*f*) the upper section; (*g*), the elastic diaphragm; (*h*), metallic plates on either side of the diaphragm; (*i*), the valve stem; (*j*), the valve; (*k*), the valve seat; and (*l*), a siphon connecting the extended portion of the cups with the induction pipe.

In this class of regulators the surfaces of the flanges (*m*) of the cups which come in contact with the elastic diaphragm have heretofore been planed or turned smooth to fit them for a tight joint. This planing or turning increases the expense of their construction, and even when thus planed an evil exists arising from the action of the gas upon their edges, corroding them and thus injuring the flanges and the diaphragm. To save the expense of planing and to prevent the corrosion, I place between the flanges, sheets of lead, shown in the drawing by red coloring, or sheets or plates of some composition, incorrodible. The coating of these surfaces with tin by any of the ordinary processes might answer, but I prefer the sheets clamped between the flanges as this makes smooth surfaces for the diaphragm and gives full protection from corrosion.

I find it better in this class of regulators to use the metal plates above and below the diaphragm, but if these plates merely lie flat upon the diaphragm or are so curved or formed that the diaphragm will have play between the edges of the plates or between the curved surfaces, there will be little or no advantage derived from their use.

To have that portion of the diaphragm between the edges of the plates and the inner edge of the flanges sensitive and to the highest degree useful the plates must clamp the diaphragm at their edges. In order to effect this I use curved plates, as shown by the drawings, which are corrugated either concentrically or radially, the latter being preferred and then by means of the screw-nuts (*n*) on the valve stem the edges of the plates can be forced tightly upon the diaphragm. This tightening may be effected by securing the edges of the plates to the diaphragm by rivets or their equivalents if preferable, but the nuts and screw thread on the valve stem renders the clamping of them to a considerable degree adjustable.

The seat of the valve and that part of the valve usually in contact with it is generally in gas regulators made smooth by turning or planing, and being of the same metal as the body of the regulator, of cast iron, is very liable to corrosion by the gas and consequently to the uncertainty of perfect action. I avoid these evils by making the seat of the valve of an independent piece of composition non-corrosive metal, of which I also make the valve, and then by grooving the socket and the surface of the composition piece between the two a complete and perfectly tight joint is made. The valve being made of this metal saves the expense of turning its surface, if made of iron, or of coating or covering it with some elastic material.

Ordinarily in gas regulators the vapor from the gas will become condensed in the chambers of the regulator and obstruct its perfect and uniform action. By means of the siphon (*l*) having a cup (*o*) at one end I make provision for conveying this condensed vapor, or the water of condensation,

from the extended portion of the body of the regulator which lies underneath the mouth of the eduction tube to the induction tube and thus avoid all the evils alluded to. This siphon I form with a central tube or chamber (*p*) so that the excess of moisture or vapor may be expended therein and be absorbed whenever the gas is too dry: and this chamber also serves as an expansion chamber and in this way tends to the regular action of the siphon.

In order that the air of the diaphragm chamber (*d*) may be controlled by simple and easily operating means, I place over the tubular exit (*q*) or opening a lever valve. By Fig. 4 this valve is shown entirely away from the mouth of the tube and by Fig. 3, nearly covering the same. One end of this lever valve is connected to the top of the tube, as shown, by a screw which also serves as its pivot for turning. It will readily be seen that if the orifice of (*q*) by closed by passing this valve over it when the diaphragm is at its lowest position the pressure of the gas will be resisted by a large body of air and the greatest degree of compression will occur therein, and if the valve be not closed until the diaphragm shall have reached its highest point then the least degree of compression will exist. It will also be perceived that if the orifice of tube (*q*) be covered to a great extent the escape of the air from this chamber upon the pressure of the gas on the diaphragm will be greatly interrupted and if only to a slight extent but little interrupted. Thus the valve (*r*) in connection with the tube (*q*) can be used to give uniformity to the motions or actions of the main valve (*j*) under the impulsive pressures of the gas derived from the varying actions of the gasometer, and also to regulate the degree of compression of air above the diaphragm.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. Interposing between the flanges of the cups or sections of the regulator and the elastic diaphragm the non corrosive metal for protecting the flanges and the diaphragm.

2. Clamping the diaphragm between the edges of the metal plates constructed and operated substantially as described.

3. Connecting the extended part of the regulator to which the exit or eduction pipe is attached to the induction pipe by a siphon constructed and arranged and operating as set forth.

4. The independent valve seat made of non corrosive metal and fitted to the regulator by a grooved joint in combination with a non-corrosive metal valve as herein described.

5. The lever valve (*r*) in combination with the tube or opening (*q*) of the upper section of the regulator for the purpose of regulating the condition of the atmospheric pressure upon the upper side of the diaphragm as set forth.

This specification signed this 31st day of July, 1860.

J. G. LEFFINGWELL.

Witnesses:
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JOHN BROADBENT.