No. 687,756. Patented Dec. 3, 1901.

C. M. KEMP.

CARBURETER.

(Application filed Nov. 21, 1898.)

(No Model.)

Fig. 3.

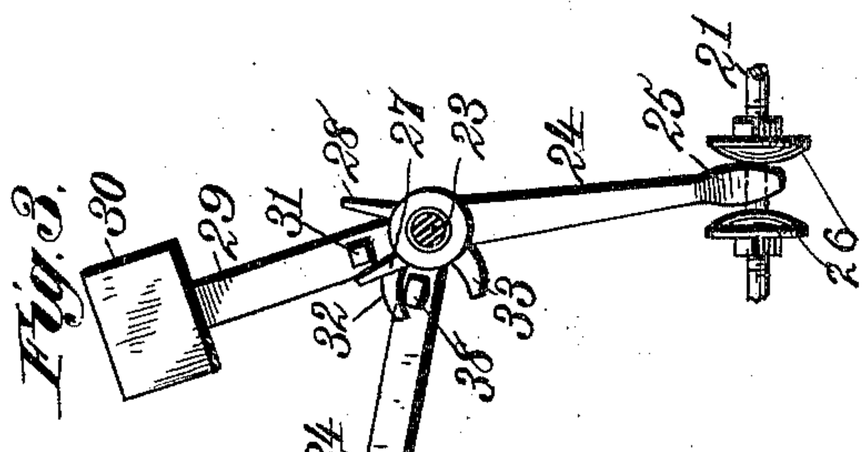


Fig. 2.

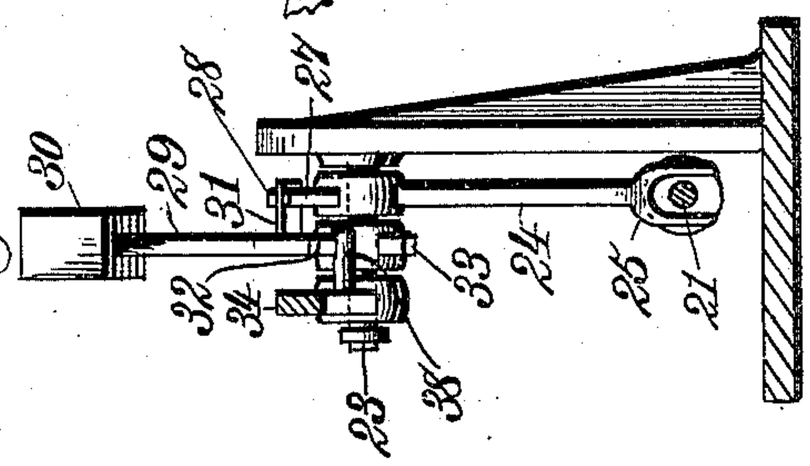


Fig. 4.

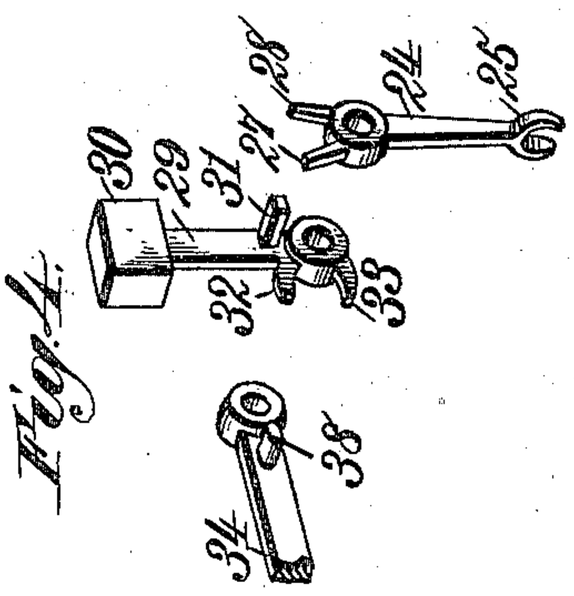
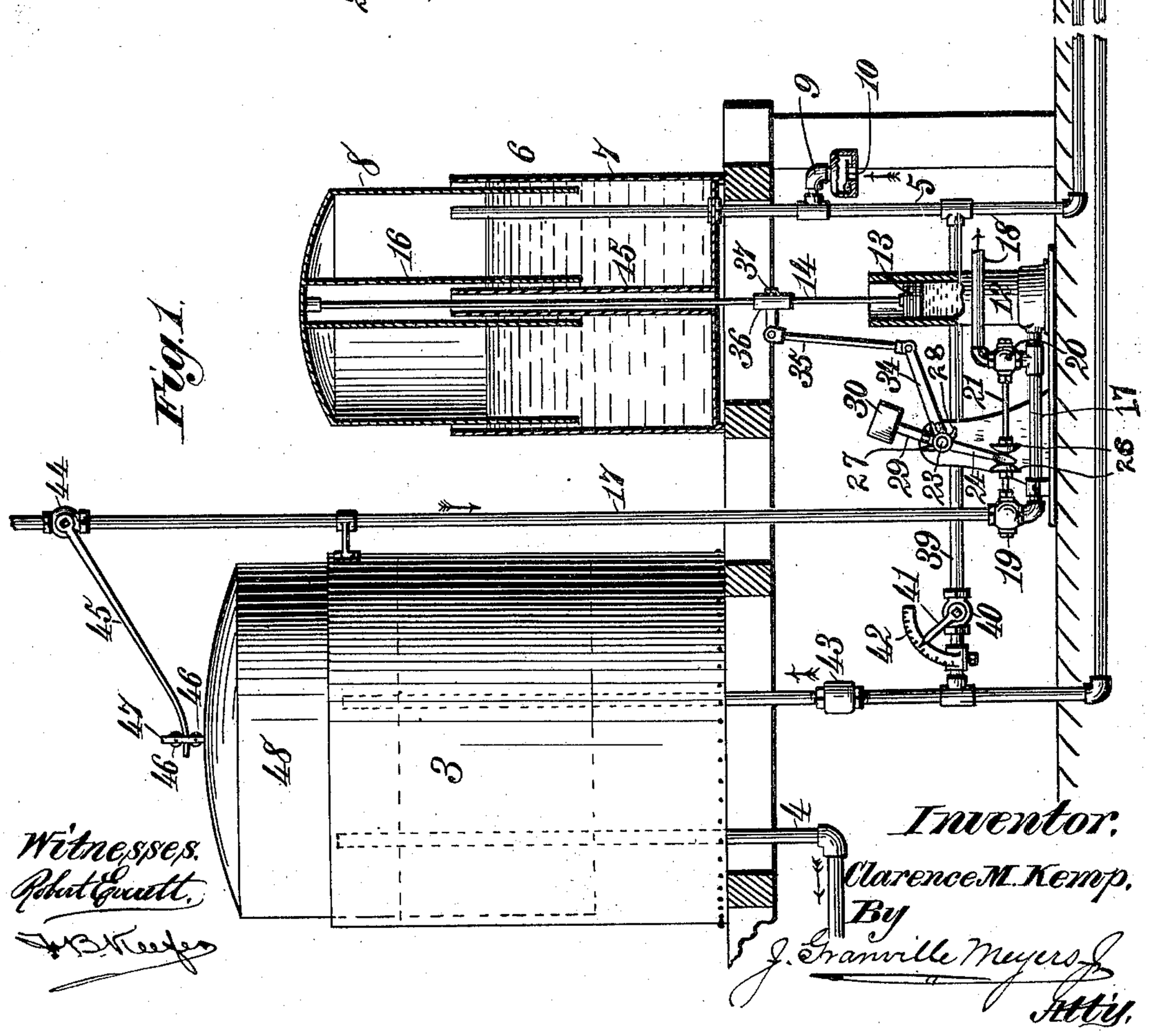


Fig. 1.



Witnesses.
Robt Evatt.
W. B. Keeler

Inventor.
Clarence M. Kemp.
By
J. Granville Meyers
Atty.

UNITED STATES PATENT OFFICE.

CLARENCE M. KEMP, OF BALTIMORE, MARYLAND.

CARBURETER.

SPECIFICATION forming part of Letters Patent No. 687,756, dated December 3, 1901.

Application filed November 21, 1898. Serial No. 696,960. (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.

This invention relates to gas generating and mixing apparatus, and more especially to that class of gas-producing machines intended for individual or domestic use; and it has for its object to provide an apparatus of the type referred to wherein air is forced through a liquid hydrocarbon by an air-pump operated by hydraulic pressure with means for automatically mixing air with the gas to dilute or reduce the richness of the latter.

It has for its further object to provide such an apparatus with means for mixing the air with the gas in regulated quantities proportioned to the richness of the gas.

It has for another object to provide novel means for automatically throwing the apparatus into and out of operation, and, finally, it has for its object to improve and simplify the construction and render more efficient the operation of machines of this class generally.

To these ends my invention consists in the features and in the construction, combination, and arrangement of parts hereinafter described, and particularly pointed out in the claims following this description, reference being had to the accompanying drawings, forming a part of this specification, wherein—

Figure 1 is a vertical elevation, partly in section, of my improved apparatus. Fig. 2 is a sectional detail view of the mechanism for actuating the valves of the hydraulic motor. Fig. 3 is a similar view taken at a right angle to Fig. 2; and Fig. 4 is a detail perspective view of said mechanism, showing the parts separated.

Referring to the drawings, the numeral 1 indicates a carbureter of ordinary or any preferred construction and adapted to be charged with a liquid hydrocarbon—such as gasolene, for example. A pipe 2 leads from the carbureter 1 to a gasometer 3, also of ordinary construction, and serves to convey the gas or carbureted air from the carbureter and store it in the gasometer, from which latter it is distributed to the point or points of consumption by a service-pipe 4. An air-pipe 5 leads from the carbureter 1 to an air-pump 6, consisting of a cylindrical vessel 7, open at its top and adapted to be filled or nearly filled with water, and a hollow cylindrical plunger 8, open at its bottom and closed at its top and fitted to rise and fall in the vessel 7. The water in the vessel 7 forms a seal for the vessel 8 and prevents the escape of air therefrom. As shown, the air-pipe 5 passes up through the bottom of the vessel 7 and terminates at a point above the highest level of the water contained in the latter, whereby water is effectually prevented from passing to the carbureter from the air-pump. Connected to the pipe 5 is a downwardly-turned air-inlet 9, having a contracted opening in which is seated a check-valve 10, that rises by atmospheric pressure when the hollow plunger is raised and allows the outer air to pass into the air-pump through the upper end of the pipe 5 to fill the vacuum caused by the upward movement of the hollow plunger, said valve closing by gravity and the pressure of the air in the pump when the plunger is lowered. Hence it will be apparent that as the plunger is raised and lowered air will be alternately drawn in through the air-inlet 9 and forced out through pipe 5 into the carbureter, thus forcing a current of air through the gasolene in the carbureter and converting it into gas, which is conveyed by the pipe to the gasometer 3.

In the class of gas-producers to which this invention relates it is necessary that the air-pump should be actuated by an automatic motor requiring no attention and that means should be provided for automatically stopping and starting the motor and for regulating its speed to correspond with the consumption of the gas. Furthermore, as the carbureter operates to charge the air more heavily with the hydrocarbon vapor when the carbureter is freshly charged than when it has been used for some time it is necessary, in order to maintain a uniform quality of gas, that air should be mixed with the gas in regulated quantities to dilute or reduce the richness of the gas to correspond with the quantity of hydrocarbon

vapor taken up or absorbed by the air passing through the carbureter. To accomplish these ends, I provide the following novel means: Mounted on a suitable base is an upright cylinder 12, in which is adapted to reciprocate a piston 13. As shown, the upper end of the cylinder is open, and rigidly attached to the piston 13 is a piston-rod 14, that passes up through the bottom of the vessel 7 and through an open-ended tube 15, that is arranged centrally within the vessel 7 and projects at its upper end above the level of the water in said vessel. A somewhat-larger tube 16 depends from the top of the hollow plunger 8 and dips into the water in the vessel 7 and surrounds the tube 15, thus forming a seal that prevents the escape of air through the bottom of the vessel 7. The piston-rod 14 passes up through the tube 16 and at its top is fixed to the top of the hollow plunger 8. It will thus be seen that as the piston 13 is raised and lowered the hollow plunger will also rise and fall, thus pumping air into the carbureter. Connected with the bottom of the cylinder 12 is a water-pipe 17, that leads from a water-main or other suitable source for supplying water under pressure, and connected to the water-pipe 17, preferably at a point near the cylinder 12, is an exhaust or waste pipe 18. Cut-off valves 19 and 20 are respectively arranged in the supply and waste pipes 17 and 18, and said valves are coupled together by a valve-rod 21. The arrangement of the cut-off valves 19 and 20, which are of ordinary and well-known construction, is such that when the cut-off valve 19 is open to supply water to the cylinder 12 the cut-off valve 20 will be closed, and conversely when the cut-off valve 19 is closed to cut off the supply of water to the cylinder the cut-off valve 20 will be open to permit the water to escape from the cylinder. Said valves 19 and 20 are automatically operated as follows: Rising from the base 11 is a standard 22, from which laterally projects a stud-shaft 23, and on said shaft is journaled an oscillating lever 24, which at its lower end is forked or bifurcated, as at 25, to straddle the valve-rod 21 and engage collars 26, fixed on said shaft. The lever 24 at its upper end is provided with two diverging tappets 27 and 28. Also journaled on the shaft 23 is an upright vibrating arm or lever 29, provided at its upper end with a weight 30 and near its lower end with a lateral projection or lug 31, that projects between the tappets 27 and 28. Projecting from one side of the boss of the arm 29 are two tappets 32 and 33. An arm or lever 34 is journaled at one end on the shaft 23 in juxtaposition to the weighted arm or lever 29, and at its other end is pivotally connected to a link 35, which in turn is pivotally connected to a sleeve 36, adjustably fixed on the piston-rod 14 by a set-screw 37. The arm or lever 34 at a point near its fulcrum is provided with a lateral projection or lug 38, that projects between the tappets 32 and 33.

The operation of the valve-actuating mechanism is as follows: Let it be assumed that the parts are in the position shown in Fig. 1 of the drawings, wherein the hollow plunger 8 is illustrated as rising to take in air through the inlet 9. Then as the plunger rises it raises the arm 34, and when the plunger reaches the limit of its upstroke the lug 38 on said arm engages the tappet 32 on the weighted lever 29 and swings said lever about its fulcrum until it passes a vertical axial line, when the weight 30 will immediately cause the lever 29 to quickly and forcibly swing or drop into a position the reverse of that shown. In this movement of the weighted lever 29 its lug 31 will strike the tappet 28 on the end of the arm 24 and swing the latter into a position the reverse of that shown, thus closing the cut-off valve 19 and cutting off the supply of water to the cylinder 12 and at the same time opening the valve 20 in the waste-pipe 18, thus permitting the water to escape from the cylinder. The piston 13 will then descend and permit the plunger 8 to drop and force the air therefrom through the pipe 5 into the carbureter. When the piston reaches the limit of its downstroke, the lug 38 on the arm 34 will engage the tappet 33 on the weighted lever 29 and raise the latter until its weight 30 throws it back into the position shown, whereupon the lug 31 will strike the tappet 27 and throw the arm 24 into the position shown, again opening the valve 19 and closing the valve 20, when the water will again raise the piston 13 and with it the hollow plunger 8, thus causing the air-pump to take in a fresh charge of air. This operation will be repeated continuously as long as water is supplied to the motor by the pipe 17, the hollow plunger 8 being thus alternately raised and lowered to force a continuous supply of air to the carbureter 1, where it is converted into gas, and force the latter from the carbureter into the gasometer 3.

A pipe 39 leads from the air-pipe 5 to the gas-pipe 2, and arranged in said pipe 39 is a valve 40, by means of which the passage of the air from the air-pipe 5 to the gas-pipe 2 may be regulated. On the stem of the valve 40 is an index-hand or indicator 41, that is arranged to move over a graduated segment 42 to indicate the position of the valve 40, and hence the relative quantity of air passing therethrough. As the air-pump is actuated to force air into the carbureter in the manner above described a portion of the air will pass from the pipe 5 into the pipe 39 and will be delivered into the gas-pipe 2, where it will be mixed with the gas coming from the carbureter and pass with the same into the gasometer. As has been before explained, when the carbureter has been freshly charged with gasolene or is nearly full the air passing therethrough will be very heavily charged with the hydrocarbon vapor, and the valve 40 will therefore be turned until the index indicates that it is fully open, or nearly so. A large

volume of air will then be caused to pass through the pipe 39 and mix with the heavily-charged gas, thus diluting or reducing the latter. As the quantity of gasolene in the carbureter is decreased by volatilization (which in practice is indicated by a gage or similar well-known means ordinarily employed for the purpose) the valve 40 will be turned to decrease the flow of air through the pipe 39, thus mixing a less quantity of air with the less-heavily-charged gas, and this operation will be repeated from time to time, as occasion requires, the indicator and graduated index or scale indicating the proper position to turn the valve to correspond with the state of the carbureter. In order to prevent any back flow or pressure of gas from the gasometer, I arrange a check-valve 43 in the gas-pipe 2, as clearly shown in Fig. 1 of the drawings.

In the supply-pipe 17 is arranged a cut-off valve 44, and fixed on the stem of said valve is an arm 45, the free end of which is loosely arranged between two antifriction-rollers 46, journaled in a stirrup 47, fixed to the upper end of the rising-and-falling dome 48 of the gasometer. When the consumption of the gas in the gasometer ceases or is less than the quantity being generated by the apparatus, the dome 48 of the gasometer will rise until the arm 45 closes the valve 44 and shuts off the supply of water to the motor 12, whereupon said motor and the air-pump 6 operated thereby stops making any further movement; but the gasometer 3 has capacity to rise upward and receive a full discharge from pump 6 after said gasometer has fully closed the water-valve 44. As the air-pump is of a weight sufficient to always cause a discharge of its contents into the gasometer whenever it has reached its upward limit and when the exhaust-valve of the motor has opened, it allows the air-pump to freely make its descent.

It will be understood that the air-pump always contains a definite quantity of air when it has reached its upward limit and is ready to discharge its contents, and if the valve 40 on the branch air-pipe is set to allow ten per cent. of this volume to pass through it then the other ninety per cent. will pass through the carbureter. The positiveness of securing this result is effected by the pump being of weight sufficient to make a prompt descent and exhaustion of its contents. If the pump should descend very slowly, its entire contents of air would likely pass through the branch pipe, although the valve were set for ten per cent. Therefore to obtain a reliable mixture of the air and gas the air-pump must first contain a definite amount of air and then make a quick descent to pass its contents through the two pipes in quantities through each as proportioned or adjusted.

When the valve 44 is closed, the apparatus ceases to generate gas until the quantity of gas in the gasometer is reduced, when the fall of the dome 48 to a certain point will again open the valve 44 and start the apparatus to working. As shown in Fig. 1, the dome of the gasometer rises or falls, owing to the increase or decrease of the quantity of gas contained in the gasometer, and the arm 45 operates the valve 44, and hence the quantity of water passing through the supply-pipe 17 will be regulated, thereby controlling the speed of the motor, and consequently the rate at which the air will be drawn into the pump 6. The gas will in this manner be generated in quantities proportionate to the rate of consumption, insuring a uniformity in the quantity of the gas and in its pressure at the point of consumption.

Other fluids than water can be used to drive the motor, such as air-pressure, and the main principle of the invention will not be deviated from if instead of using a piston-motor any other motor controlled in like manner by levers connected to the operating parts of the apparatus is used.

As will be seen, the air and gas pipes from the air-pump to the gasometer are entirely free from valvular constructions, with the exception of the regulating-valve 40 and the check-valve 43, and the latter may even be dispensed with, if desired, it being understood, of course, that the pressure exerted by the plunger is greater than the pressure exerted by the gasometer. The passage of the air and gas is therefore free and under no restraint whatever so far as the movement toward the gasometer is concerned. This forms one of the essential features of my construction in view of the fact that the tendency of the gas to expand, owing to the volatilizing of the liquid which impregnates the air to form the gas, is not restrained, an outlet for this expansion being provided by the bell of the gasometer.

Having described my invention, what I claim is—

1. In combination, a carbureter; a gasometer; a gas-pipe leading from said carbureter to said gasometer; a rising-and-falling air-pump or aspirator; an air-pipe leading from said pump to said carbureter, an air-intake for the pump, a cross-pipe connecting said air-pipe with said gas-pipe, means for imparting regular intermittent movements to said pump, and means controlled by the gasometer to render the pump inactive under certain conditions.

2. In combination, a carbureter; a gasometer; a gas-pipe leading from said carbureter to said gasometer; a rising-and-falling air-pump or aspirator; an air-pipe leading from said pump to said carbureter and provided with an air-intake valve intermediate said carbureter and said pump; a cross-pipe connecting said air-pipe with said gas-pipe; means for imparting regular intermittent movements to said pump; and means controlled by said gasometer to render said pump inactive under certain conditions.

3. In a gas generating and mixing appara-

tus, the combination with a carbureter, of a rising-and-falling air-pump or aspirator; an air-pipe connecting said pump with said carbureter; an air-intake valve in said air-pipe intermediate said pump and carbureter; means for imparting regular intermittent lifting movements to said pump; means controlled by the upward movement of the pump to cause a regular intermittent cessation of said pump-lifting means; a gasometer; a gas-pipe connecting said gasometer and said carbureter; and means controlled by said gasometer to render said pump or aspirator inactive under predetermined conditions.

4. In a gas generating and mixing apparatus, the combination with a carbureter, of a rising-and-falling air-pump or aspirator; an air-pipe connecting said pump and carbureter; an air-intake valve in said pipe; means for lifting said pump or aspirator; instrumentalities controlled by the upward movement of said pump to cause a regular intermittent cessation of said pump-lifting means; adjustable connections between said pump and instrumentalities to determine the period of cessation of said lifting means; a gasometer; a gas-pipe connecting said gasometer and said carbureter; a cross-pipe connecting said gas-pipe and said air-pipe; and means controlled by said gasometer to render said air-pump or aspirator inactive under predetermined conditions.

5. In a gas generating and mixing apparatus and in combination; a carbureter; a rising-and-falling air-pump or aspirator; an air-pipe connecting said carbureter and said air-pump and provided with an intake-valve; a hydraulic-pressure device for lifting said air-pump; a supply-pipe for said pressure device; a cut-off in said supply-pipe controlled by the upward movement of said air-pump and a relief-valve for said pressure device controlled by the upward movement of said air-pump, whereby a regular intermittent cessation of pressure in said hydraulic-pressure device may be secured; a gasometer; a gas-pipe connecting said gasometer and said carbureter and having a back-pressure valve therein; a cross-pipe connecting said gas-pipe with said air-pipe; and a second cut-off valve in said supply-pipe controlled by said gasometer to render said air-pump inactive under predetermined conditions.

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

CLARENCE M. KEMP.

Witnesses:
THOS. C. BAILEY,
JOHN J. CARROLL.