2 Sheets—Sheet 1.

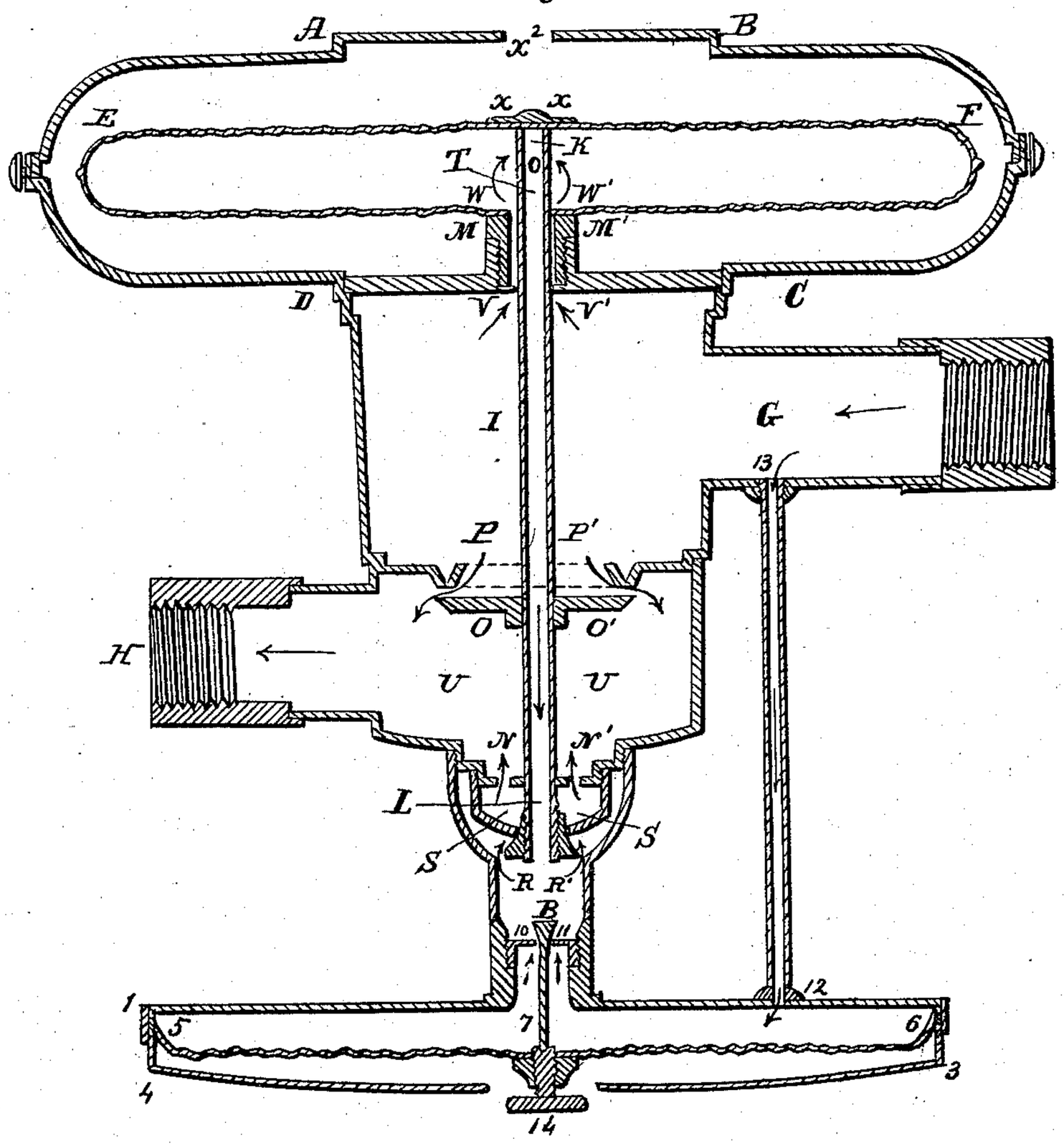
# R. CORNELIUS.

## Gas Regulator.

No. 17,317.

Patented May 19, 1857.

Fig. 1.




Witnesses:

J. H. B. Jenkins

J. E. Shaw.

Inventor:

Robert Cornelius

2 Sheets—Sheet 2.

# R. CORNELIUS.

## Gas Regulator.

No. 17,317. Patented May 19, 1857.

*Fig. 3.*

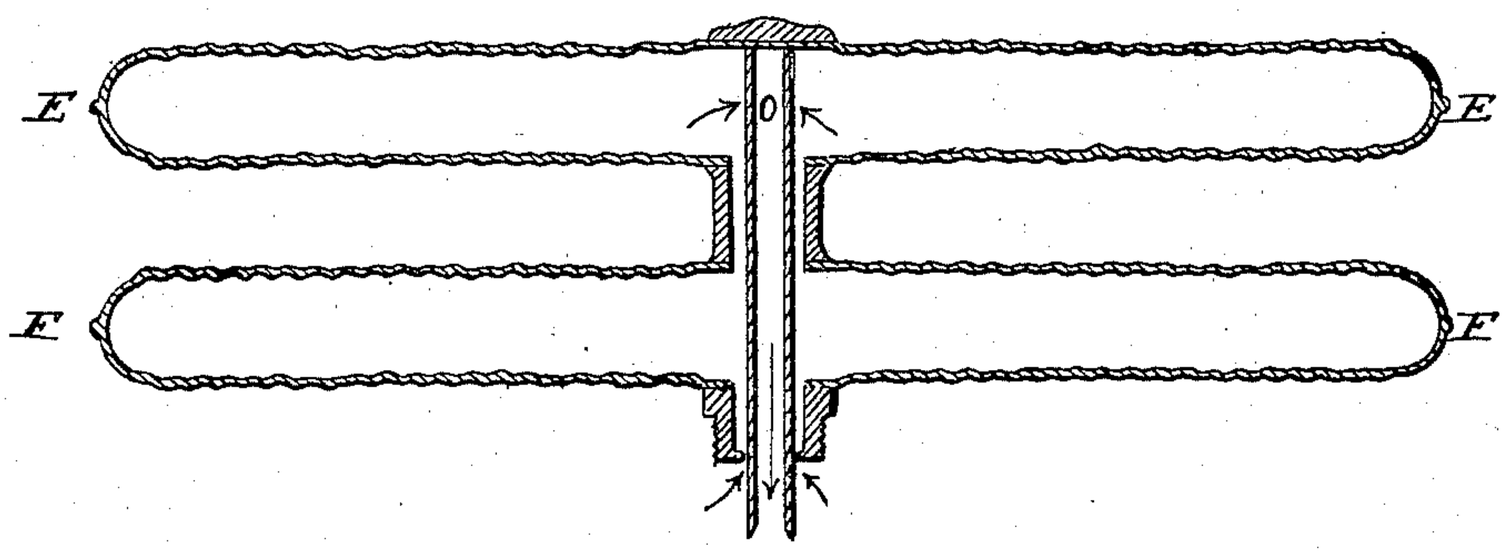
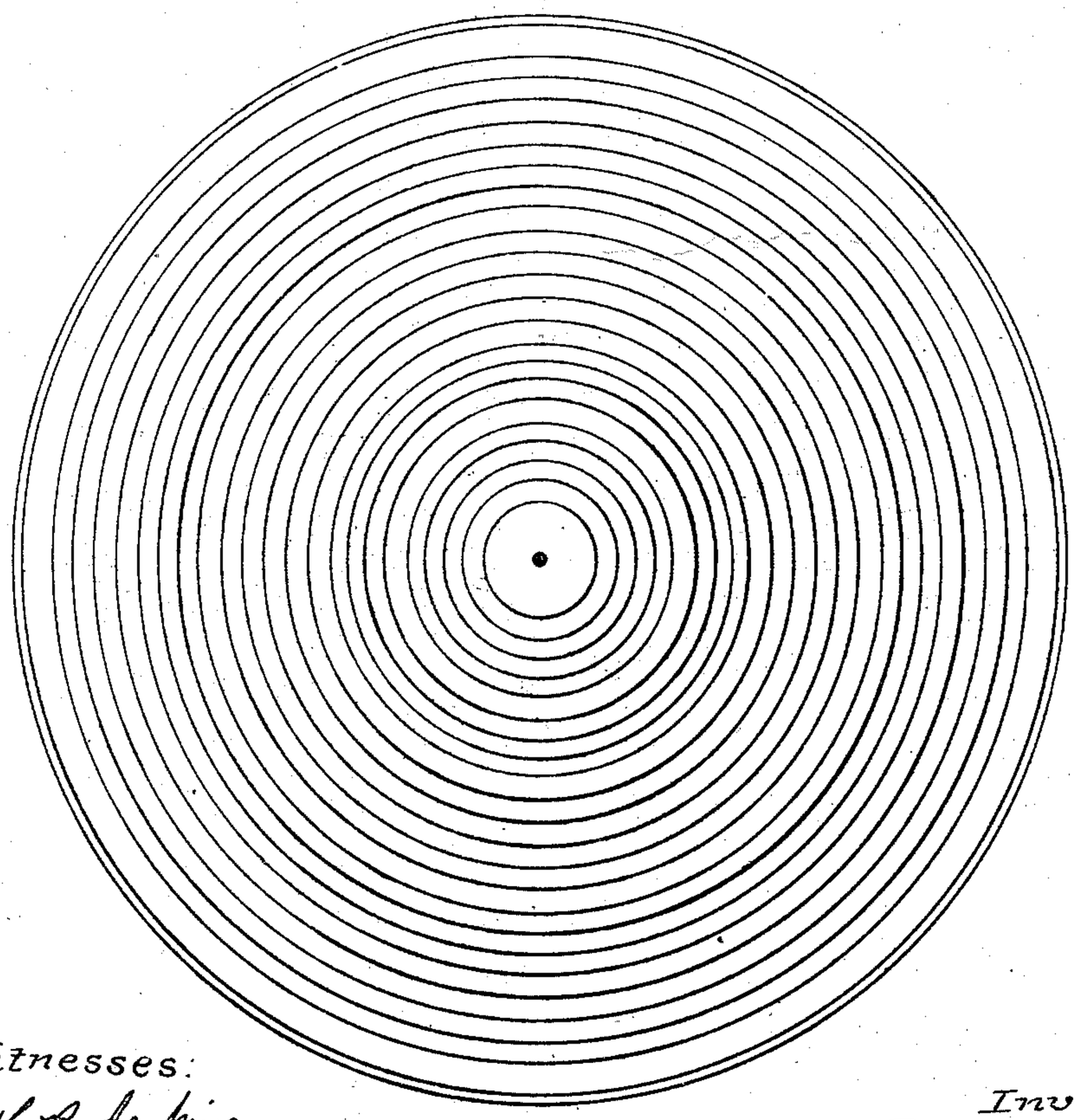



*Fig. 2.*



Witnesses:
J. H. B. Jenkins
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Inventor:
Robert Cornelius.

# UNITED STATES PATENT OFFICE.

ROBERT CORNELIUS, OF PHILADELPHIA, PENNSYLVANIA.

## IMPROVEMENT IN GAS-REGULATORS.

Specification forming part of Letters Patent No. 17,317, dated May 19, 1857.

*To all whom it may concern:*

Be it known that I, ROBERT CORNELIUS, of the city of Philadelphia and State of Pennsylvania, have invented a new and useful Improvement in Gas-Regulators formerly patented by me; and I do hereby declare the following to be a full and exact description of the same, reference being had to the annexed drawings, making a part of this specification, in which—

Figure 1 is a vertical section of my regulator, the part colored pink showing my present improvement. Fig. 2 is a top view of part E F of Fig. 1. Fig. 3 is a view of a modification of the same apparatus shown in Fig. 1.

My improvement consists in an attachment to the gas-regulator patented to me by Letters Patent dated April 21, 1857, and has for its object the more perfect regulation of the flow of gas through the burners, so that the escape of gas from any given pipe to one or to a number of burners shall be under a uniform or very nearly uniform pressure, no matter how many burners attached to such pipe are open and no matter what variation the pressure in the main or street pipe undergoes.

I constructed my former patented regulator as follows:

A B C D is a flat or ellipsoidal box or case.

E F is a spring-box composed of two thin plates of brass corrugated in concentric circles and attached together by soldering at the outer circumference. The lower plate is soldered to the piece M M′.

G is the entrance or supply pipe from the main.

H is the pipe going to the burners.

I is an intermediate valve-chamber.

K L is a hollow or tubular rod attached firmly to the spring-box E F, moving up and down with the plates of the box. This rod K L slides through a guiding-collar at N N′. A flat valve O O′ fits over a circular opening P P′. This valve O O′ is the valve through which the main supply of gas escapes from G through I to H, and the quantity of gas so permitted to pass will depend in a great measure on the distance to which O O′ is removed or separated from P P′. A small valve R R′, of a peculiar shape, is attached to the lower extremity of the tube-rod K L. A small opening T is made into the upper extremity of the rod K L. The small valve R R′ is very nearly in shape that which would be formed by the revolution of a semi-parabola upon a line parallel to its transverse axis. Its shape is such as to present a section of a size greater in proportion than the motion of the hollow rod K L. For example, if the valve-rod K L run through one-tenth ($\frac{1}{10}$) of an inch the sectional arc presented between R R′ and P P′ will be greater than twice that presented by a similar motion of K L through one-twentieth ($\frac{1}{20}$) of an inch, and so on. Thus it will be seen that there were three chambers formed by my regulator, which for distinctiveness I have now colored as follows: The main chamber is red, the second or intermediate chamber blue, the third or discharging chamber green.

The operation of this part of the regulator is as follows: The gas enters at G under the street-pressure, passes into the chamber I, from I it passes through at O O′ to *u u*, and thence to H in the direction shown by the arrows. A small portion of gas also passes up through the narrow passage W V W′ V′ into the interior of the spring-box E F, and thence through the small aperture T, down the tubular rod K L, and between R R′ and S S′, into the chamber *u u′*, where it meets the gas flowing through O O′, and they flow together through H to the burners. When no burners are lighted on H, the pressure of the gas in I is communicated through W V and W′ V′ to the interior of E F, and the spring-plates of E F being separated to their greatest extent the valve O O′ is drawn up almost to its seat P P′ and the valve R R′ almost to its seat also. When one burner is lighted, the gas flows through at P P′ and also at R R′, and this flow diminishes the pressure which was distending E F, and that box contracting slightly the rod K L is pushed down and O O′ and R R′ slightly opened. When two burners are lighted, O O′ and R R′ are for a like reason depressed and more gas escapes; but the peculiar shape of R R′ permits more gas to escape than double the quantity which passed before. This relieves the pressure still more within the box E F, and it contracts consequently a little more and removes O O′ and R R′ still farther from their seat and permits a larger quantity of gas to pass through at O O′.

With this apparatus constructed and operated as above I found that within certain

limits of street or main pressure it operated perfectly—as, for example, when the variation in the outside pressures was from two to three inches; but when the street or main pressure varied through greater limits than the above—as, for example, from one and one-half to four inches—the full perfection of the instrument was not maintained. I found that under the latter circumstances of variation as the street-pressure increased the valve O O′ would contract the opening at P P′ a little too much, and thus operate to a little too great extent. To remedy this defect and maintain the full perfection of my regulator as heretofore patented, I have added the parts shown in pink in the drawings, which constitute my present improvement, and are as follows:

1 2 3 4 is a spring-box with one flexible corrugated disk 5 6. To this corrugated disk is attached a valve and stem 7.

8 is a small valve, of conical or nearly conical shape, attached to the rod 7. This valve 8 slides through and increases or diminishes the sectional opening 10 11. This opening 10 11 communicates between the interior of the chamber 1 2 6 5 and the intermediate chamber, (marked blue on the drawings.)

12 13 is a tube leading from the main chamber at G to the interior of the chamber 1 2 6 5, through which the gas flows in the direction shown by the arrows. The tube 12 13 causes the gas in the chamber 1 2 6 5 to be of the same pressure as in the street or main pipe at G. As the pressure on the street increases the pressure on the disk 5 6 increases and forces down the spring 5 6, and the stem and valve 7 8 contracting the passage for the escape of gas through 10 11 into the intermediate or blue chamber. As the quantity of gas which passes through 10 11 is checked, of course it tends in so much to diminish the pressure in the intermediate or green chamber. If the pressure in the green chamber be diminished, it would permit an increased flow of gas through T L, and consequently as the sectional opening 10 11 is diminished it would tend to diminish the pressure in the interior of the spring-box E F. As this is diminished, it permits the opening in O O′ to be increased by the contraction of the spring-box E F forcing down the hollow stem K L. Thus as the pressure in the street or in the main chamber G (marked red) increases the valve O O′ is prevented from being too much closed by the counteraction of the gas through the tube 12 13 and spring-box 5 6.

At 14 an adjusting-screw is placed to regulate or adjust the position of the valve 10 11.

The spring-box E F described above or the spring-box 5 6 may be either single or double.

Having thus described my invention, what I claim as my improvement is—

The employment of the auxiliary spring-box 5 6, communicating directly with the main chamber G, in combination with the valve 10 11, communicating with the middle chamber, for the purpose of preserving the uniform action of my regulator under considerable variation in the main pressure.

ROBERT CORNELIUS.

Witnesses:

J. H. B. JENKINS,

J. E. SHAW.