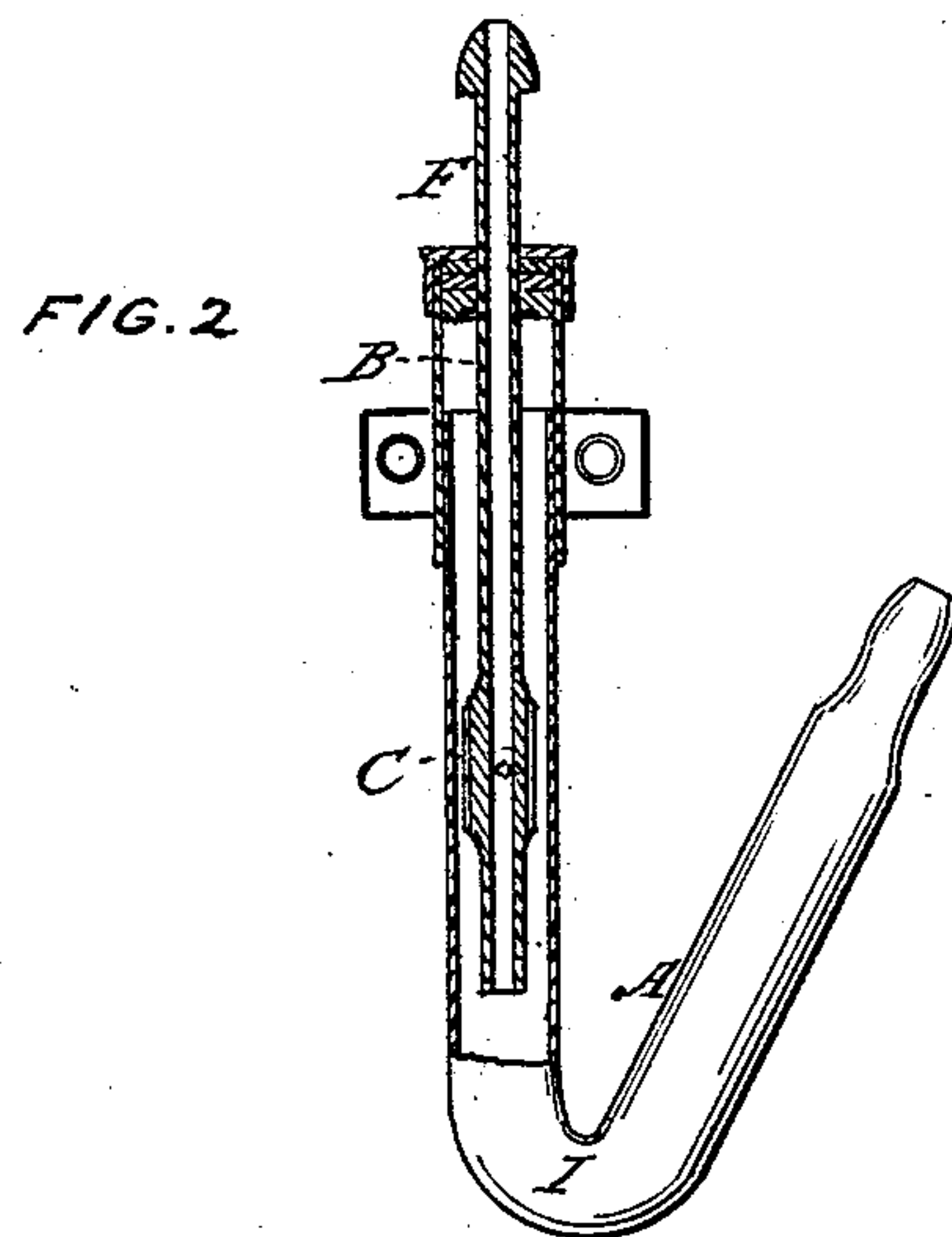
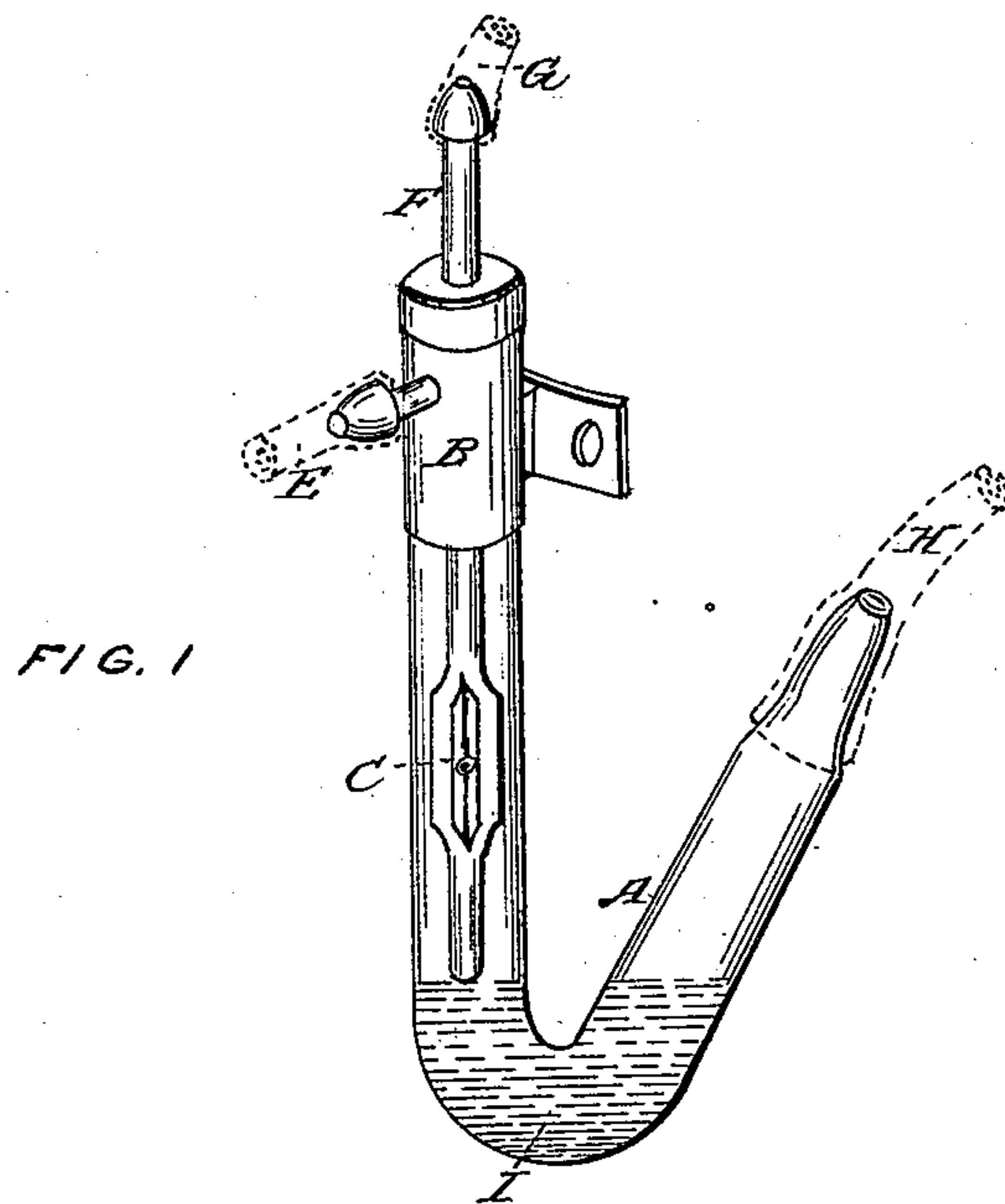


J. B. COOLIDGE.
Gas Regulator.

No. 97,051.

Patented Nov. 23, 1869.



WITNESSES:

J. L. Newton
L. S. Fowler

INVENTOR:

John B. Coolidge

United States Patent Office.

JOHN B. COOLIDGE, OF BOSTON, MASSACHUSETTS.

Letters Patent No. 97,051, dated November 23, 1869.

IMPROVED MERCURIAL GAS-REGULATOR FOR NITROUS-OXIDE APPARATUS.

The Schedule referred to in these Letters Patent and making part of the same.

To all whom it may concern:

Be it known that I, JOHN B. COOLIDGE, of Boston, in the county of Suffolk, and State of Massachusetts, have invented a new and useful Mercurial Gas-Regulator; and I hereby declare that the following is a full and exact description thereof, and reference is made to the accompanying drawings, and to the letters of reference thereon, as parts of this specification.

Figure 1 is a perspective view of the regulator, showing its parts and connections.

Figure 2 is a section of the same.

The letter A represents the U-shaped glass tube.

B, the packing-box.

C, an orifice in the inlet-tube F.

E, a flexible tube connected with the heating-burner.

G, a flexible tube to admit the illuminating-gas through the tube F into one end of the tube A.

H, a flexible tube to admit the manufactured gas into the other end of the tube A; and

I, the mercury in the tube A.

The object of the invention is to regulate the amount of illuminating-gas admitted to a burner, which heats a retort or flask containing material for manufacturing nitrous-oxide or other gas evolved by heat, and which may be passed through water for purification.

The nature of the invention consists in the use of mercury as a partial cut-off or regulator, arranged and combined with a device, and the improvements connected therewith, wherein the nitrous-oxide or other gas evolved and confined in a wash-jar connected with the mercurial tube, presses upon the mercury in the tube, in one arm, causing it to rise in the other arm of the same tube, thereby diminishing the supply of heating-gas, and thus diminishing the heat which causes the nitrous-oxide or other gas to evolve.

The invention is an improvement upon any existing device and process for this purpose, and is thus explained and described:

The device consists of a strong U-shaped glass tube, A, into one end of which a boxwood tube, *f*, which fits and slides air-tight through a metallic packing-box, B, and this inlet-tube is adjustable. (See figs. 1 and 2, in the drawings.) Other material than boxwood may be used for the inlet-tube which mercury does not affect.

The device may be attached by screws to the room wall, or to any convenient upright surface of five by three inches, the space which the device occupies, the part of the tube containing the inlet-tube F, being upright.

When used, illuminating-gas is admitted by a flexible tube, G, (see dotted lines, fig. 1,) and flows through the boxwood pipe *f* into the mercury-tube A. It is, of course, prevented from descending further into the tube than the mercury I, which occupies the bent portion

of the tube, (see figs. 1 and 2,) and, rising, flows through the flexible tube E, which is connected, at its opposite end, with the burner under the retort.

The flexible tube H, (see dotted lines, fig. 1,) is connected with the wash or purifying-jars, usually the second from the gasometer, or may be connected by a T between two jars, when one or more jars are used.

These wash-jars (four in number are preferred) are connected with each other by tubes, passing from the retort into the first jar down into the water, which fills the same about two-thirds full. The nitrous oxide rises above the water, and passes by a second tube, having its open end near the air-tight cover of the jar, over into the second jar in like manner, and so on through the series of jars and to the gasometer.

Whenever nitrous oxide is making too fast, its pressure through the tube H upon the mercury causes the mercury to rise in the opposite or upright portion of the tube A, and its upward pressure lessens the space in the tube, and diminishes, of course, the supply of gas flowing to the burner.

Should the mercury continue to rise, and completely close the passage through the end of the tube F, sufficient gas will flow through the small orifice C, in the side of the tube, (see figs. 1 and 2,) to prevent the extinguishment of the flame under the retort. The heat being diminished, and, consequently, the pressure of the nitrous oxide, the mercury falls, and the supply of burning-gas increases, and thus a constant and nearly even supply of nitrous oxide will be evolved, by nearly constant volume of burning-gas being consumed, and the pressure of nitrous oxide upon the mercury regulates the amount of burning-gas. The mercury operates, of course, as a solid valve, through which the gases cannot pass.

The distance of the tube F from the mercury may be increased or diminished at will, by moving it up or down through the gas-tight packing-box, and the regulator thereby be made to admit uniformly any quantity of burning-gas required.

This regulator is far superior to any now in use for this purpose, because it is much more compact in form, less liable to be broken in transportation and use, and is not liable to get out of order. Because it contains no water to become saturated with burning-gas, and communicate it to the nitrous oxide, as is inevitable, when water and like fluids are used as a valve, and, having no joints, cannot corrode or leak. Because its cost is much less than any other regulator. Because it has an extra vent in its inlet-tube F, so that the supply of burning-gas cannot be entirely cut off.

I am aware of the patent of James M. Osgood, of date November 1, 1864, for an automatic regulator, in which he claims a regulator, operating by pressure of air, gas, or vapor, upon a column of fluid; but by his

device the gas evolved acts upon the water in the wash or purifying-jar, and presses the same water (or fluid) through a pipe into another vessel, into which the burning-gas flows, and the flow of which is regulated by this column of water, (or fluid;) *i. e.*, the column of water (fluid) from the purifying-vessel to the gasometer, containing the burning-gas, operates as a valve, and is a part of the purifying-fluid.

In my device, the evolved gas operates directly upon the mercury, operating as a valve, but having no connection with the fluid in the purifying-jar; and, moreover, Osgood's device cannot, as shown, operate mercury, though a fluid.

I do not claim an automatic regulator, operating by the pressure of air, gas, or vapor, upon a column of fluid, the same having been used; but

I claim, as my invention, for a gas-regulator—

1. The use of mercury, operated by the pressure of gas upon the mercury, in combination with the tube A, containing the mercury, and the inlet-tube C, substantially as shown, and for the purpose specified.

2. The adjustable inlet-tube F, combined and arranged with the packing-box B, and a tube, A, holding a column of fluid, substantially as shown, and for the purpose specified.

3. An extra vent, so arranged as to keep the flame burning when the regulator-vent is closed by the mercury, substantially as shown, and for the purpose specified.

JOHN B. COOLIDGE.

Witnesses:

J. L. NEWTON,

J. D. TOWLE.