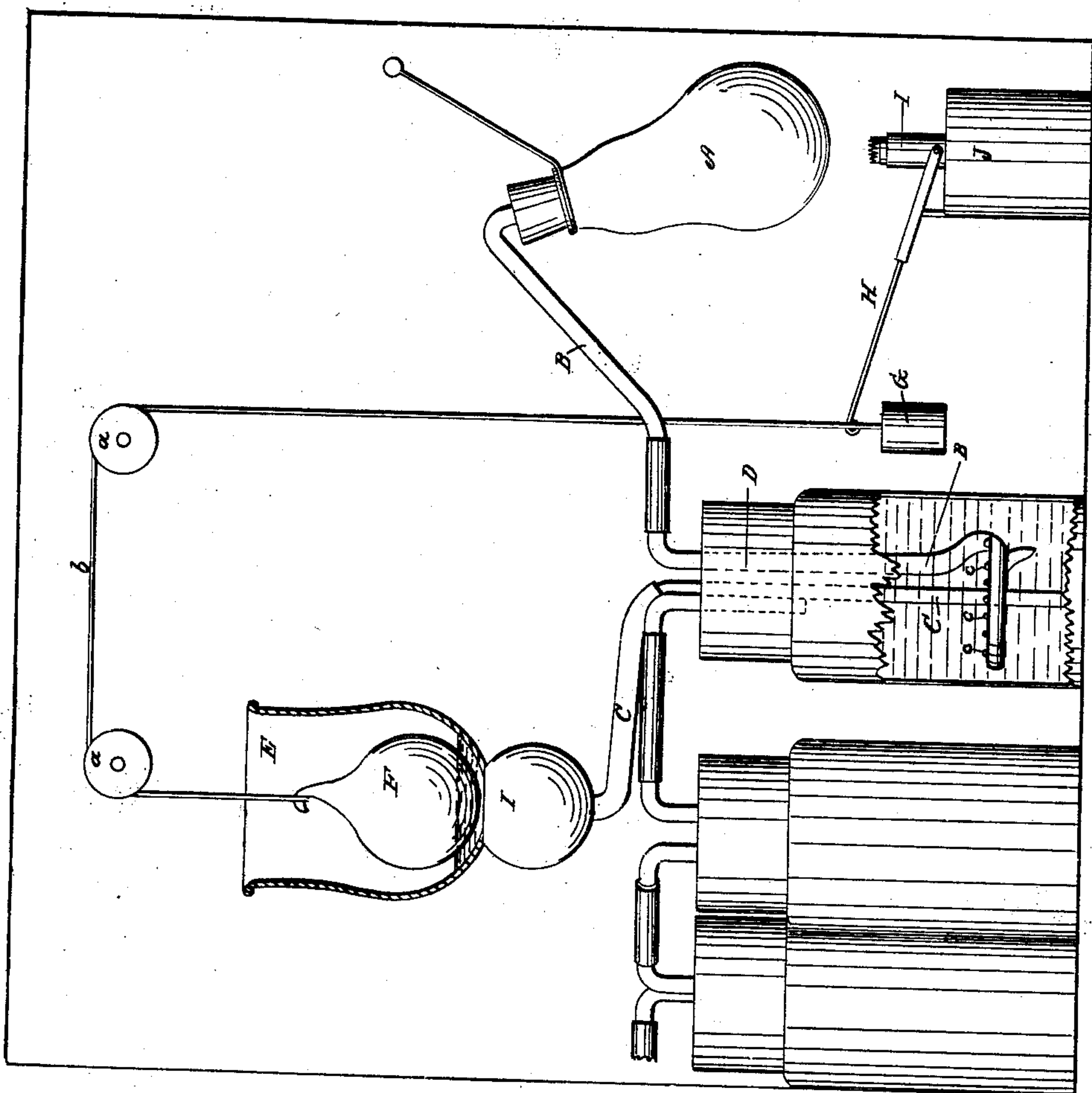


A. W. SPRAGUE.

Apparatus for Generating and Washing Gases for Inhalation.

No. 55,548.

Patented June 12, 1866.



Witnesses:

J. H. Adams  
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Inventor:

A. W. Sprague.

# UNITED STATES PATENT OFFICE.

A. W. SPRAGUE, OF BOSTON, MASSACHUSETTS.

## IMPROVED APPARATUS FOR GENERATING AND WASHING GASES FOR INHALATION.

Specification forming part of Letters Patent No. 55,548, dated June 12, 1866.

*To all whom it may concern:*

Be it known that I, ALFRED W. SPRAGUE, of Boston, in the county of Suffolk and State of Massachusetts, have invented a new and useful Improvement in Apparatus for Generating, Washing, and Purifying Gases for Inhalation, of which the following is a full, clear, and exact description, reference being had to the accompanying drawing, making a part of this specification, and representing an elevation of the apparatus containing my improvements.

The object of my invention is, first, to provide for the regulation of the heat where a given and uniform temperature is required; and, secondly, to produce a means for thoroughly washing and purifying the gas as it passes through the water; and the invention consists, first, in the employment of a float resting upon a column of water which is forced up by the pressure of gas in a vessel below, and made to operate upon a device which controls and regulates the flame of a lamp or the supply of gas to a burner; and it consists, secondly, in the use of a series of conically-shaped projections, perforated at their apexes and formed in a tube, funnel, globe, or device of any other convenient shape, of glass, to admit of the passage of the gas to be used.

My invention is more particularly designed to be applied to the manufacture of nitrous-oxide gas.

The increasing popularity of this agent, and its superiority over ether and chloroform for anæsthetic and sanitary purposes when used in a pure state, and the injurious effects caused by the use of an impure article, have rendered it necessary that the utmost precautions should be taken in its preparation and manufacture.

It is found that the salt of ammonia, from which the gas is made, should be maintained at nearly a uniform heat, which latter should exceed but little the point where the salt begins to decompose into gas—say 400° Fahrenheit. This can effectually be accomplished by means of the automatic regulator employed in my apparatus. By the old process of preparing nitrous-oxide gas it was necessary that the heat given out should be constantly watched, and even then the heat of the melted salts would be liable to fluctuate between 400° and 600°, by which acids of a deleterious char-

acter would be evolved and the flask containing the salt be liable to break.

Referring to the drawing, A represents the flask or retort for holding the nitrate of ammonia, from which the gas is evolved, and placed over a lamp or gas-burner. Extending from the flask is a tube, B, communicating with the first wash-jar, in the usual manner.

Above the wash-jars is supported, in any suitable manner, a vessel, E, from the bottom of which extends a pipe or tube, C, to the lower part of the vessel D. When the retort is charged the gas or vapor evolved by distillation passes into the vessel D through the water and rises to the surface thereof, filling the space between the water and the upper part of the vessel, and by pressure acts upon the water to force it up into the vessel E. In the vessel E, and resting upon the water thus forced up, is a float, F, to the upper part of which is attached a cord, b, which passes over pulleys a a, and, extending downward, has a weight attached to its lower end. Near the lower end of the cord b is attached one arm of a lever, H, the other end having pivoted to it a sliding tube, I, fitted to move easily over the wick-tube of a lamp, J, so as to increase or diminish the flame as it moves up or down. As the heat from the flame increases more gas is evolved from the flask, and consequently a greater pressure is exerted upon the water in the vessel D, and a greater quantity of water is forced up into the vessel E. The float consequently rises, and thus causes the lever to operate upon the slide, which rises and diminishes the amount of flame and heat.

The position of the float may be adjusted in the vessel E, relatively to the regulating device on the lamp, by adjusting the weight on the end of the cord b, so that when the requisite degree of heat for the proper distillation of the salt is ascertained it may be readily maintained and the apparatus left to regulate itself.

In case any illuminating-gas is used for heating the flask A, the lever which is operated by the float may be attached to a stop-cock arranged in the pipe or tube that conducts the gas to the burner placed under the flask, or any other equivalent device may be used for the purpose, the lever serving to open or close the cock according to the supply of



gas and degree of heat required. The method here described may be applied to regulate the heat not only of oil, naphtha, alcohol, or other fluid lamps, but all lamps supplied with gas or vapor where the product of the heating is gas or vapor forced through any liquids.

The lower part of the tube B, which conducts the gases evolved to the bottom of the vessel or purifier D, is shown as curved and occupying a horizontal position. In this tube are formed small conical projections *c*, perforated at their apexes to admit of the passage of the gases. This constitutes an important feature of my invention, being the result of long-continued experiments in attempting to perfect the thorough washing of the gas as it passes through the water. Perforated tubes of metal and rubber were first tried; but the perforations soon became clogged and useless. Glass tubes of even surface and provided with plain perforations were then used, and perforations were made by punching them inwardly; but these proved unsatisfactory. Projections were then made outwardly, and it was found

that the gas would readily pass through a minute perforation made in the point of a conical projection when it will pass by even a larger opening made in a smooth surface.

Instead of a curved tube, a funnel, globe, or device of other form may be used, in which the conical perforated projections may be made.

Having thus described my invention, what I claim, and desire to secure by Letters Patent, is—

1. The combination of the float F and vessel E with the lever H or its equivalent, as and for the purpose described.

2. The perforated conical projections *c*, formed in the tube B, or its equivalent device, substantially as and for the purpose specified.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

ALFRED WHITE SPRAGUE.

Witnesses:

J. H. ADAMS,

EDWD. F. ADAMS.