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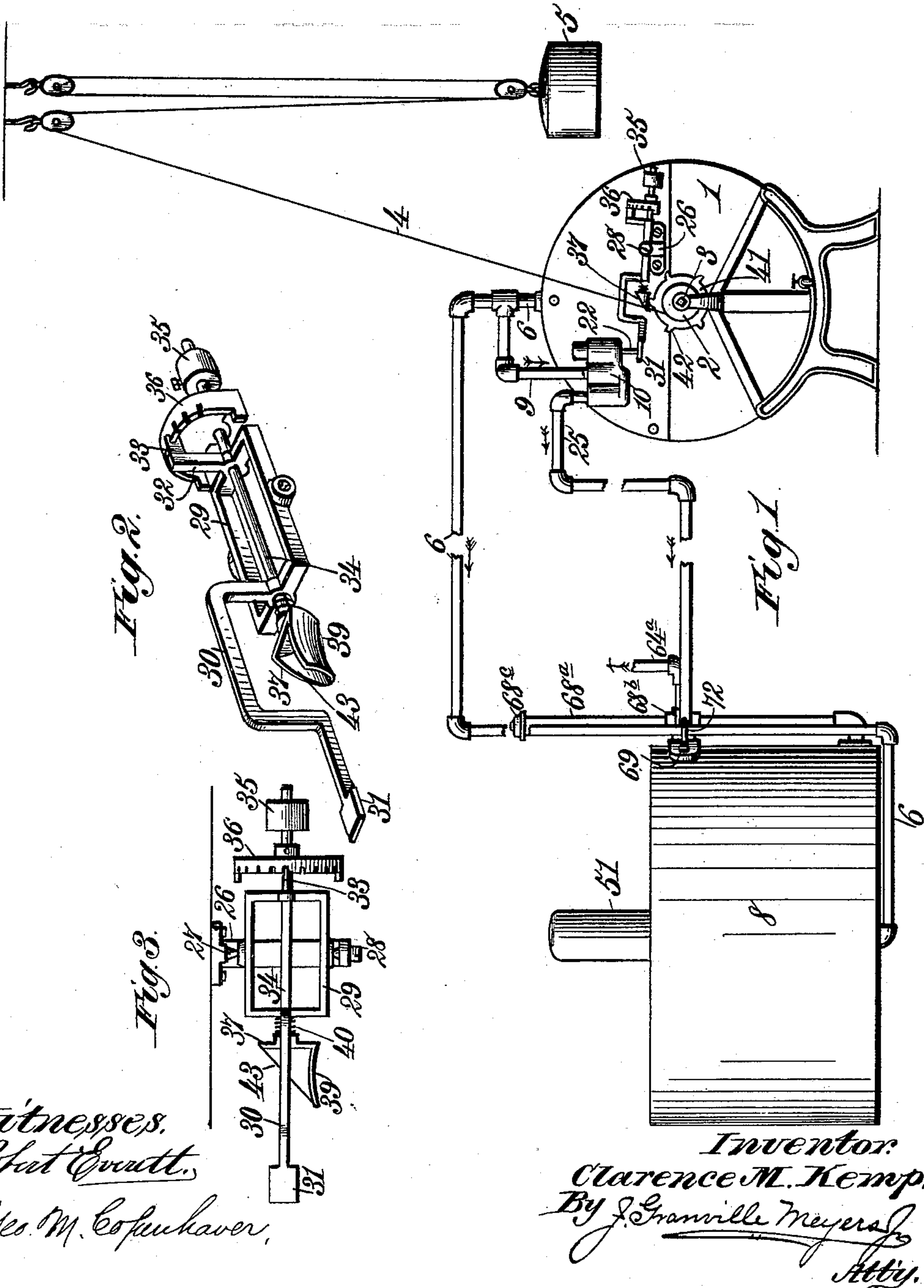
Patented Apr. 11, 1899.

C. M. KEMP.
CARBURETER.

(Application filed June 4, 1898.)

(No Model.)

2 Sheets—Sheet 1.



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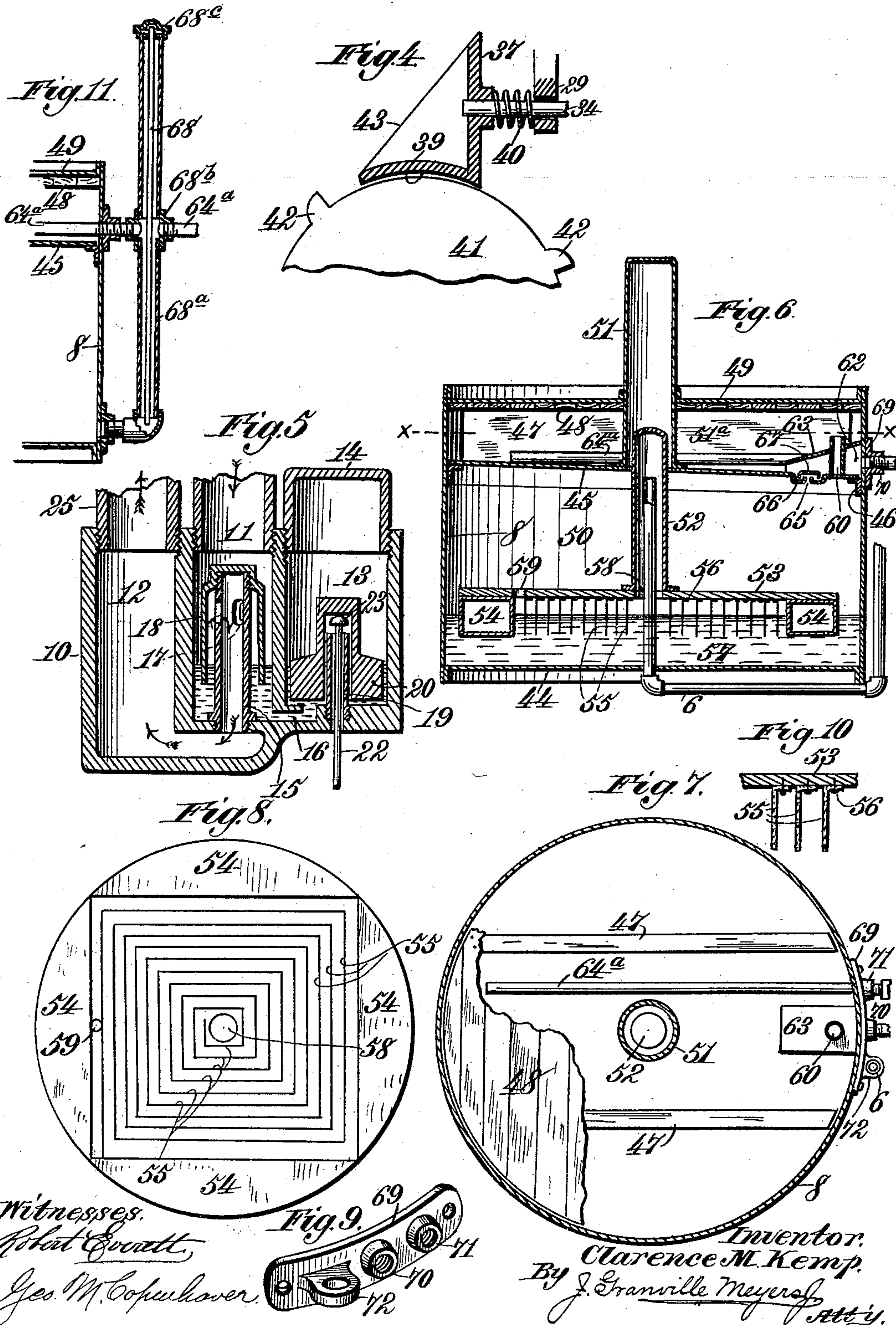
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2 Sheets—Sheet 2.



UNITED STATES PATENT OFFICE.

CLARENCE M. KEMP, OF BALTIMORE, MARYLAND.

CARBURETER.

SPECIFICATION forming part of Letters Patent No. 622,808, dated April 11, 1899.

Application filed June 4, 1898. Serial No. 682,537. (No model.)

To all whom it may concern:

Be it known that I, CLARENCE M. KEMP, a citizen of the United States, residing at Baltimore, in the State of Maryland, have invented certain new and useful Improvements in Gas-Machines; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My present invention relates to certain new and useful improvements in gas-machines, and more particularly to that class wherein a meter-wheel air-pump and a generator or carbureter are combined and cooperate to furnish a uniform quality of gas that may be used for heating or lighting purposes, as desired.

The invention has for its objects to improve and simplify the general construction of certain parts of a gas-machine of this character and to render the same more positive and uniform in action, so as to deliver a more uniform degree of gas.

It is one purpose of my present invention to provide a new and improved means for producing gas of a uniform quality and wherein the natural laws relating to gravity and the flow of fluids are availed of through mechanism which I provide for the purpose.

It is another purpose of the invention to provide a new and improved form of automatic valve for controlling the flow of a part of the air to the generator and an improved means for operating said valve through suitable connections with the air-pump.

It is still another purpose of the invention to provide certain improvements in the construction of the carbureter or generator, so as to render the same more effective in operation, simpler to construct, and cheaper to manufacture.

To these and other ends the invention comprises the novel features of construction and combinations and arrangements of parts hereinafter described in detail and then more definitely pointed out in the claims which conclude this specification.

In order to enable others skilled in the art to make, use, and operate my said invention, I will proceed to describe the same in detail,

reference being had for this purpose to the accompanying drawings, wherein—

Figure 1 is a front elevation of a complete gas-machine constructed in accordance with this invention. Fig. 2 is a detail perspective view of the air-valve-operating mechanism. Fig. 3 is a detail plan view of the same. Fig. 4 is a detail sectional view of a part of the valve-operating mechanism. Fig. 5 is a vertical sectional view of my improved liquid-sealed air-valve. Fig. 6 is a vertical sectional view of the carbureter or generator. Fig. 7 is a longitudinal sectional view of the carbureter, taken on the line *xx* of Fig. 6. Fig. 8 is a bottom plan view of the carbureter-float, showing the manner of arranging the absorbent material. Fig. 9 is a detail perspective view of an improved form of bracket or casting for supporting the air and gas pipes of the carbureter. Fig. 10 is a detail sectional view showing the manner of attaching the absorbent wicking to the float-disk. Fig. 11 is a sectional view of a part of the carbureter and showing the filling and vent pipe connection thereto.

Referring now to the drawings, the reference-numeral 1 designates an ordinary meter-wheel air-pump having the usual drum 2 upon its shaft 3 and operated through the medium of a cord or rope 4 and weight 5, all as is common in this type of gas-machines and need not therefore be further described. A main air-pipe 6 conveys a constant supply of air from the air-pump to a generator or carbureter 8, presently to be described, and a branch pipe 9 conveys an intermittent or interrupted supply of air from the pump to the generator, said branch pipe 9 being tapped into or connected with the main air-pipe 6, as will be seen.

It is a fact well known to those familiar with gas made by combining common air with hydrocarbon by evaporating the same in a carbureter that the quality of the gas produced is variable and needs to be many times reduced in richness by mixing with air, and the amount of air needed for mixing of course varies according to the variable quality of the rich gas, and therefore must be regulated and controlled from time to time in order to produce a supply of gas at a uniform degree of enrichment. It is this consideration that

forms an important part of my present invention, to accomplish which I provide a constant or continuous air-supply and an intermittent or interrupted air-supply, said intermittent
5 air-supply being regulated and controlled and automatically operated by movable parts of the air-pump.

The branch air-pipe 9 discharges into a valve-chamber 10, wherein is located a peculiar form of liquid-sealed valve now to be described. The said chamber 10 is attached to
10 the front of the air-pump 1, as shown, and consists of a central air-inlet chamber 11, an outlet-chamber 12, and a weight-containing chamber 13, said latter-named chamber being
15 provided with a removable cap or cover 14 to exclude dirt and prevent tampering with the parts. Communication is had between the central air-inlet chamber 11 and weight-containing chamber 13 through a small port or
20 passage 16, formed in the bottom of said chamber 13, and a pipe 15, having its lower end open, is extended upward within the air-inlet chamber 11, said pipe being provided with
25 openings 17 at its upper end and with a depending imperforate cap 18, which latter extends to near the bottom of the air-inlet chamber. Extending upward within the chamber 13 is an open pipe 19, and over said pipe is
30 slipped a weight 20, said weight being freely located within the chamber 13 and provided with a central cavity or bore, into which extends the pipe 19 in such manner as to allow the weight to readily rise and fall, the rising
35 movement being accomplished by means of a rod 22, extending up through the pipe 19 and operated through suitable mechanism hereinafter to be described. The upper end of the rod 22 is provided with a head or knob
40 23, which abuts against the weight and also serves to prevent the said rod from falling or slipping out of the tube 19. A quantity of mercury, glycerin, or other sealing liquid is placed within the air-inlet chamber 11, and
45 in its normal level or position, as shown in Fig. 5, said liquid rises above the lower end of the pipe, to seal the same and close off communication between the air-inlet chamber 11 and outlet-chamber 12. A pipe 25 connects
50 with the upper end of the outlet-chamber and leads to and discharges within the upper part of the generator or carbureter for the purpose of diluting or thinning the gas made in the lower or carbureter portion. Therefore the upper portion of the carbureter becomes a mixing and storage chamber.

The operation of my improved liquid-sealed valve is as follows: The weight 20 being raised by means of the rod 22, the mercury or other
60 sealing liquid will fall within the inlet-chamber 11 and rush into the weight-containing chamber 13 through the port or passage 16, thus unsealing the pipe, which will allow a supply of air to pass up within said pipe
65 through the openings 17 into the outlet-chamber 12 and from thence through the pipe 25 to the generator. If the weight is now al-

lowed to fall, the sealing liquid will be displaced or forced from the chamber 13 into the chamber 11, when the sealing action of
70 the pipe will again take place and prevent the further flow of air.

It should be understood that the weight is raised or operated intermittently and held in its raised position for a predetermined length
75 of time, such time being varied and controlled by the mechanism now to be described and which is illustrated in detail in Figs. 2 and 3 and in operative position in Fig. 1.

To the front of the air-pump 1 is attached
80 a bracket 26, having a fixed journal-point 27 and an adjustable journal-point 28. A yoke-frame 29 is journaled between these points 27 28, so as to balance or swing freely up and down, and a bent arm 30 projects upward
85 and outward from one end of the frame 29, said arm terminating at its end in a blade or flat portion 31, which lies directly beneath and operates upon the rod 22, heretofore described. Rising upward from the rear end
90 of the yoke-frame 29, opposite to the bent arm 30, is a vertical arm 32, having a tooth or lip 33 projecting laterally therefrom. A shaft 34 is passed freely through the yoke-frame lengthwise, said shaft carrying an ad-
95 justable weight 35 at one end and a notched segment 36 adjacent to the weight, said segment being arranged to cooperate with the tooth or lip 33 on the yoke-frame. To the opposite or forward end of the shaft 34 is se-
100 cured a cam-block 37, having a curved outer wall or surface gradually diminishing in length, said surface or wall being concaved, as shown at 39, Figs. 2 and 4. A coiled spring
105 40 is arranged upon the shaft 34, between the cam-block 37 and front end of the yoke-frame 29, said spring acting normally to draw the rod forward and hold the notched segment into contact with the tooth or lip 33. Upon
110 the shaft 2 of the pump I fix a wheel 41, carrying a series of cam projections 42, as shown, said wheel being so located that during its rotation the cams will successively contact with the curved wall or surface 39 of the cam-block
115 37 and raise said block and with it the yoke-frame 29, bent arm 30, and weight-rod 22, as will be understood. The cam-block 37 is of a peculiar shape, somewhat approaching the triangular, and it has its extreme end 43 cut
120 off obliquely, as seen more clearly in Figs. 2 and 3, thus producing a contact-surface 39 for the cams 42 of gradually-diminishing length. The shaft 34, as heretofore explained, is freely mounted in the yoke-frame, and it
125 can be rotated therein, so as to bring a longer or a shorter surface of the cam-block into action with the cam projections 42, according to the quality of gas desired, and it may be
130 locked in any such adjusted position by means of the notches in the segment engaging with the tooth 33. It will thus be seen that if it is desired to feed a considerable supply of air through the branch pipe 9 to the mixing-chamber of the generator I will adjust the cam-

block 37, so that its longest surface will be presented to the cams 42, in which position it will operate to hold the weight 20 raised for a considerable period of time, during which the pipe is unsealed and the air will find a free passage therethrough out to the mixing-chamber in the generator. This adjustment of the cam-block is usually desirable when the generator is first supplied with oil and for a considerable period thereafter, during which time the oil is very volatile and vaporizes quite rapidly. If, on the other hand, it is desired to feed only a small quantity of air through the branch pipe, then the cam-block will be adjusted so that its shortest length or part of the surface 39 will be acted upon, in which case the weight will be held up only for a moment, allowing but a momentary feed of air. The cam-block may also be adjusted, so that no part thereof will come in contact with the cam projections, and in this case all the air supplied by the air-pump will pass through the main air-pipe to the generator. It will thus be seen from the foregoing that I provide a simple, effective and positive means for regulating and controlling the amount of air fed to the generator, so that the quality of the gas produced will be uniform and practically fixed in its degree of enrichment.

I am aware that it is not broadly new to provide means for regulating the feed of air to the generator; but I believe I am the first to provide the peculiar mechanism for this purpose herein described and shown.

My improved carbureter or generator in which I claim some points of novelty will now be described.

The reference-numeral 44 designates a tank or vessel, preferably made of metal, which is usually buried in the ground and which is provided with a slightly-inclined horizontal partition or division-plate 45, said partition being supported upon and secured to an annular ring of angle-iron 46, as shown. The top of the generator is made flat and is constructed by arranging a series of cross-supports 47, of wood, upon which is laid a board flooring 48, and covering this flooring is a metal top plate 49, which is secured air-tight around its edges to the tank or vessel. This form of top is very durable, capable of bearing considerable weight, which is essential, since it is buried in the ground, and is much cheaper than the ordinary curved or arched top now commonly used. The space between the bottom of the generator and division-plate 45 forms a generating-chamber 50, and the space between the said plate 45 and top of the generator forms a mixing-chamber 51^a, the peculiar function of which will be presently explained. A guide pipe or tube 51, having a closed upper end and an open lower end, is secured to the division-plate 45 and extends up through the top of the generator, said tube being arranged to guide a similar pipe 52, which is attached at its lower open

end to a float, now to be described. This float consists of a top disk 53, of wood, having attached to the under side thereof four float-boxes 54, as shown, and between these boxes is arranged a continuous strip of absorbent material 55—such as wicking, flannel, or the like—said strip being arranged in a practically spiral manner to provide a continuous spiral way or conduit for the passage of the air during the vaporizing or carbureting action. A simple and effective way of attaching the flannel or wicking 55 to the disk 53 is by folding the upper edge of the strip, as at 56, and tacking the same to the disk. In operation the absorbent material is partially submerged in the body of oil 57 contained in the tank, as is well understood. The main air-supply pipe from the pump enters the generator through the bottom and extends upward therein to near the division-plate and discharges into the tube or pipe 52 and then passes downward through an opening 58 in the float-disk 53, where it enters the spiral way or conduit formed by the absorbent material and travels through the whole area of said conduit and finally discharges through an opening 59 in the float-disk 53 and enters the generating-chamber 50, from whence it escapes upward through a short pipe 60 into the mixing-chamber 51^a, where it mixes with the air from the branch air-pipe 25. This branch pipe enters the mixing-chamber 51^a at the point 61 and discharges into a small chamber 62, the top 63 of which is inclined, as shown, and extends to near the division-plate 45, but is removed sufficiently therefrom to provide a contracted outlet-opening 64^a, through which the air passes in puffs or blasts from the intermittently-opened branch air-pipe. The short pipe 60 it will be seen extends up through the inclined top 63 of the chamber 62, and the gas passing up through said pipe being heavily charged with vapor falls upon the said inclined top and passes downward, where it will be met by the blasts of pure air from the branch pipe, thereby thoroughly agitating and mixing the same. The mixed gas passes out from the mixing-chamber through a pipe 64^a, the open end of said pipe being located at that side of the mixing-chamber opposite to the short pipe 60, so as to receive the gas which has had the full intervening space wherein to be mixed.

It is customary to provide separate and independent mixing-chambers, wherein the gas as made at the generator and the air supplied for mixing can enter, and these mixing-chambers are sometimes put in the cellars of the houses in contiguity to the air-pump and sometimes are placed in the trench on the line of the gas and air pipes leading out to the generator, in all of which there is friction in delivery of the gas to the mixing-chamber. In the present invention I employ a very short pipe 60, which passes the gas from the generator to the mixing-chamber promptly and

which forms also a trap, thereby preventing its return, as immediately the gas passes its top edge it drops downward into the mixing-chamber through the lighter mixed air and gas therein. This construction of mixing-chamber and carbureter simplifies a gas apparatus and makes the connections less numerous and easier and facilitates the mixing and accomplishes it in a more reliable manner and cheapens the construction.

In order to discharge any oil of condensation from the mixing-chamber, I provide a drain-opening 65, surrounded by a trough 66, having a cap 67 to form a seal, whereby the upward escape of the gas will be prevented, but at the same time allowing a free outlet for the oil. The generating-chamber is supplied with oil through a pipe 68, as shown in Fig. 11, which pipe passes down through a vent-pipe 68^a and leads to the bottom of the tank at its lower end, while the upper end projects aboveground to facilitate filling. A cap 68^c is screwed upon the top of the pipes 68 and 68^a. The vent-pipe 68^a is supported by and tapped into a cross-coupling 68^b, as will be seen, said coupling also carrying the gas-outlet pipe 64^a.

In practice I prefer to have the air and gas pipes entering the generator assembled at approximately the same point, and in order that they may be held securely in position I have provided a novel and simple form of supporting bracket or casting, which is shown in detail in Fig. 9. This bracket consists of a base portion 69, carrying two hollow internally-threaded nipples 70 71 and an apertured lug 72. The branch air-pipe is screwed into the nipple 70, the gas-outlet pipe passes through the nipple 71, and the main air-supply pipe passes downward through and is supported by the apertured lug 72. The bracket or casting is secured to the outside of the generator-tank by means of screws, bolts, or rivets, as may be desired.

The branch pipe 25 is made of large caliber and has as few as possible of fittings or joints that make friction or retard the flow of air through it after the air leaves the mercury-valve, and when the valve is open to the air it takes its passage therethrough in preference to going through the main air-pipe and working its way through the generator, wherein it becomes weighted with the vapors of the gasoline. One thousand cubic feet of air charged with this vapor has weight of thirty to forty pounds to carry, as about five gallons of gasoline are vaporized by each one thousand cubic feet of air at times. Hence this heavily-charged air needs pressure to elevate it into the mixing-chamber, and when the mercury-valve is open the air delivered by the meter-wheel air-pump has choice of two means of passage, and naturally it selects the one presenting the line of least resistance and the one likewise that will impel the least effort—that is, the one where the law of gravity is not combatted. There is much less restric-

tion to the air to pass through the pipe 25, and likewise the air so passed does not have to carry any weight.

From the foregoing description it will be obvious that I provide a gas-machine wherein the supply of air to be fed to the generator may be regulated to a fine degree and with the arrangement shown a supply of air is led into direct contact with the hydrocarbon and an intermittent supply is led to the mixing-chamber, wherein it mixes with the heavily-vaporized air. Furthermore, it will be noticed that I so arrange the parts of my machine that the air and gas will be made to travel at all times in a direction best suited and agreeing with the natural laws.

Minor changes or additions may be made to the various parts of my machine without departing from the spirit of the invention.

What I claim is—

1. In a gas-machine, the combination with an air-pump, of a generator or carbureter, a main air-supply pipe leading from the air-pump to the generator and furnishing a constant supply of air thereto, a branch air-pipe also leading to and discharging within the generator, a valve controlling the passage of air through said branch pipe, and means for operating said valve whereby an intermittent supply of air will be furnished to the generator through the said branch air-pipe.
2. In a gas-machine, the combination with an air-pump, of a carbureter having a generating-chamber and a mixing-chamber with a communicating passage between them, a main air-supply pipe leading to the carbureter and entering the generating-chamber, a branch air-pipe discharging into the mixing-chamber of the carbureter, a valve controlling the passage of air through said branch pipe, and means for operating said valve whereby an intermittent supply of air may be led to the said mixing-chamber, substantially as described.
3. In a gas-machine, the combination with an air-pump, of a generator or carbureter, a main air-supply pipe leading from the air-pump to the generator and furnishing a constant supply of air thereto, a branch air-pipe leading to the generator, a valve-chamber connected to said branch pipe and provided with a liquid-sealed passage for the air, a movable weight for controlling the said liquid-sealed passage to open and close the same, and means for operating said movable weight, for the purpose specified.
4. In a gas-machine, the combination with an air-pump, of a generator or carbureter, a main air-supply pipe leading from the air-pump to the generator, a branch air-pipe leading to the generator, a valve-chamber connected to said branch pipe and provided with a liquid-sealed air-passage, a movable weight acting directly upon the body of sealing liquid to control the sealing of said passage, and means for operating said weight.
5. In a gas-machine, the combination with

an air-pump, of a generator, a main air-supply pipe leading from the air-pump to the generator, a branch air-pipe leading to the generator, a valve-chamber connected to said branch pipe and provided with a liquid-sealed air-passage, a movable weight acting directly upon the body of sealing liquid to control the sealing of said passage, and means operated from a movable part of the air-pump for operating the weight.

6. In a gas-machine, the combination with an air-pump, of a generator a main air-supply pipe leading from the air-pump to the generator, a branch air-pipe leading to the generator, a valve-chamber connected to said branch pipe and provided with a liquid-sealed air-passage, a movable weight acting directly upon the body of sealing liquid to control the sealing of said passage, a rod for raising said weight, a pivoted yoke-frame carrying an arm to actuate said rod, and means for rocking said yoke-frame.

7. In a gas-machine, the combination with an air-pump, of a generator, a main air-supply pipe leading to the generator from the air-pump, a branch air-pipe leading to the generator and arranged to pass an intermittent supply of air thereto, a valve-chamber connected to said branch pipe, and provided with a liquid-sealed air-passage, a weight-containing chamber arranged adjacent to said liquid-sealed passage and provided with a port through which the sealing liquid may pass from one chamber to the other, a movable weight acting directly upon the body of sealing liquid to displace the latter for the purpose specified, and means for raising said weight to unseal the air-passage.

8. In a gas-machine, the combination with an air-pump, of a generator, a main air-supply pipe leading to the generator from the air-pump, a branch air-pipe leading to the generator and arranged to pass an intermittent supply of air thereto, a valve-chamber connected to said branch pipe and provided with a liquid-sealed air-passage, a weight-containing chamber arranged adjacent to said liquid-sealed passage and provided with a port through which the sealing liquid may pass from one chamber to the other, a movable weight acting directly upon the body of sealing liquid to displace the latter for the purpose specified, a vertically-moving rod for lifting said weight, and mechanism actuated by the air-pump for intermittently raising said rod, substantially as described.

9. In a gas-machine, the combination with an air-pump, of a generator, a main air-pipe feeding a constant supply of air to the generator, a branch air-pipe tapped into the main air-pipe and arranged to feed an intermittent supply of air to the generator, a liquid-sealed pipe interposed in the branch air-pipe between the pump and generator, and a weight acting upon the sealing liquid to normally seal the said liquid-sealed pipe.

10. In a gas-machine, the combination with an air-pump, of a generator a main air-pipe feeding a constant supply of air to the generator, a branch air-pipe arranged to feed an intermittent supply of air to the generator, a liquid-sealed pipe controlling the passage of air through said branch pipe, a weight acting upon the body of sealing liquid and serving to seal the said air-passage, a pivoted yoke-frame secured to the front of the air-pump and provided with an arm for actuating the said weight, a cam-block carried by the yoke-frame, and a plurality of cam projections acting successively upon the said cam-block, substantially as and for the purpose described.

11. In an intermittent air-supply for carbureters, the combination with a branch air-pipe, of a valve for controlling the passage of air through said pipe, a pivoted yoke-frame carrying an arm for operating said valve, a shaft journaled in said yoke-frame, an adjustable cam-block secured to said shaft and provided with a contact-wall of varying width, and a rotary wheel provided with a plurality of cam projections, said projections being arranged to successively engage the cam-block whereby the valve is intermittently operated.

12. In an intermittent air-supply for carbureters, the combination with a branch air-pipe, of a valve for controlling the passage of air through said pipe, a pivoted yoke-frame carrying an arm for operating said valve, a shaft journaled in said yoke-frame, an adjustable cam-block secured to said shaft and provided with a contact-wall of varying width, a notched segment carried by the shaft and cooperating with a tooth on the yoke-frame to hold the cam-block in different positions of adjustment, and a rotary wheel provided with a plurality of cam projections arranged to successively engage the said cam-block and operate the valve intermittently.

13. In an intermittent air-supply for carbureters, the combination with a branch air-pipe, of a valve for controlling the passage of air through said pipe, a pivoted yoke-frame carrying an arm at one end for operating said valve, a shaft journaled in said yoke-frame, an adjustable cam-block secured to one end of said shaft and provided with a contact-wall of varying width, a balancing-weight at the opposite end of said shaft, a notched segment secured to the shaft adjacent to the weight, a tooth on the yoke-frame cooperating with the segment to hold the cam-block in different positions of adjustment, and a cam-wheel arranged to intermittently actuate the cam-block, for the purpose specified.

14. In an intermittent air-supply for carbureters, the combination with an air-pipe, of a valve for controlling the passage of air through said pipe, a pivoted yoke adapted to operate said valve, a cam-block adjustably mounted upon said yoke and provided with a contact-wall of varying width, and means

coöperating with the said cam-block for moving the yoke-frame, substantially as and for the purpose specified.

5 15. In an intermittent air-supply for carbureters, the combination with an air-pipe, of a valve for controlling the passage of air through said pipe, a movable part for operating said valve, a cam-block adjustably mounted upon said movable part and having
10 a contact-wall of varying width, means for locking said cam-block in different positions of adjustment, and mechanism coöperating with the cam-block for actuating the said movable part to operate the valve.

15 16. In a gas-making apparatus, the combination with an air-pump, of a carbureter comprising two compartments with a communi-

cating pipe between them, a small chamber in the upper compartment having an inclined top wall through which said pipe passes and
20 above which the latter terminates, a main air-supply pipe leading from the pump to the lower compartment, a branch air-pipe leading from the pump and discharging into the said small chamber from whence it passes
25 out through an opening in the latter to the upper compartment, and a gas-discharge pipe leading from said latter-named compartment.

In testimony whereof I affix my signature in presence of two witnesses.

CLARENCE M. KEMP.

Witnesses:

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WM. F. BRISWANGER.