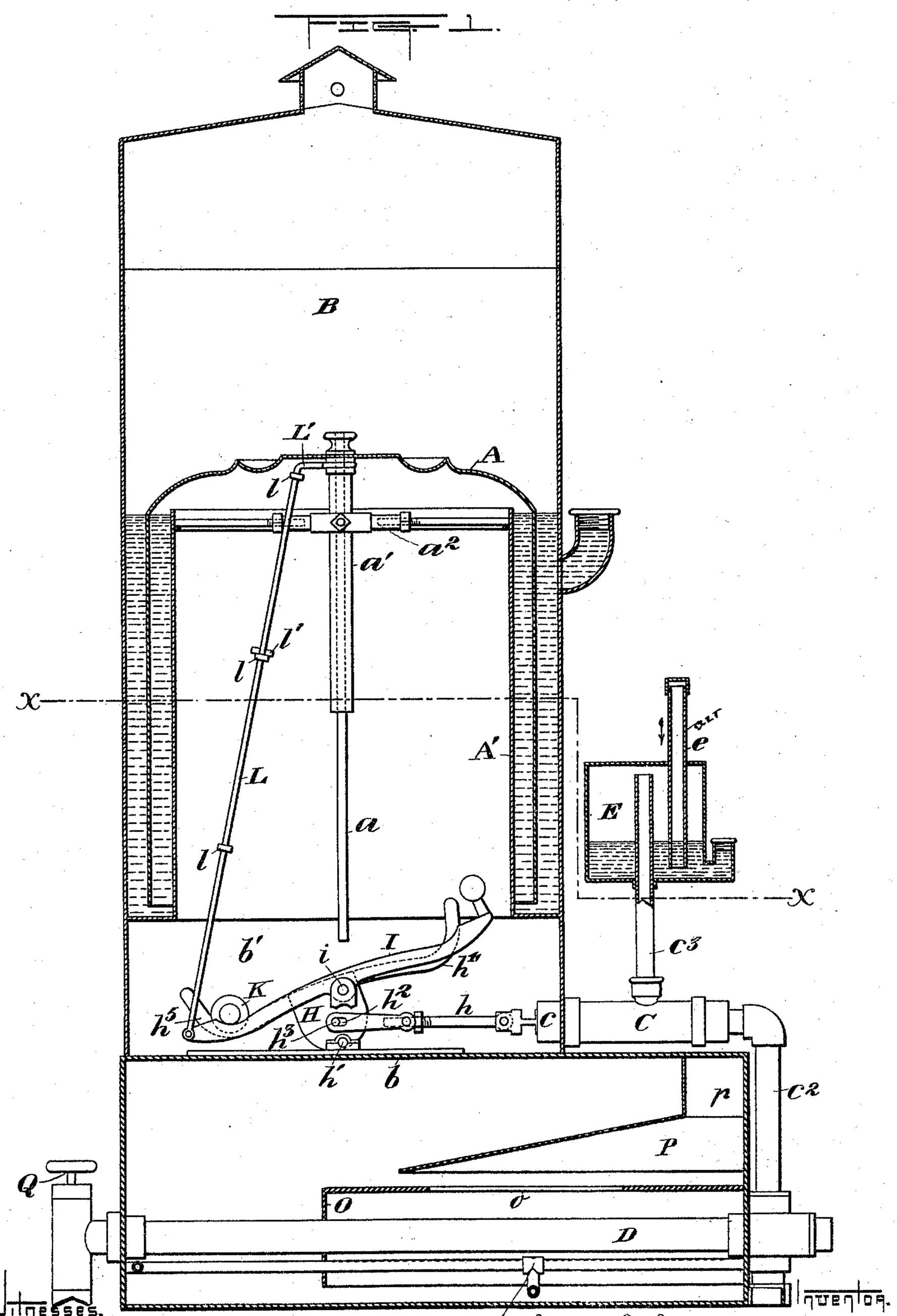
(No Model.) 4 Sheets—Sheet 1.

H. C. SERGEANT.

GAS MACHINE.

No. 584,605. Patented June 15, 1897.



Witnesses.
Geo. Sumner
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Inventor.
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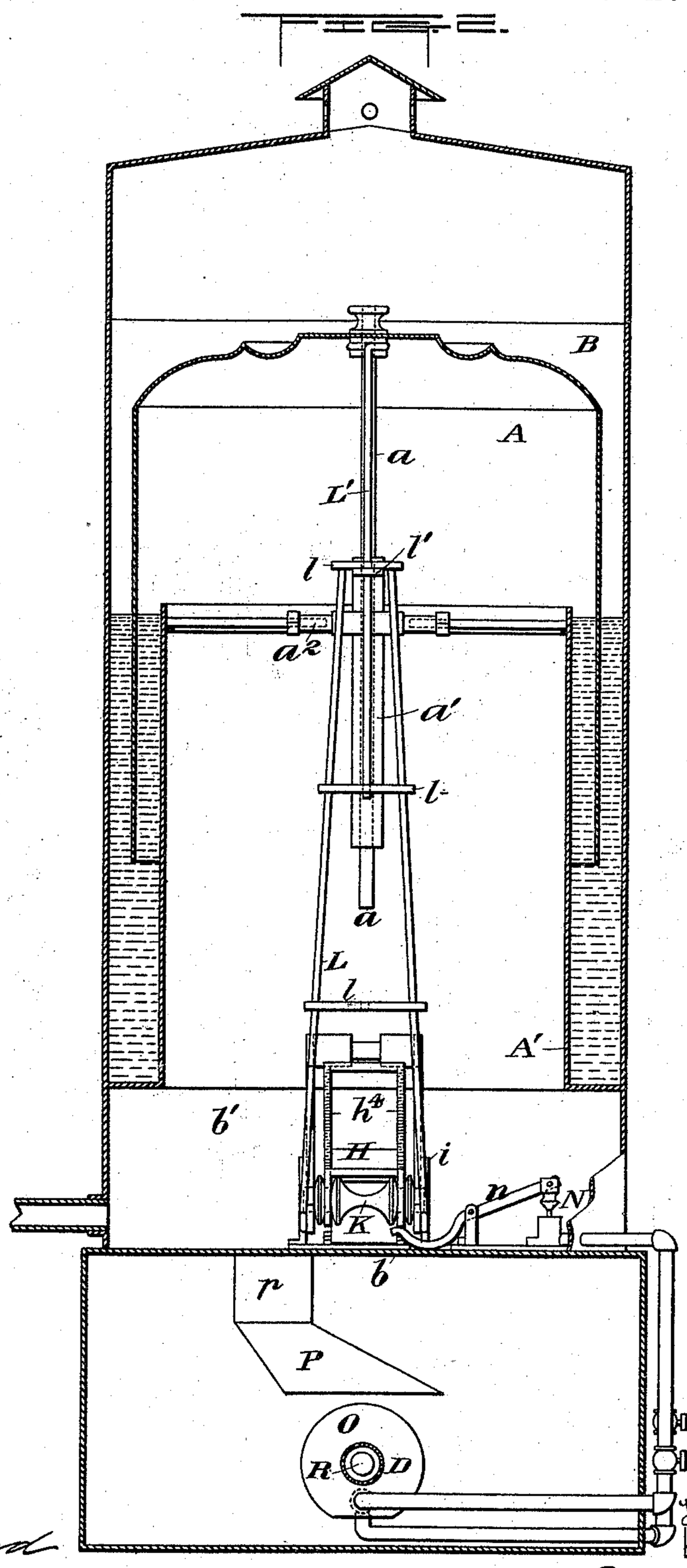
(No Model.)

4 Sheets—Sheet 2.

H. C. SERGEANT.

GAS MACHINE.

No. 584,605. Patented June 15, 1897.



Witnesses.
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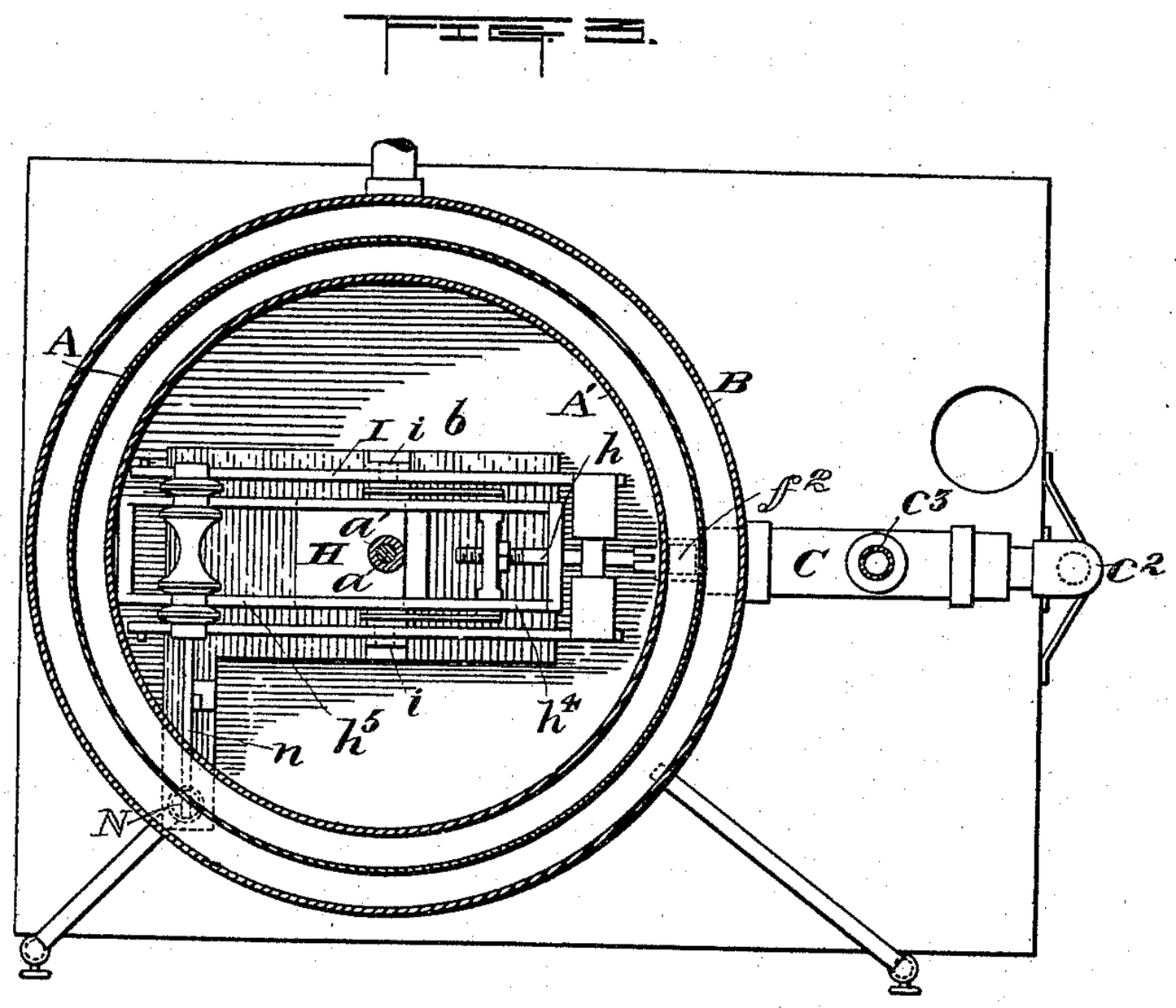
(No Model.)

4 Sheets—Sheet 3.

H. C. SERGEANT.

GAS MACHINE.

No. 584,605. Patented June 15, 1897.



Witnesses.
H. B. Edmonds.
George Berry.

Inventor.
Henry C. Sergeant,
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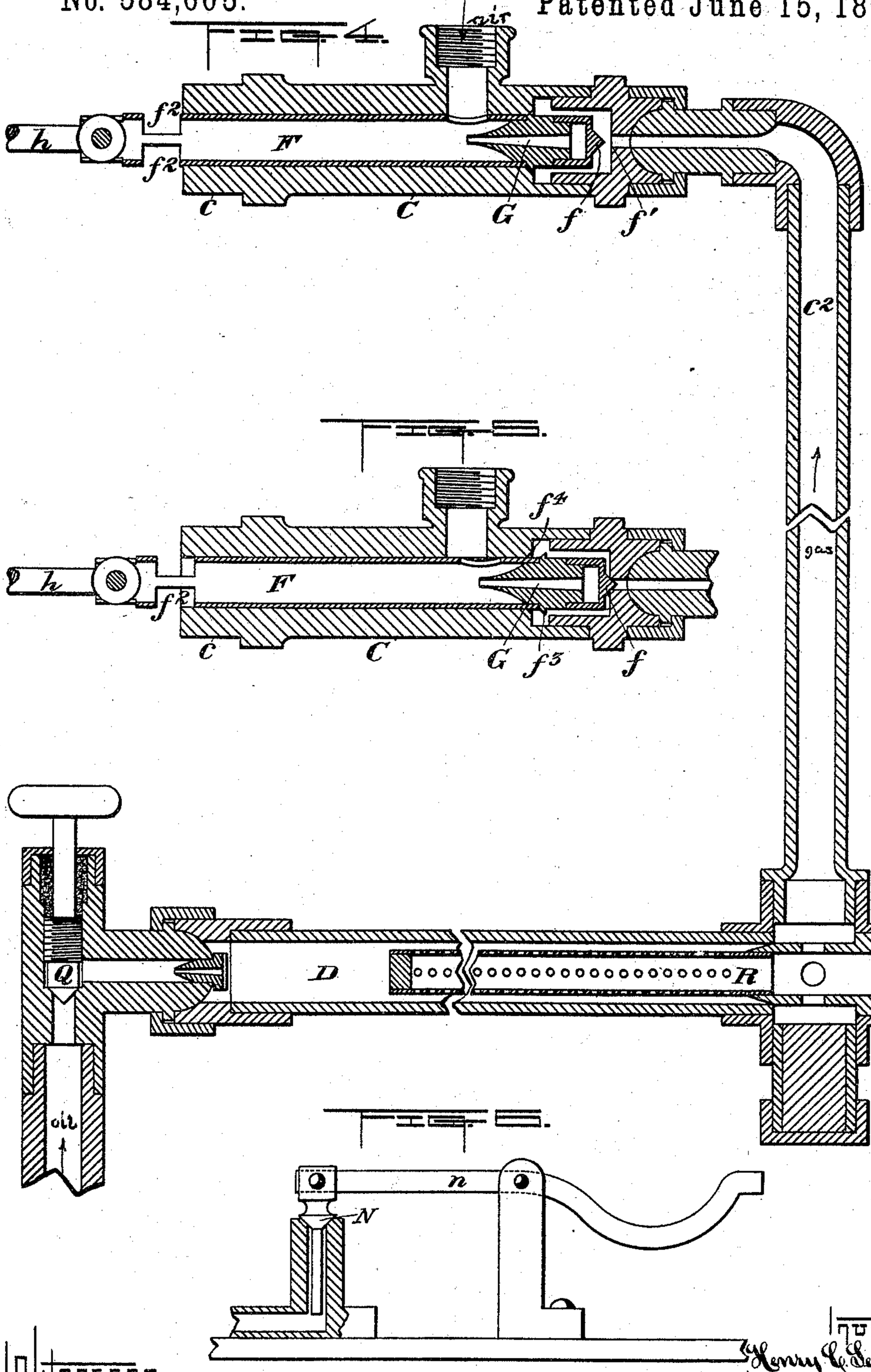
Brown & Edmonds

(No Model.) 4 Sheets—Sheet 4.

H. C. SERGEANT.

GAS MACHINE.

No. 584,605. Patented June 15, 1897.



Witnesses.
T. B. Desmond
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Inventor.
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Brown & Ewart

UNITED STATES PATENT OFFICE.

HENRY C. SERGEANT, OF WESTFIELD, NEW JERSEY.

GAS-MACHINE.

SPECIFICATION forming part of Letters Patent No. 584,605, dated June 15, 1897.

Application filed August 22, 1893. Serial No. 483,752. (No model.)

To all whom it may concern:

Be it known that I, HENRY C. SERGEANT, of Westfield, in the county of Union and State of New Jersey, have invented a new and useful Improvement in Gas-Machines, of which the following is a specification.

My invention relates to an improvement in gas-machines in which the gas-holder is made use of to operate a valve which controls the admission of the gasified hydrocarbon to the gas-holder, the said valve and its operating parts being located substantially within the holder.

A practical embodiment of my invention is represented in the accompanying drawings, in which—

Figure 1 is a view of the machine in vertical section, taken in a plane extending in the longitudinal direction of the retort. Fig. 2 is a similar view taken in a plane extending at right angles to the retort. Fig. 3 is a transverse section on line *x x* of Fig. 1. Fig. 4 is an enlarged sectional view in detail of the retort and gas-admission valve and parts immediately connected therewith. Fig. 5 is an enlarged sectional view of the gas-admission valve, showing the latter closed as distinguished from its open position shown in Fig. 4; and Fig. 6 is a view in detail of the valve for admitting the temporary supply of gas to the burners for making gas.

The vertically-movable section of the gas-holder is denoted by A and is adapted to fit loosely over an inner permanent section A′, as is usual, an outer casing B serving to hold a water seal between it and the exterior of the permanent casing A′ for the reception of the lower open end of the movable section A. The lower portion of the casing B also forms a part of the gas-holder below the permanent inner casing A′ and gas seal and also forms, together with its bottom *b*, a chamber *b′*, the chamber *b′* within which the valve operating-rod and its actuating-lever are located for admitting the gasified hydrocarbon into the holder.

The valve for admitting the gas is located within a cylindrical pipe-section C, one end *c* of which is open and extends through the wall of the casing B into the chamber *b′*, the joint between the casing B and the section C being made air-tight. From the opposite end of the section C a pipe c^2, making an air-tight connection with the section C, extends to and communicates with the interior of the retort D for the transmission of the gas from the retort to the valve-chamber C. A pipe c^3 leads from the valve-chamber C intermediate of the valve and the end *c* of the valve-chamber up through the bottom of an air-admission chamber E and through a mass of liquid in said chamber to a point near the top of the chamber, a second pipe *e* for the admission of air into the chamber E extending from a point above the chamber down within the chamber with its open end below the surface of the liquid in the chamber. Air in order to pass into the valve-chamber C and thence into the holder must flow down the pipe *e* and escape from the lower open end of said pipe into the liquid within the chamber, thence up through said liquid and down through the pipe c^3 into the chamber C, and thence within the holder.

The admission-valve for admitting the gasolene to the holder is denoted by *f* and is fixed to the end of a sliding tube F, fitted to slide longitudinally within the bore within the pipe-section C, constituting the valve-chamber. The valve *f* is cone-shaped and adapted when closed to enter the end of the passage-way through the pipe c^2, leading from the retort to the valve-chamber, the wall around the end of said passage-way constituting the valve-seat *f′*. (See Fig. 4.) Between the valve *f* and the opening of the air-pipe c^3 through the wall of the valve-chamber and through the side of the tube F there is located a nozzle G, through which the inflowing gas must pass to enter the holder. As the gas issues from the nozzle G in a stream across the opening for the admission of air it will produce a suction sufficient to draw the air into the tube through the pipe c^3 and the commingled air and gasified hydrocarbon will pass on into the holder through the exposed opening f^2 at the end of the tube within the holder.

As a matter of construction I find it desirable to secure the nozzle G to the tube F, and then secure the valve *f* to the nozzle, leaving sufficient opening around the base of the valve *f* for the free entrance of the gas into the nozzle G. The valve-tube F is connected

by a rod *h* with a tilting support H, pivotally secured to a fixed bearing *h'* within the chamber *b'* of the holder. The connection between the rod *h* and the tilting piece H is such that there is an appreciable amount of lost motion when the piece H is tilted either in a direction to operate the rod *h* and close the valve or in the opposite direction to open the valve, so as to permit the piece H to get well under headway before it begins to operate the rod *h*, thereby insuring a prompt and effective closing and opening of the valve. I find it convenient to provide for such lost motion by forming an elongated slot h^2 in the rod *h*, adapted to receive a pin h^3, projecting from the side of the tilting piece H.

The tilting support H carries on its upper end a pair of oppositely-extending arms h^4 h^5, having their outer ends turned upwardly in position to engage and hold the rolling weight K, which, by its engagement with the one or the other, locks the piece H and hence closes or opens the valve within the chamber C.

A cradle I is pivotally secured to a fixed support—such, for example, as *i*—within the chamber *b'* and in proximity to the arms of the tilting support H, in the present instance the cradle being made of such form as to embrace the arms of the tilting piece H, permitting the latter to rock between the sides of the cradle independently of the cradle. The cradle I is provided with a rolling weight K, which as the cradle is tilted in one direction or the other will roll from the higher to the lower end of the cradle when the latter has reached a predetermined degree of inclination. The turned-up ends of the arms h^4 and h^5 on the valve-operating piece H are in position to arrest the movement of the weight K as it rolls from one end of the cradle to the other and the impulse of said weight is intended to be sufficient to tilt the piece H and hence operate the valve whenever the weight impinges against the one or the other of the turned-up edges of said arms.

One end of the cradle I has attached thereto an operating-rod L, consisting in the present instance of a pair of side rails connected by cross-pieces *l*, and a rod L', connected at one end with the movable gas-holder section A, has a telescopic connection with the rod L, so that when the movable holder-section A approaches the limit of its upward movement an abutment *l'* on the rod L' will engage the upper cross-piece *l* on the operating-rod L and will rock the cradle I until finally the weight K will, under the influence of gravity, rush toward the opposite end of the cradle and impinge against the arm h^4 of the rocking piece H and throw the latter over in a direction to close the admission-valve. This condition of things will continue until the movable section A of the gas-holder approaches the limit of its downward movement, when the abutment *l'* will engage the cross-piece *l* and rock the cradle I in a direction to throw the weight K back in the opposite direction to rock the piece H in a direction to open the valve and admit gas again.

The holder A is conveniently guided in its upward and downward movements by means of a central guide-rod *a*, having a free sliding movement within an extended socket-piece *a'*, fixed to the central portion of a skeleton bridge or spider a^2, fitted within the upper end of the stationary gas-holding section A'.

Underneath the retort D there is located a burner M, from which there is a permanently-ignited jet supplied from the gas-holder. When it is desired to manufacture gas to replenish the holder, there is an additional supply of gas admitted to a series of burners underneath the retort by means of a valve N, (see Fig. 6,) operated by a lever *n*, under the control of the weight K as it rolls in the direction to open the valve *f* to admit gas. The temporary jets of gas supplied by the opening of the valve N are ignited as soon as the valve N is opened by means of the permanent jet from the burner M. The retort D is inclosed throughout a suitable portion of its length by a casing O, open along the lower side for the admission of the necessary amount of air to support combustion, and also open at the top, as at *o*, for the escape of the products of combustion into a hood P, on which they are taken through a flue *p* to a suitable uptake.

The valve for admitting the hydrocarbon to the retort D from a suitable supply is denoted at Q, Fig. 1, and also in Fig. 4.

The operation of the several parts has been set forth at considerable length during the foregoing description and need not be repeated here specifically. In general the movement of the holder-section A as it approaches the limit of its downward movement opens the valve *f* through the rocking piece connected with the valve and the cradle for throwing the weight against the said rocking piece and at the same time supplies gas to the temporary jets for heating the retort, and gas continues to be made and enters the holder until the holder A nears the limit of its upward movement, when by rocking the cradle, and hence the tilting piece H, the valve *f* is closed and the entrance of gas to the holder ceases, its production being at the same time stopped by the closing of the admission of gas to the temporary burners and the stoppage of the flow of the hydrocarbon through the retort by the closing of the valve *f*.

In order to effectually prevent leakage between the outer face of the tubular valve-stem F and the interior wall of the chamber in which it slides when the valve *f* is open, I provide the valve *f* with an annular bevel-faced projection f^3, adapted to seat in a corresponding seat f^4 at the end of the bore in which the tubular valve-stem slides, so that when the valve *f* is open the projection f^3 will seat and prevent the entrance of any gas other than through the injector. The valve *f* becomes, therefore, in effect a double valve.

I also find it important to locate a tubular strainer R within the retort D for collecting the burned carbon and preventing it from entering the nozzle of the injector. The strainer R consists of a perforated tube extending along within the retort throughout the greater portion of the length of the retort and provided with perforations through its wall, the maximum diameter of each of said perforations being somewhat less than the diameter of the exit-opening for the gas in the nozzle of the injector to prevent the entrance of any particles of carbon to the nozzle of the injector which are not of less diameter than the opening therein, to insure the injector against clogging. The tubular strainer is made removable from the outer end of the retort.

It will be observed that the admission-valve *f* is controlled wholly by the movement of the gas-holder itself through mechanism located within the holder, so that there is no opportunity for leakage exterior to the holder.

What I claim is—

1. In a gas-machine, a gas-holder having a movable section, a valve-chamber opening into the holder, a tubular valve-stem having a reciprocating movement within the chamber, a valve and an injector-nozzle carried by the tubular stem, a passage-way leading from an air-inlet chamber to the interior of the tubular stem and a connection between the valve-stem and the movable section of the holder for controlling the admission of gas to the holder, substantially as set forth.

2. The combination with a tilting piece provided with arms extending in opposite directions from its free end and a valve-operating rod connected with the tilting piece, of a cradle pivoted in proximity to the said arms of the tilting piece, a traveling weight carried by the cradle and means for tilting the cradle to throw the weight back and forth, the said weight being arranged to strike the arms of the tilting piece to rock it and thereby actuate the valve-rod, substantially as set forth.

3. In combination, the gas-holder, the gas-admission valve under the control of the holder within the holder, the retort, the valve for admitting a temporary supply of gas to the generating-burners, and means under the control of the gas-holder for automatically operating the valve to admit the temporary supply of gas to the burners, at the moment the gas-admission valve is opened, substantially as set forth.

4. The combination with the retort, the gas-pipe leading therefrom and a nozzle for the escape of the gas from the pipe, of a perforated tube extending along within the retort throughout the greater portion of the length of the retort, each of the perforations through the wall of the tube having a maximum diameter somewhat less than the diameter of the exit-opening for the gas in the said nozzle, substantially as set forth.

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Witnesses:
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FREDK. HAYNES.