S. P. SANDERS.

CARBURETER.

APPLICATION FILED MAY 28, 1909.

962,860.

Patented June 28, 1910.

2 SHEETS—SHEET 1.

Fig. 1.

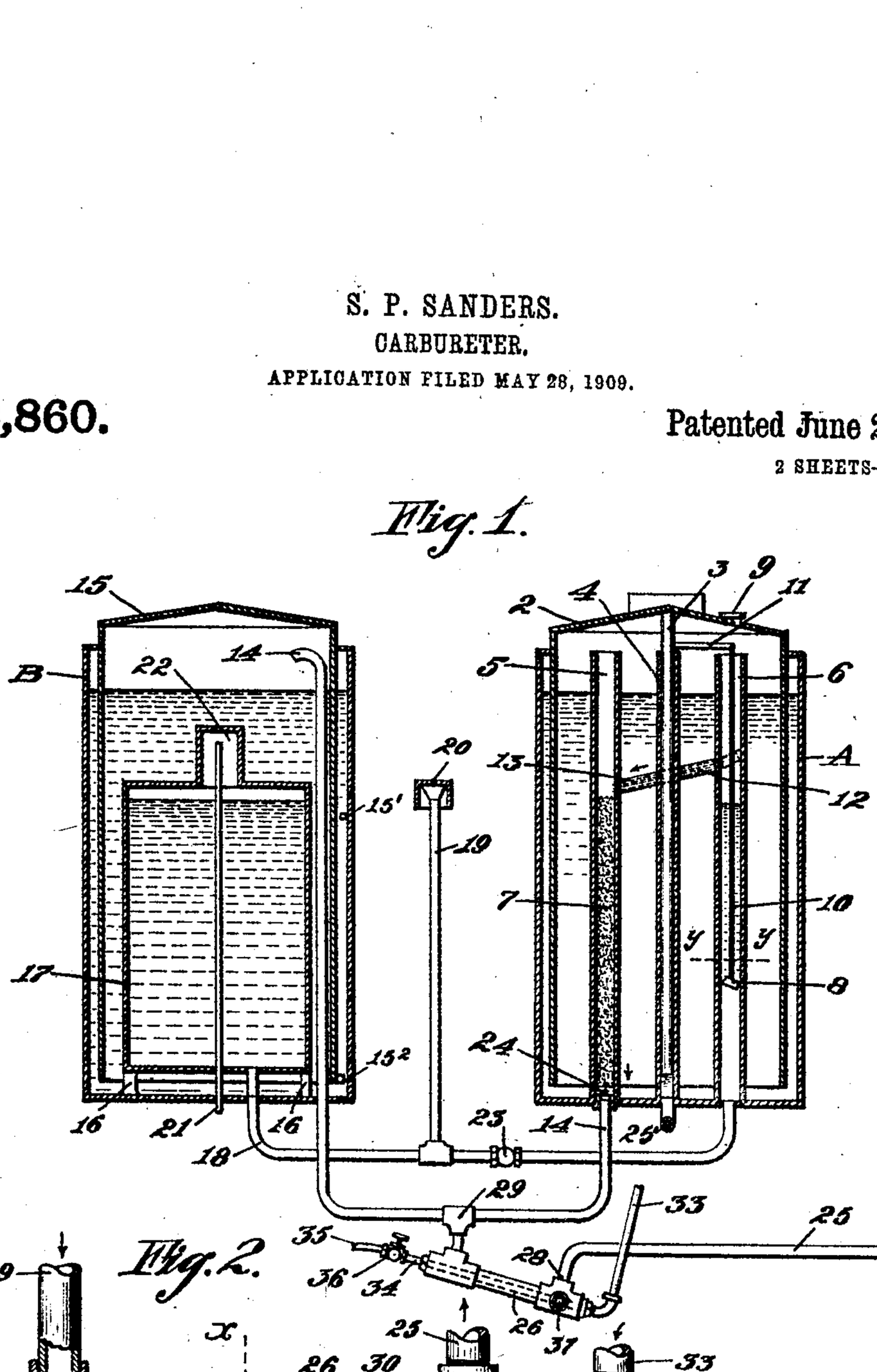



Fig. 2.

Fig. 3.

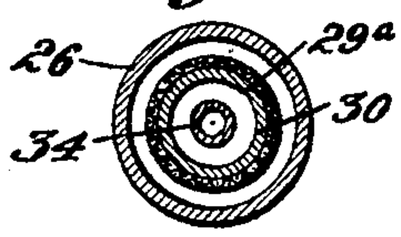



Fig. 5.


Fig. 6.

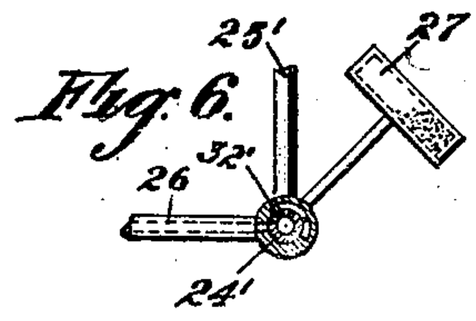
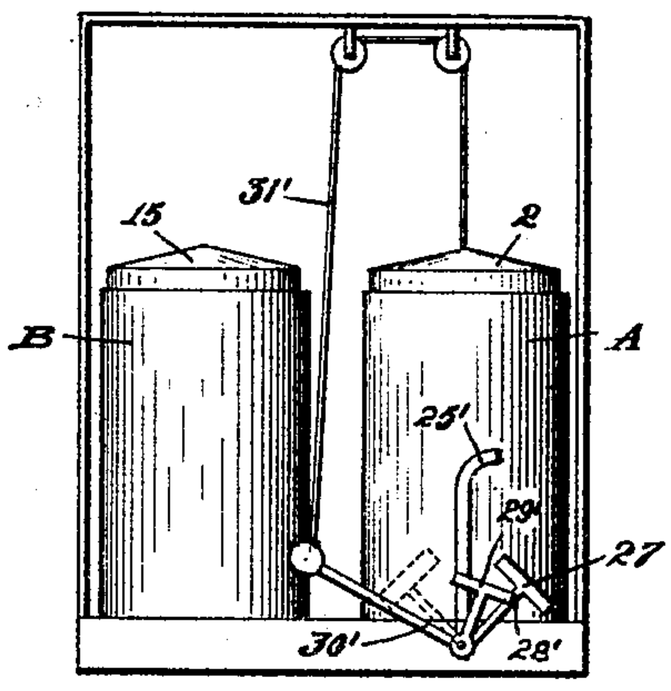



Fig. 4.

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2 SHEETS—SHEET 2.

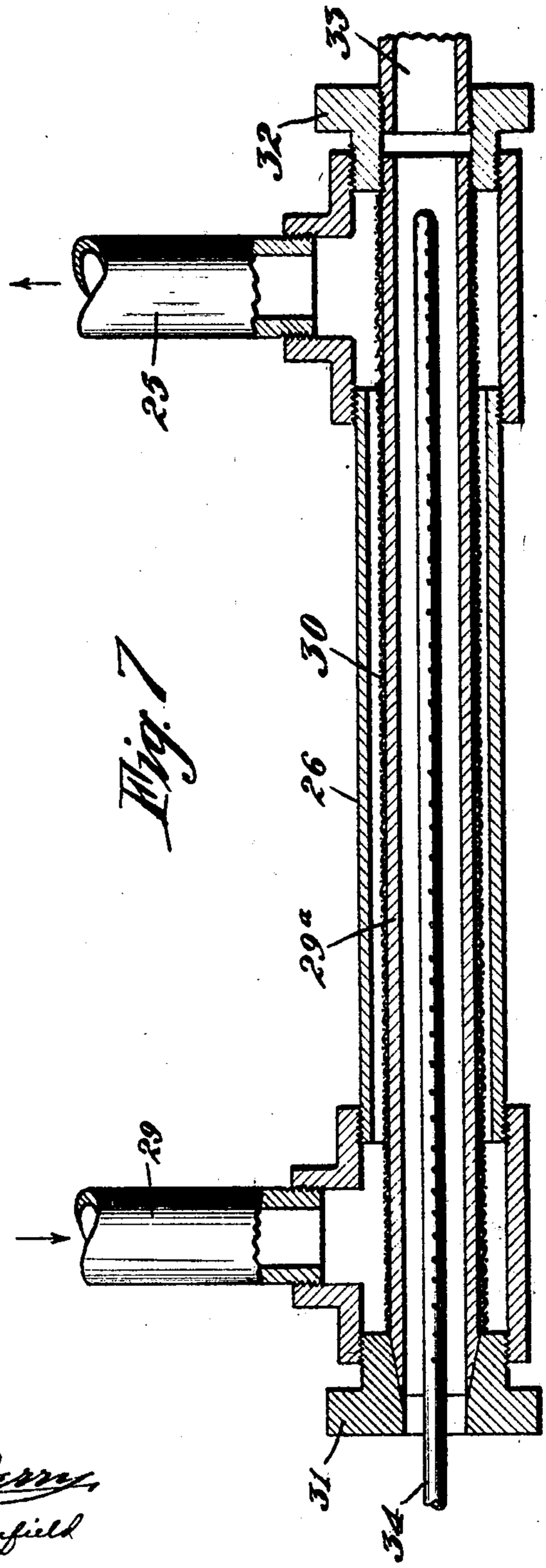


Fig. 7

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# UNITED STATES PATENT OFFICE.

STEPHEN P. SANDERS, OF CUPERTINO, CALIFORNIA.

## CARBURETER.

962,860. Specification of Letters Patent. Patented June 28, 1910.

Application filed May 28, 1909. Serial No. 499,025.

*To all whom it may concern:*

Be it known that I, STEPHEN P. SANDERS, a citizen of the United States, residing at Cupertino, in the county of Santa Clara and State of California, have invented new and useful Improvements in Carbureters, of which the following is a specification.

This invention relates to improvements in machines for carbureting gas from gasolene or other suitable liquid hydrocarbon used for lighting, heating, cooking, or other purposes.

The object of this invention is to provide a gas generator that is particularly adapted to making a gas of absolutely uniform standard, and to simplify the construction and operation of machines of this character so as to provide a clean, safe and practical means for carbureting gas from low proof liquid hydrocarbon at small expense.

The invention consists of the parts, and the construction and combination of parts, as hereinafter more fully described and claimed, having reference to the accompanying drawings, in which—

Figure 1 is a vertical section of the machine. Fig. 2 is a detailed view of the carbureter partly in section. Fig. 3 is an enlarged section on the line *x*—*x* Fig. 2. Fig. 4 is a side elevation of the machine. Fig. 5 is a cross section of the oil well on the line *y*—*y* Fig. 1. Fig. 6 is a detail in partial section, showing the method of operating the three-way cock. Fig. 7 is a longitudinal section of the supplemental carbureter.

A is a tank adapted to contain water, in which the bell 2 operates. This bell carries a downwardly extending stem or shaft 3, having a snug sliding fit in the ram-cylinder 4, which latter projects up from the bottom of the tank A, and is open below to a suitable source of fluid-pressure supply, not necessary to be here shown. The fluid is admitted and discharged to and from the ram-cylinder 4 beneath the stem 3 so as to reciprocate the bell 2, and is accomplished by suitable means hereinafter to be described.

Suitably arranged within the tank A is a carbureter-cylinder 5, also an oil well 6, both suitably fixed in the bottom of the tank A, and open at their upper ends which project up into the bell 2, above the water level.

The carbureter cylinder 5 is filled with a wicking or absorbent filling 7, of burlap, sponge, or other suitable material. The well 6 is so connected with a source of hydrocarbon supply that a quantity of hydrocarbon liquid is always maintained therein.

A predetermined quantity of liquid is dipped up from the well 6 at convenient intervals, by means of a bucket 8, and deposited into the carbureter 5 above the filling 7, to become absorbed and distributed by the latter.

Air is drawn into the bell 2 through an inlet valve 9 which opens to admit air as the bell is raised. The exhaust from the bell 2 as it falls, occurs through the carbureter 5, so that the air becomes thoroughly saturated, to form a rich illuminating or fuel gas, as may be desired.

The periodical delivery of the liquid into the carbureter may be accomplished by any suitable means. As here shown, the bucket 8 is carried by a rod or wire 10 which depends from a radial arm 11, which is attached to the stem 3. The bucket 8 consists preferably of a section of pipe closed at one end and pivotally suspended from the rod 10 so as to have a limited tilting movement. When the bucket is filled it will normally stand in inclined position as shown in Fig. 1, so that as it rises its more elevated end will engage a projecting wire or wires 12, contained in the duct 13, which connects the well 6 with the carbureter 5 above the filling 7. With the bucket thus partaking of the movement of the bell 2, the bucket will be submerged in the liquid in the well and fill as the bell lowers, and as the bell rises it will automatically discharge its load into the duct 13, the wires 12 serving not only to trip the bucket, but to lead the liquid into the pipe 13.

The gas produced by forcing air through the saturated material in the carbureter, is conveyed through a pipe 14 to a receiver of suitable construction. The distillate or other liquid from which the gas is made, may be stored in any desired or convenient manner or place, so long as a constant supply is maintained in the well 6. In this case I have shown the gas receiver and distillate supply tank as combined in a single structure.

B represents a tank adapted to contain water, in which the bell 15 rises and falls in the usual manner. Supported within the tank on standards 16, is a submerged oil tank 17, from the bottom of which extends

a pipe 18 connecting with the well 6 in the bottom of the tank A.

The tank 17 is designed to be filled through a pipe 19, which connects with the pipe 18 between the tanks A—B, and having its filling end about on a level with the top of the oil tank 17. A removable cap 20 is provided on the end of the pipe 19 to prevent evaporation.

An air-vent pipe 21 extends up through the tanks 13 and 17, and terminates in a dome 22 in the top of the tank 17. The lower end of the pipe 21 is open to the atmosphere to permit the egress and ingress of air to and from the oil tank during the filling or discharge of the latter. The tanks B and 17 are so positioned relative to the well 6 that a proper level of liquid will always be maintained in the well. A check valve 23 in pipe 18 prevents the liquid from being forced back out of the well 6 on the descent of the bell 2.

The pipe 14 through which exhaust from the carbureter takes place, passes up through the bottom of the tank B, and terminates above the water level in the dome of the bell 15. A check valve 24 is interposed at the junction of the pipe 14 and the carbureter 5 so as to prevent the gases from the reservoir or generator 26 passing back into the generator 5.

Interposed between the pipe 14 and the service pipe 25, at any convenient point between the tanks A—B, is a generating tube, detailed in Figs. 2—3, for the purpose of converting into gas such hydrocarbon liquids as may percolate through the tube 5 into the pipe 14. This generator consists of a tube 26 plugged at both ends, and suitably connected with the pipe 14 at 29, and to the service pipe 25 at 28.

An asbestos covered tube 29ª is inserted within the tube 26, with sufficient space between the asbestos covering 30 and the inner surface of the generator tube 26, to allow the gases to circulate within the chamber thus formed.

The ends of the tube 29ª open to the atmosphere through the plugs 31—32. A vent pipe 33 is connected with the plug 32 and terminating at any desired point remote from the generator. A burner tube or torch 34, having jet openings therein, is inserted in the asbestos covered tube 29ª through the plug 31, and is fed with fuel gas by connecting with the storage pipe 14 at any convenient point, by a flexible tube 35. A valve 36 is provided by which the flow of fuel gas to the torch 34 may be regulated.

By igniting the torch 34 and inserting it within the tube 29ª, the latter becomes sufficiently hot to convert such oil or distillate as may be fed to the tube 26 into gas.

As the liquid enters the tube 26, it is more or less absorbed by the asbestos covering 30 so that the heat radiated through the tube 29ª acts directly and effectively thereon.

Air is admitted to the interior of the tube 29ª either through the vent pipe 33, or through the opening in the plug 31, so as to cause a circulation of air around and along the torch 34 thereby insuring combustion within the tube 29ª, the gases formed by the combustion in the tube 29ª being carried off either through the plug 31, or the vent pipe 33.

The generating tube 26 is set at an incline as shown in Fig. 1, so that the liquid fed through the connection 29 will tend to travel downward the length of the tube. A plugged opening 37 is provided at the lower end of the tube 26, through which accumulated liquid or substances may be removed when required.

The capacities of the bell 2 and of the bucket 8 are so proportioned that each rise of the bell 2 draws in a suitable supply of air, which on becoming properly saturated with the volatile hydrocarbon produces just the right mixture.

It is understood that the lifting of the rising or breathing bell 2 is done by the shaft 3 by outside force, but that said bell falls by gravity and its weight is sufficiently greater than bell 15 so that the vapor mixture in bell 2 will pass across to bell 15 and operate to raise the latter. At the same time the difference in weight between the two bells should not be great enough to cause any material fluctuation in the pressure of the gas in the mains leading to the burner. A stop 15′ limits the upward movement of bell 15. With the latter against stop 15² bell 2 will cease to rise.

Various mechanisms may be employed to regulate the inlet and discharge of a propelling medium into the ram 4. In the present instance I have shown a three-way cock 24′, adapted to turn the water from the supply pipe 25′ into the ram or to turn the water from the ram into the discharge pipe 26 and shut off the supply from pipe 25′, according as the bell is to lift or to lower. The operation of this valve is preferably controlled by the rise and fall of the bell. The stem of the valve 24′ carries a rocking member 27, which has a limited oscillating movement independent of the stem. This rocking member is here shown in the shape of a T, having its upper horizontal arms made tubular to contain a quantity of mercury or other suitable shiftable weight for the purpose of causing the arm to work quickly to turn the valve and immediately cut off or turn on the water from the supply pipe 25′. Normally this rocking member will stand at an incline to one side or the other of a vertical line supported by the stops 28′ on an arm 29′, carried by an operating lever

30′, which has its weight end connected by a cord or chain 31′ with the bell 2. The function of the arm 30′ is to lift the member 27 until the latter approaches or slightly passes the vertical. As soon as this occurs, however, the mercury or other shiftable weight contained in the cross-piece of member 27 causes the arm to instantly descend on the opposite side, thereby hitting a stop 32′ on the valve stem to rock the latter and turn the cock in the desired way.

The operation of the apparatus is as follows: The tank 17 being filled with liquid, flow therefrom to the well 6 takes place through the pipe 18. Assuming the cock 24′ to be turned to let in water to the ram 4, the bell 2 is lifted, causing the bucket 3 to dip up a predetermined quantity of liquid and at the proper moment, or when the bell 2 has drawn in a full charge of air, discharge the liquid so dipped up into the carbureter, where it soaks through the absorbent filling therein. At that moment the valve 24′ is reversed by the falling of the arm 30′, and if the receiver 15 is not already filled, the bell 2 will begin to descend. This causes the air within the bell 2 to be exhausted through the carbureter, carrying with it the volatile liquid distributed through the filling across through pipe 14 into the receiver, and also through the generator 26 into the service pipe 25, when the latter is opened to permit of the flow. The gas generated in the tube 26 flows forward into the service pipe 25; the valve 24 preventing any back flow into the carbureter 5. The liquid caused by the condensation of gas in the pipes drains back to the heating tube 26, there to be regenerated into gas.

The device is very simple in construction, is compact, and has comparatively few parts, with very little liability for them to get out of order.

The operation in generating the gas in the gas supply tank is analogous to breathing through the lungs, since the air drawn into the bell 2 through the valve 9, on exhalation, becomes saturated from the charge of liquid delivered into the carbureter. The resulting gas of one inhalation of the apparatus is consumed before another inhalation begins. Thus the gas is made fresh at the instant it is ready for use, and the making of it stops as soon as the burners are turned off.

The bucket serves to maintain an agitation of the liquid in the well, so that the liquid which is actually delivered into the carbureter is always of the same density and the generated gas is all of equal richness. The proportions of oil and air may be changed at any time by changing or varying the capacity of the bucket.

When the apparatus is so located that steam or other fluid heat can be used, such a heating means can be employed by passing it through the asbestos-covered tube, and the burner or torch dispensed with.

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

1. A carbureting machine comprising a water-containing tank, a gas-conducting pipe leading therefrom, and a supplemental carbureter connecting with said pipe, said carbureter including a closed pipe having an asbestos covered tube and an interior heating tube, and means for admitting air to the heating tube.

2. In a gas machine, the combination of a water containing tank, a gas conducting pipe leading therefrom, a supplemental carbureter connecting with the lower part of said pipe, said carbureter including an inclined tube, and an interior burner tube or torch and connections between said inclined tube and the service pipe.

3. A carbureter machine having in combination a water containing tank, and a pipe connection therefrom, a supplemental carbureter connected to said pipe and comprising an inclined closed pipe having an asbestos covered tube located therein, an interior heating tube extending from one end of the inclined closed tube, a connection extending from the heating tube, and an air inlet pipe located at the opposite end of the asbestos covered tube and adapted to admit air to the heating tube.

4. In a gas machine, the combination with a carbureter and a pipe leading therefrom, of a supplemental carbureter connected to said pipe and comprising an inclined tube disposed below said pipe, an asbestos covered tube within said inclined tube, a heating tube concentrically located within the asbestos covered tube, means for admitting a heating medium from one end of the heating tube, means for admitting air from the opposite end of the asbestos covered tube, a service pipe, and a connection between the outer tube and said service pipe.

5. In a gas machine, the combination with a carbureter and a pipe leading therefrom, of a supplemental carbureter comprising an inclined tube having air openings at opposite ends, a connection between said inclined tube and the pipe leading from the main carbureter, an asbestos covered tube located within the first-named tube, a heating tube extending into the asbestos covered tube from one end of the inclined tube, means for admitting a heating medium into one end of the heating tube, an air inlet tube connecting with the opposite end of the inclined tube, a service pipe, and connections between the inclined tube and service pipe.

6. In a gas machine, the combination with a main carbureter and a pipe extending therefrom, of a supplemental carbureter disposed below said pipe, and comprising an

inclined tube having open connection with said pipe, an asbestos covered tube of smaller diameter located within the inclined tube, a heating tube extending into said asbestos tube from one end, and having connection with a source of heat, an air inlet tube opening into the opposite end of the inclined tube, a service pipe, and connection between the inclined tube and said service pipe.

7. In a gas machine, the combination with a main carbureter and a pipe connecting therewith, of a supplemental carbureter comprising an inclined tube connecting with said pipe, an asbestos covered tube of smaller diameter located within the inclined tube, perforated plugs inclosing the ends of the inclined tube, said plug supporting the asbestos covered tube, a heating tube extending through and supported by one of said plugs, and located within the asbestos covered tube, means for supplying a heating medium to the heating tube, an air inlet opening through the opposite plug, a service pipe and connection between the shell of the inclined tube and service pipe, and means at the lower end of the inclined tube for withdrawing any surplus liquid therefrom.

8. In a gas machine, the combination with a main carbureter, of a supplemental carbureter connected therewith and including inclined concentric tubes between which hydrocarbon is admitted, and means for supplying a heating medium to the innermost of said tubes.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

STEPHEN P. SANDERS.

Witnesses:
GEO. H. STRONG,
CHARLES EDELMAN.