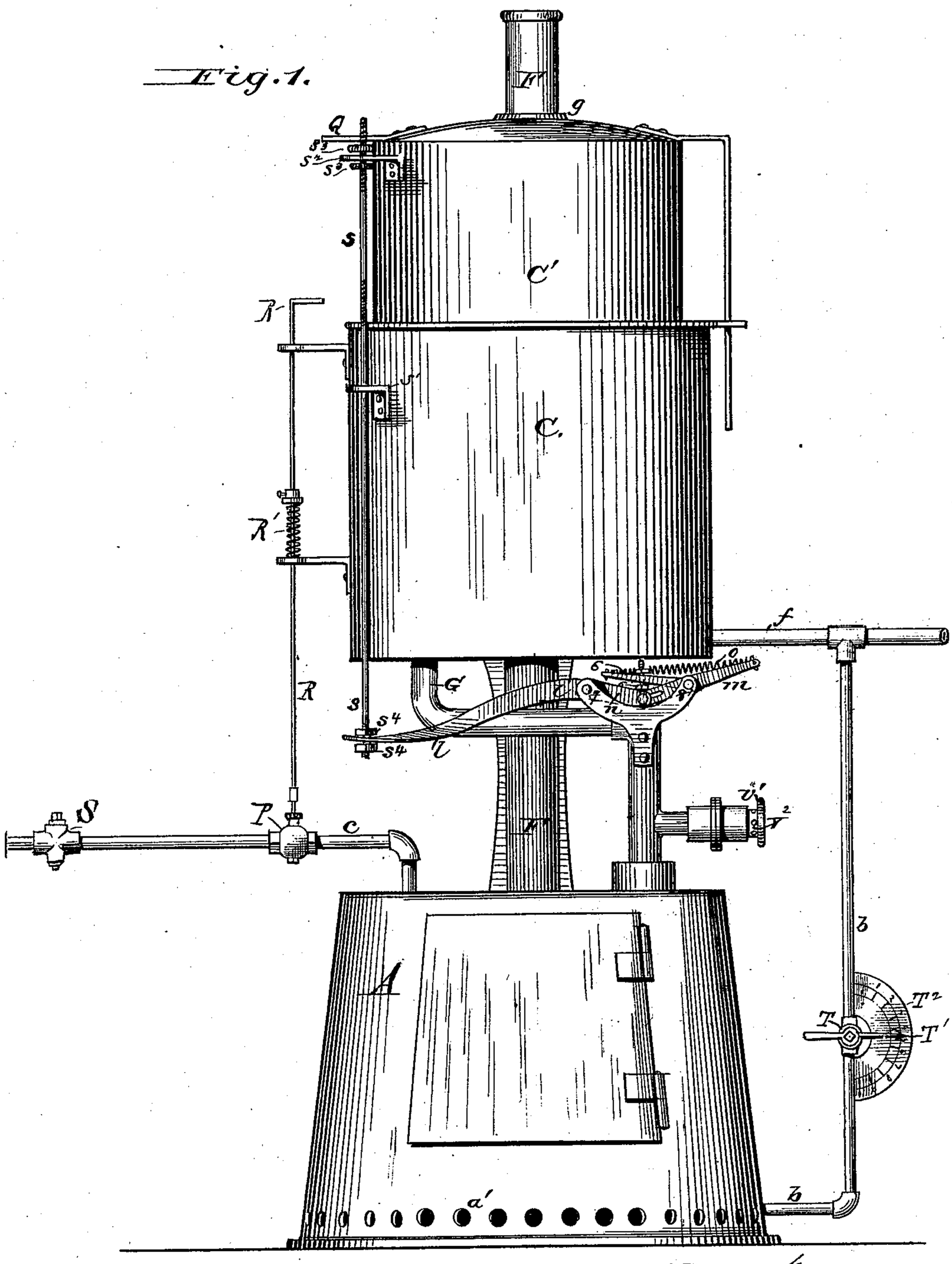
2 Sheets—Sheet 1.

H. D. FITCH.

Gas-Apparatus.

No. 204,016. Patented May 21, 1878.

Fig. 1.



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2 Sheets—Sheet 2.

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Gas-Apparatus.

No. 204,016. **Patented May 21, 1878.**

Fig. 2.

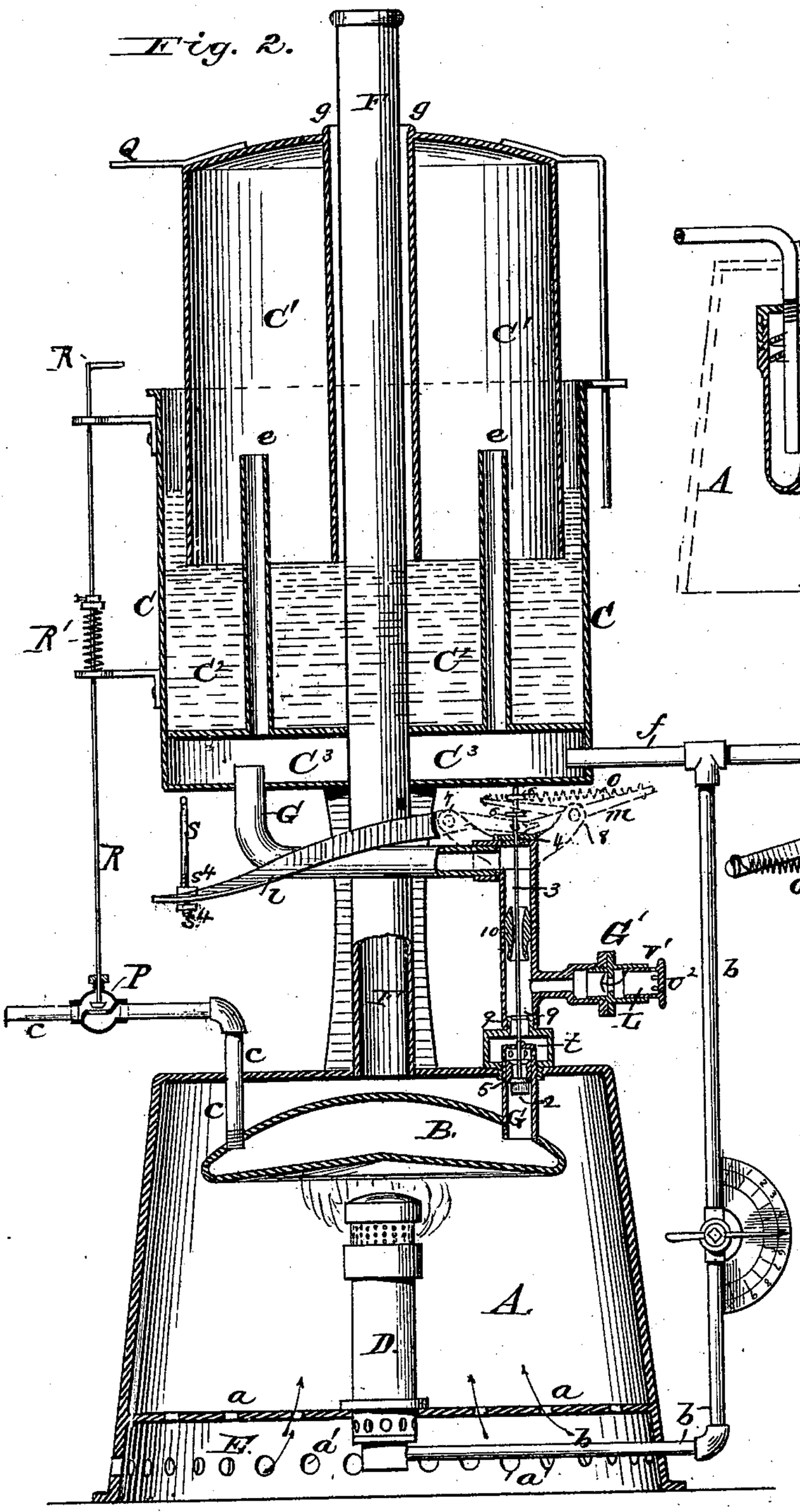


Fig. 5.

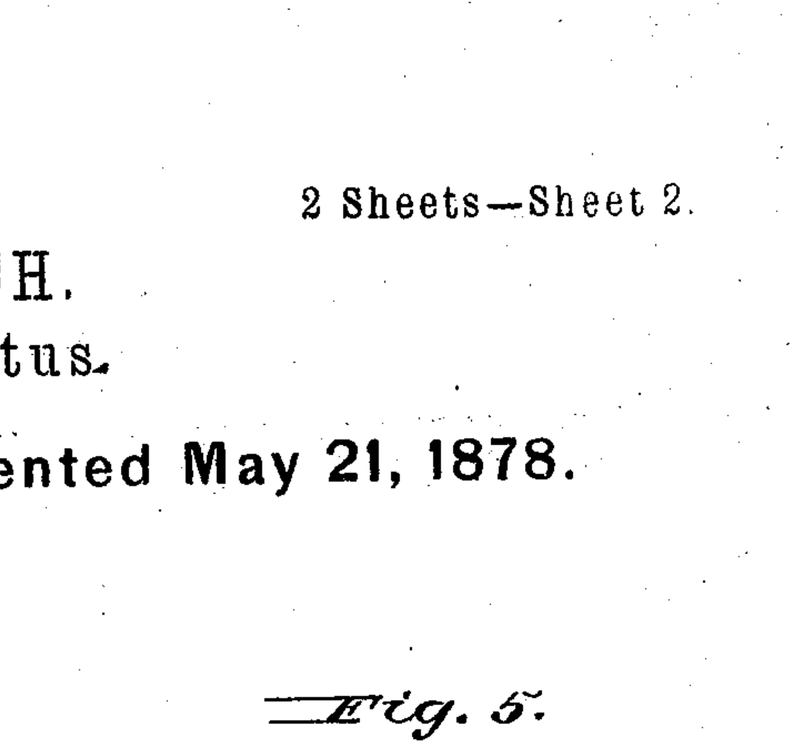


Fig. 3.

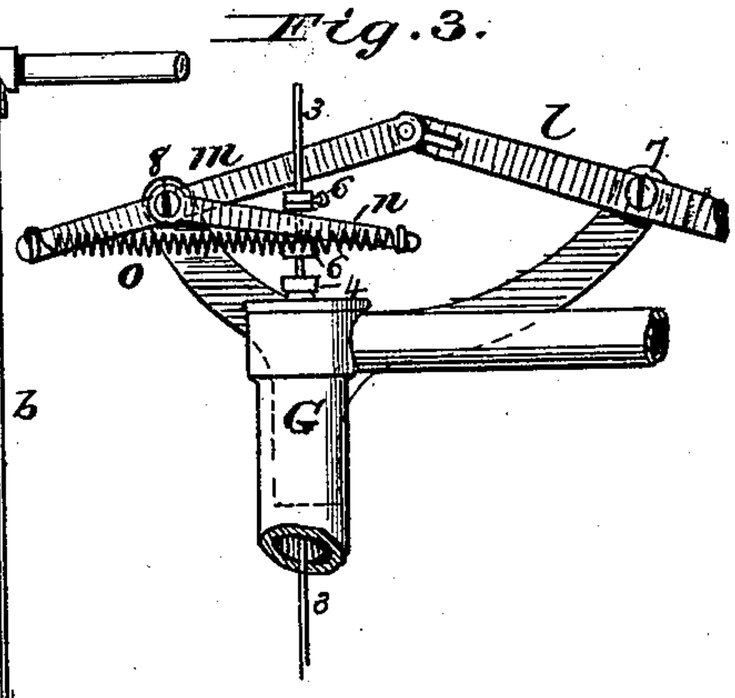
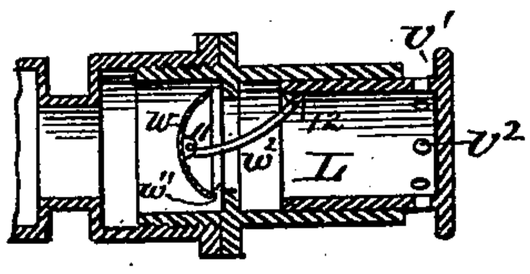


Fig. 4.



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UNITED STATES PATENT OFFICE.

HENRY D. FITCH, OF LOUISVILLE, KENTUCKY.

IMPROVEMENT IN GAS APPARATUS.

Specification forming part of Letters Patent No. **204,016,** dated May 21, 1878; application filed April 1, 1878.

To all whom it may concern:

Be it known that I, HENRY D. FITCH, of Louisville, in the county of Jefferson and State of Kentucky, have invented certain new and useful Improvements in Gas Apparatus; and I do hereby declare that the following is a full, clear, and exact description thereof, which will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to letters of reference marked thereon, which form a part of this specification.

This invention relates to that class of gas apparatus in which gasoline or other hydrocarbon liquid is vaporized by means of heat and the hydrocarbon vapor mixed with air to form the gas.

The object of my invention is to provide a gas apparatus adapted to domestic or private use.

To this end the several elements are embodied in a small compact portable device, free from complicated mechanism, and operating only when required for use.

The invention consists, first, in the peculiar construction and arrangement of the apparatus, the gas-holder being located above but somewhat removed from the retort heating-chamber, and attached thereto in such a manner as to form one continuous structure, the necessary pipes, valves, and valve mechanism being arranged in the intervening space, by which construction the desired compactness of structure and security of and accessibility to said mechanism are attained, and a proper temperature for preventing the condensation of the gas in the gas-holder is readily secured, the gas-holder being at the same time sufficiently removed from the heating-chamber to prevent an overheating of the former; second, in a pipe for the gases of combustion from the retort heating-chamber, opening into said chamber and passing through the gas-holder, whereby the waste heat from said chamber is more directly availed of for imparting warmth to the gas-holder for the purpose stated; third, in certain improvements in the construction of the retort; fourth, in improved means for automatically stopping the flow of oil in case the retort-burner should from any cause become extinguished, all as hereinafter distinctly set out in the specification and claims.

In the annexed drawings, Figure 1 is an elevation of my improved gas-machine. Fig. 2 is a vertical section thereof. Fig. 3 represents the mechanism for operating the injection-valve, showing said mechanism in the position it takes when said valve is open. Fig. 4 is an enlarged sectional view of the air-valve. Fig. 5 is a sectional view of my improved retort.

The apparatus stands upright, and is preferably cylindrical in form, and somewhat enlarged at the base. It is designed to be placed in a room, on the mantel-piece or on brackets, and to occupy a space not generally exceeding twelve by thirty inches, and have a capacity to supply about thirty burners.

The lower section A constitutes a heating or combustion chamber, in which is located the retort B and a gas-burner, D, directly under the latter.

The chamber A has a perforated false bottom, *a*, through which air is admitted to support combustion from an air-chamber, E, underneath, the air being first admitted to the latter from without the apparatus through holes *a'* around the lower circumference thereof.

The retort-burner D is specially adapted to the purpose for which it is designed, and is supplied through a pipe, *b*, which connects with the gas-holder.

The diameter of the retort B is somewhat less than that of the combustion-chamber, in which it is placed, and it is located a little below the top thereof, leaving a flue-space between it and the sides and top of said chamber for the passage of the gases of combustion and heated air resulting from the flame of the retort-burner.

An exit-flue, F, for carrying off the gases of combustion, passes up through the center of the apparatus, its lower end opening into the combustion-chamber A directly over the center of the retort. This location of the flue-opening, in connection with the location of the retort with reference to the sides and top of the combustion-chamber, leads the ascending caloric current to impinge against all sides of the retort.

My improved retort (shown in Fig. 5) is pref-

erably of cast-iron, in two parts, as shown, and is provided within with a series of cast-iron or other metal plates, *j*, which serve to absorb and retain heat and afford additional heating-surface.

The bottom of the retort is somewhat concave, and it thus presents a large surface to the flame of the retort-burner. The retort is supplied with hydrocarbon liquid by means of a pipe, *c*, which projects through the top and opens near the bottom of the retort. This pipe leads to a reservoir or tank containing said liquid, which tank may be elevated sufficiently to afford the requisite pressure; or the pressure may be obtained by a head of water or other means.

A pipe, G, leading from the top of the retort, carries the vapor evolved therein to the gas-holder C, which is located above and somewhat removed from the combustion-chamber A, and constitutes the upper section of the apparatus. This pipe is provided with valves, hereinafter described, for the control of the vapor and the admission of air.

The gas-holder C includes the well-known features of a water-tank, C^2, an inverted cylinder, C^1, rising and falling therein, and upright pipes *e e*, opening through the bottom of the water-tank and above the water-surface, for the passage of the gas. This holder is, however, annular in form, having a passage or tube, *g*, lengthwise through its center, for the exit-flue F, which carries off the gases of combustion from the heating or combustion chamber. The flue F acts as a spindle to keep the holder C^1 in place, and the heat from the escaping current passing through the flue imparts warmth to the holder and its contents, and serves to prevent the condensation of the gas. Immediately below the holder proper is an intermediate receiving-chamber, C^3, into which the gas is first discharged on coming from the retort, and from which it is led out for use through pipe *f*, which connects with the gas-pipe for supplying the burners. This chamber is connected with the holder proper through pipes *e e*, previously referred to, the lower ends of which open into the chamber.

The pipe G makes two turns between the retort and the gas-holder, and carries upon its back, so to speak, the mechanism for operating the valves with which it is provided. These valves are a vapor-valve, opening from the retort, and an automatic air-valve, which is carried in the branch G′ and operates in connection with the vapor-valve.

The vapor-valve is a downward-opening valve, 2, having an upright valve-stem, 3, which lifts and depresses the valve in relation to its seat 5, said valve-stem projecting through a stuffing-box, 4, at the bend in the pipe. Two levers, *l m*, are fulcrumed at 7 8, respectively, to a support or supports attached to the pipe G. The inner ends of these levers are connected by means of a pin or wrist of one sliding in a slot of the other. A third lever, *n*, is also pivoted at 8, the power end of which is connected to the outer end of lever *m* by means of a contractile spring, *o*.

Lever *n* carries the valve-stem 3 of the vapor-valve 2, being provided with a slot, through which said valve-stem projects, and being held between the two adjustable nuts 6 6 on said valve-stem. The vapor-valve being open, and the valve-operating mechanism in the position shown in Fig. 3, when the outer end of lever *m* is raised by means of the lever *l* it carries up the spring *o*, and when said spring is carried sufficiently past the center 8 its contractile force draws up the lever *n*, raising and closing the valve. The vapor-valve being closed, and the valve-operating mechanism in the position shown in Figs. 1, 2, when the outer end of lever *m* is depressed, by means of lever *l*, so as to carry the spring *o* down sufficiently past the center 8, the contractile force of the spring brings down the lever *n* and opens the valve. The outer end of lever *l* is placed between two adjustable collars, with set-screws or nuts s^4 s^4 upon the lower end of the upright vertically-moving rod *s*, which is carried by the gas-holder. The rod *s* slides loosely through an ear, s^1, projecting from the stationary portion of the gas-holder, and is attached to the moving gas-holder by means of two adjustable nuts, s^3 s^3, with which it is provided at its upper end, which clamp between them the ear s^2, projecting from said gas-holder. Immediately above the valve 2 is an expansion-chamber, *t*, into which the vapor first enters on escaping through the valve.

The pipe G is provided with an injector, consisting of a nozzle or jet, *q*, a discharging-tube, 10, and an air-inlet, G′. The branch G′ is closed at its end by a tubular slide, L, fitting the inner (or outer) circumference of the pipe. This slide is open at its inner end and closed at its outer end, the closed end having a flange, v^1, formed by the projecting rim of its head. This tubular slide is provided around its circumference with holes v^2. When the slide is pushed in, so that flange v^2 rests against the end of the pipe, the branch G′ is closed. When the slide is drawn out, the holes v^2 are exposed and the branch G′ is open. By adjusting the slide at different points, the size of the holes is varied, and the quantity of air to be admitted is thus governed. This branch G′ is provided with an automatic air-valve, *w*, opening inward. This valve rests on the valve-seat w^1, and is attached to the valve-stem w^2, which is hinged at 11 12. When the vapor-valve *z* is opened and the vapor escapes under pressure through the nozzle or jet *q*, a vacuum is created in pipe G opposite the branch G′, and the air-valve *w* is forced off its seat by the normal external pressure of atmosphere, and, the slide L being open, the air enters and mingles with the vapor, and the product passes on to the gas-holder. When the vapor-valve 2 is closed and the flow of vapor from the retort ceases, the valve *w* falls

back to its seat, and the internal pressure of the gas holds it there until it is again sucked off, as before.

P is a globe-valve, designed as a safety device to prevent the oil from flooding the retort in case the light under the retort should become extinguished. In such case, when the vapor-valve is opened by the descent of the gas-holder, and the gas fails to inflate the same from such failure of the burner, it would continue to descend until the arm Q, projecting from said holder, struck the rod R, when the valve P would be thereby forced to its seat, and the flow of oil would be stopped. The spring R′ is designed to be of just sufficient force to balance the weight of the valve and its rod, and hold the valve open until it is struck and seated by the gas-holder.

S is a globe-valve, to turn on or shut off the hydrocarbon liquid, as needed.

T is a valve for regulating the supply of gas to the burner under the retort, provided with the indicator T^1 and a dial, T^2, with numerals, as shown, by the aid of which the quantity of gas supplied to the burner—consequently of heat to the retort, consequently of gas manufactured—is readily proportioned to the number of illuminating-burners desired for use.

What is claimed as the invention is—

1. A portable gas apparatus consisting of two sections, located one above the other, with an intervening space between them, and united together in one continuous structure, the lower section constituting a heating-chamber inclosing a vaporizing-retort, and the upper section constituting a gas-holder, the connecting vapor-conveying pipe and the valve mechanism being arranged in the intervening space between the two sections, substantially as described.

2. In a gas apparatus, the combination of a retort for the vaporization of hydrocarbon liquid, a burner underneath the retort, a gas-holder located above, and an exit-flue for the products of combustion opening over the retort and passing through the gas-holder, for the purpose of imparting warmth to the latter to prevent condensation of the gas, substantially as described.

3. In a gas apparatus, the combination of a retort for the vaporization of hydrocarbon liquid, a combustion-chamber inclosing said retort, a burner within the combustion-chamber and underneath the retort, a gas-holder, and an exit-flue for the products of combustion leading from said combustion-chamber and passing through said gas-holder, for the purpose of imparting warmth to the latter to prevent condensation of the gas, substantially as described.

4. In a hydrocarbon-gas apparatus, a retort consisting of two parts, of cast-iron, united together, as shown, and provided in its interior with a series of perforated cast-iron plates, substantially as described.

5. In a gas apparatus, the combination, with the oil-supply pipe, of a valve, a rod connecting said valve with the gas-holder, a spring for holding said valve open, and an arm projecting from the gas-holder, the said parts being arranged as described, whereby said valve is not affected by the usual rising and falling of the gas-holder, but is closed automatically by the continued or abnormal descent of the gas-holder in case the burner accidentally becomes extinguished and the vaporization ceases, substantially as described.

H. D. FITCH.

Witnesses:
L. H. BOND,
B. F. D. FITCH.