No. 662,024. Patented Nov. 20, 1900.

# V. J. A. REY.

## CARBURETER.

(Application filed Jan. 23, 1900.

(No Model.) 2 Sheets—Sheet 1.

Witnesses:
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*Fig. 4.*

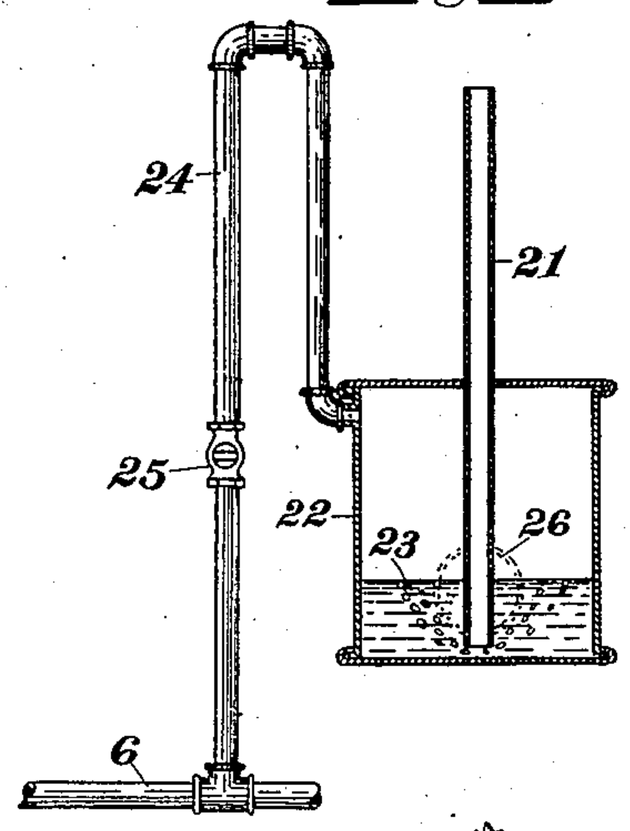


*Fig. 5.*

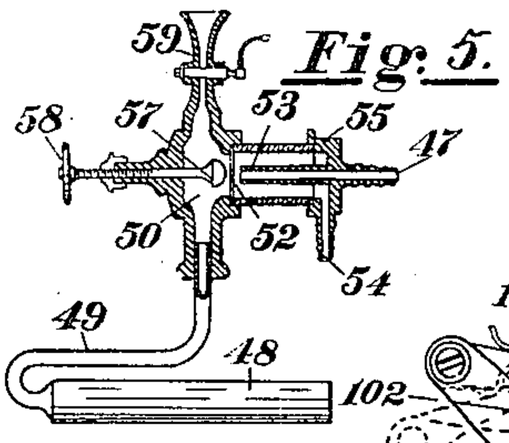


*Fig. 2*

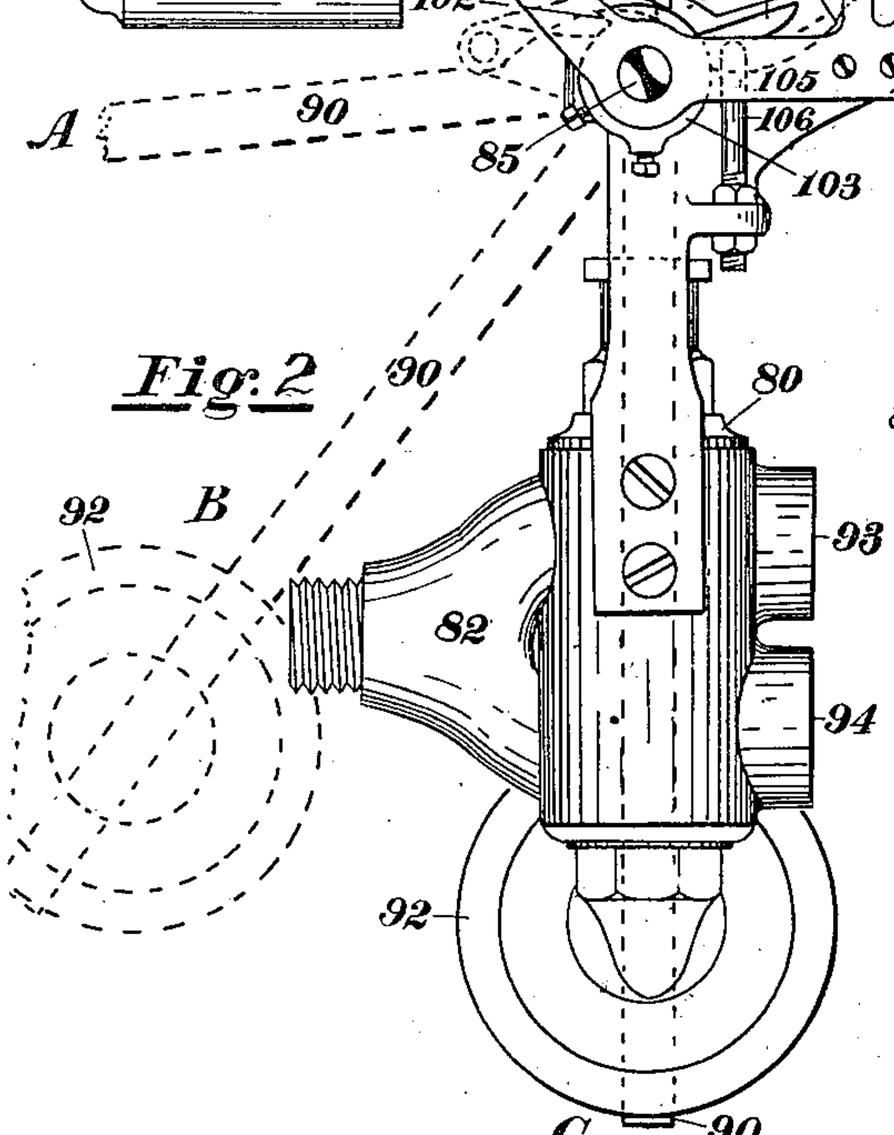


*Fig. 3*

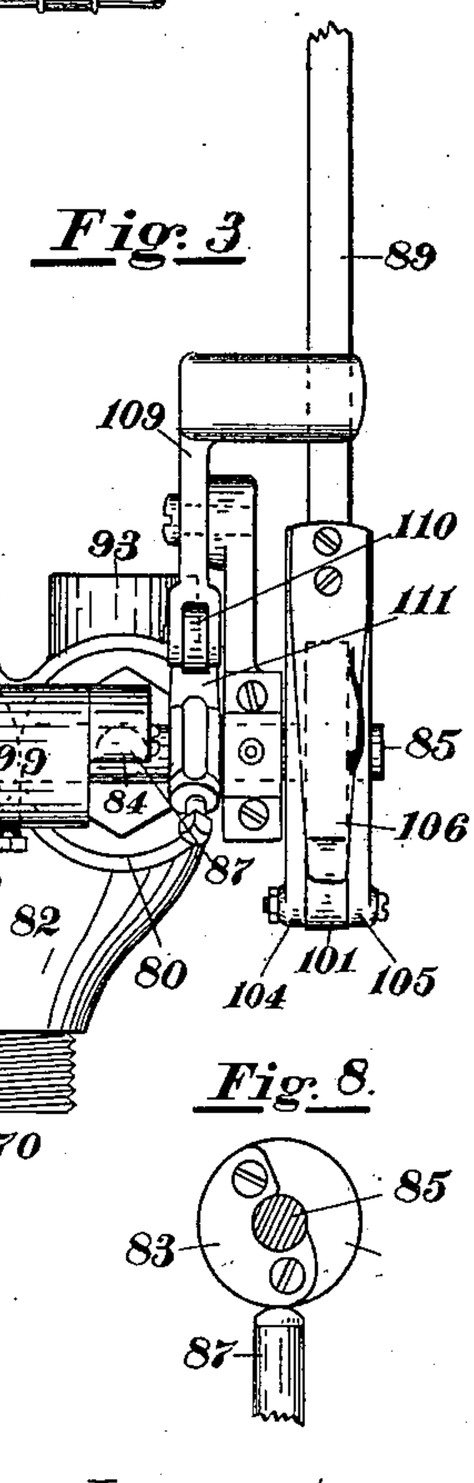


*Fig. 8.*




**Witnesses:**

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# UNITED STATES PATENT OFFICE.

VALENTINE J. A. REY, OF SAN FRANCISCO, CALIFORNIA.

## CARBURETER.

SPECIFICATION forming part of Letters Patent No. 662,024, dated November 20, 1900.

Application filed January 23, 1900. Serial No. 2,524. (No model.)

*To all whom it may concern:*

Be it known that I, VALENTINE J. A. REY, a citizen of the United States of America, residing at San Francisco, county of San Francisco, and State of California, have invented certain new and useful Improvements in Carbureters; and I hereby declare the following to be a full, clear, and exact description of the same, reference being had to the accompanying drawings, forming a part of this specification.

My invention relates to carbureters whereby volatile oils are carbureted and to an improvement in machines for a similar purpose set forth in an application for Letters Patent, Serial No. 718,762, filed by me on the 28th day of May, 1899.

My present improvements consist in an improved manner of regulating the temperature of the carbureting-chamber and of the oil supplied thereto, in devices to operate the distributing-valves for the carbureter, in a manner of sealing the auxiliary or surplus air-supply, and in other features hereinafter more fully explained in connection with the drawings illustrating my improvements and forming a part of this specification.

The objects of my invention are to completely and uniformly carburet the carbon oil, adapt the apparatus to various degrees of temperature, to attain certain and automatic action of the machinery and apparatus, and to produce gas of a uniform quality.

To these ends I construct gas-producing or carbureting machines as illustrated in the drawings herewith and forming a part of this specification.

Figure 1 is an elevation of a gas-generating apparatus embracing my improvements. Fig. 2 is a side view of the devices to operate the distribution-valves for the hydraulic charging-engine and oil-supply pump. Fig. 3 is a plan view of Fig. 2; Fig. 4, a vertical section through the auxiliary air-inlet valve and its connections. Fig. 5 is a section through the thermostatic devices for regulating the temperature of the oil supplied and of the carbureting-chamber. Fig. 6 is a plan view of a baffling-plate in the main carbureting-chamber. Fig. 7 is a detail of the trap-gearing for the distributing-valves to operate the pumps. Fig. 8 is a detail showing a side view of one of the cams to operate the water-distributing valves.

Similar characters of reference indicate corresponding parts throughout the various figures of the drawings.

Referring now to the construction and operation of my improved apparatus and to the drawings representing the same, 1 is the main carbureting-chamber, preferably a cylindrical vessel, provided with an automatic air-inlet valve 2 at the top, a glazed aperture 3 at the side, through which the interior can be seen, and a perforated diaphragm 36 below the oil-inlet 5, as seen in Fig. 1.

Air to be carbureted is drawn through the inlet-valve 2 and also, when required, through a supplementary air-inlet way, hereinafter to be described, and pipe 6 by means of a pump or impelling apparatus, consisting of the inverted open-mouth cylinder 7, moving in the water-filled tank 8 by means of a hydraulic cylinder 9 and piston 10, connected to the top of the cylinder 7 by a rod 12, the latter passing through a sealing-tube 13 in the usual manner of such apparatus.

When the cylinder or pump rises, it is drawn full of gas from the carbureting-chamber 11, and when it descends the gas or carbureted air therein is forced through the pipe 14, having a check-valve at 15, into a common gas-holding vessel 17, set in the water-tank 18, from which the gas is conducted through the supply-pipe 19 as fast as it is consumed, so that these vessels 7 and 17 when of like capacity have oppositely-coincident movement, but at different rates. When the air thus carbureted takes up too much of the volatile oil entering the carbureting-chamber at 5, I provide for diluting the resulting gas by the introduction of pure air through the pipe 21, which opens near the bottom of the vessel 22, as seen in the detail drawing Fig. 4, and is sealed by some suitable non-congealing liquid 23, such as glycerin, through which the air rises and then passes over the siphon-pipe 24, through a regulating-cock 25, and to the pipe 6, where this pure air mingles with the gas and is drawn into the vessel 7.

To prevent entrainment of the sealing liquid 23 and its escape from the vessel 22, I provide a siphon-pipe 24, extending some dis-

tance above the vessel 22, as shown in the drawings. Otherwise the air drawn in becomes saturated by agitation of the liquid 23, and the latter is carried out of the vessel 22 and mixes with the gas and interferes with its combustion. A glazed sightway 26 is provided, so the amount of the liquid 23 can be observed at any time and be replenished when required. The amount of air admitted is regulated by a cock 25.

Referring to the volatile oil, this is supplied from a tank 27, placed underground or in some position secure from fire, by means of a pulsating or diaphragm pump. The oil is drawn through the pipe 29, provided with check-valves 30, and is expelled through the pipe 32, provided with check-valves 33. This pipe 32 connects to a retort or heating vessel 34, inclosed in the heating-chamber 35. From here the oil passes into the carbureting-chamber 11 and is discharged through a spraying-nozzle at 5, as shown in Fig. 1. The oil thus discharged mingles with and saturates the air entering at 2, and surplus oil, if there is more than is taken up by the air, drains down through the perforated diaphragms 36 and 38 and passes through and is strained by a stratum of fibrous material 37 and then escapes by a passage 39 into the vessel 40. In this vessel 40 are a float 42 and a valve 43, operated thereby, so that as soon as the vessel 40 fills up to some predetermined point the float 42 opens the valve 43 and the collected oil escapes into the pipe 29 and is added to the supply. This last-described part of the apparatus is the same as that explained and included in my application for Letters Patent, Serial No. 707,747, for combining apparatus for gases and liquids, filed March 4, 1899, and does not form a part of my present invention. The chamber 35 is warmed or heated by a flame-burner 44, the heat from which passes up a conductor 45 through the chamber 35 and escapes by a chimney 46 to the open air. The gas-supply to the burner 44 is from a pipe 47, connected to any convenient source of supply having the required head or pressure, and is automatically regulated by the devices shown enlarged in Fig. 5, operating as follows: Within the main carbureting-chamber 11 and exposed to the temperature thereof is placed a tube 48, filled with mercury, connected by a pipe 49 with the chamber 50. When the mercury in the tube 48 is expanded, that in the chamber 50 presses upon the flexible diaphragm 52, pushes it outward, and closes the end of the oil-inlet tube 53. When the temperature in the carbureting-chamber 1 falls below some predetermined point, the mercury in the tube 48 contracts, relieves the diaphragm 52 from pressure, and admits gas from the pipe 47 into the chamber 55, from where it flows by the pipe 54 down to the burner 44, thus constituting the apparatus an automatic thermostat to regulate the temperature of the oil-supply at 5 and of the carbureting-chamber 11. This maintenance of a nearly uniform temperature of the oil and the chamber 11 is a desirable feature, determining to a great extent the regularity and amount of hydrocarbon taken up by the air in passing through the chamber 11, and is especially important in cold climates and the consequent exposed position of the apparatus. When these heating devices are not required, they are put out of use by advancing the valve 57 by means of the hand-wheel 58. This presses the diaphragm 52 against and closes the tube 53, stopping the supply of gas from the pipe 47, or a common cock in the pipe 54 can be used for the same purpose. The cock and funnel at 59 are for the supply of mercury to the chamber 50 and the tube 48.

In cold climates and exposed situations it is necessary to keep the water in the tanks 8 and 18 above a freezing temperature, and, as the thermostatic devices just described are always in use in such cases, I employ the heat of the burner 44 to modify the temperature of the water in the tanks 8 and 18 in the following manner: The small pipe 60 (seen in Fig. 1) connects from some water-supply to a small coil in the conducting-pipe 45, (indicated by dotted lines at 66,) and a pipe 63 extends to the tank 8, as shown in the drawings, Fig. 1. A third pipe 64 connects the tanks 8 and 18, so that when required the water at the top of each tank can be kept warm. The oil or hydrocarbon when forcibly ejected at 5 into the carbureting-chamber 11 unless baffled will find its way to the air-inlet valve 2 and permit some to escape during the closing movement of that valve and also impede the entrance of the air. To avoid this and to diffuse the sprayed oil, I provide a baffling-plate 4, attached to the conical top of the carbureting vessel 1 and cut away at the periphery, as seen in Fig. 6, so as to permit the free entry of air around this plate.

Referring next to the hydraulic apparatus for operating the pump 28 and the piston 10, the induction and eduction valves are contained in the chambers 79 and 80, forming a portion of the integral housing 82. These valves are operated by depressible stems, and being fully set forth and described in my application for Letters Patent, Serial No. 718,762, filed May 29, 1899, the present description can be confined to the mechanism for operating them, as shown in the enlarged detail, Figs. 2, 3, 7, and 8. The induction and eduction valves are operated by depressing their stems alternately by means of the cams 83 84 on the shaft 85, that press downward the valve-stems, (indicated by dotted lines at 87 and 88 in Fig. 3 and as shown in Fig. 8.) The shaft 85 is turned in one direction by the lever 89 and in the other direction by the lever 90 and the weight 92, the lever 89 operating the induction-valve by means of the cam 84, pressing down the stem 87, and admitting water from the pipe 93 to the pipe 70, and the lever 90 operating the cam 83, depressing the stem 88, opening the eduction-valve, and releasing

water from the pipe 70, the cylinder 9, and from the chamber 60 of the pump 28. The lever 89 is operated by a rod 95, that passes up through a tube 97 (indicated by dotted lines in the tank 18) and is attached to the interior of the top of the gas-holding vessel 17, as indicated in Fig. 1; but as the stroke of the rod 95 exceeds that required by the lever 89 provision is made accordingly, as will be explained. The cams 83 and 84 are not attached to the shaft 85, but to a collar 99, held by the screw 100. This keeps the cams in their true position relatively and renders their adjustment convenient.

Referring to the mechanism for operating the distributing-valves, this consists of the lever 89, mounted loosely on the shaft 85 and actuated by the rod 95. This lever 89 at its short end is branched into two parts 104 105, and between these is pivoted a pawl-hook 101, pressed downward by a spring 106 and adapted to catch in the notch 102 in a collar 103 on the shaft 85, so that when this lever 89 is raised to the position indicated at D in Fig. 2 the pawl 101 engages at 102, and when the lever 89 is depressed the shaft 85 is turned accordingly until the lever 90 is raised to the position shown at A in Fig. 2. Its further action will be described presently.

Referring to Figs. 1 and 2, suppose the vessel 7 has been raised by action of the piston 10 and has drawn in a charge of gas from the carbureting vessel 1 through the pipe 6, also, perhaps, some pure air through the pipe 21, and that the lever 90 is at some point between the positions A and B in Fig. 2, the cam 84 on the shaft 85 depressing the valve-stem 87, and the induction-valve admitting water from the pipe 93 to the cylinder 9 and to the chamber 60 in the pump 28, raising the vessel 7. In the meantime the gas-holding vessel 17 is descending by reason of gas pressing out at the service-pipe 19, the rod 95 is depressing the lever 89 and turning the shaft 85 until the pawl 101 comes in contact with the adjustable stop-screw 106. As the lever 89 continues the stop-screw 106 disengages the pawl from the collar 103 and the weight 92 causes the lever 90 to fall to the position at C. This descent of the lever 90 turns the shaft 85, and the cam 83 depresses the stem 88 of the exhaust-valve and permits the water in the cylinder 9 and in the chamber 60 of the pump 28 to escape through the pipe 94. The vessel 7 then descends by gravity, and its charge of gas is transferred to the gas-holding vessel 17 through the pipe 14. When the charge from the vessel 7 is transferred to the gas-holding one 17, this latter rises at the same rate that the former descends, the rod 95 raising the lever 89 by means of the hinged pawl 107, that rests on the pin 108 and engages the end of the lever 89, as seen in Fig. 7, and raises the latter a predetermined distance, when the pawl 107 passes the lever and permits that to stop until the rod 95 has completed its upward stroke. As the gas contained in the vessel 17 is consumed it again descends, and the pawl 107 when it comes in contact with the lever 89 is turned upward on its pivot, passing the lever, which remains stationary until the roller 96 comes in contact with and depresses this lever 89. When the lever 89 is started upward by the rod 95, it rises and comes in contact with the pivoted member 109, having a roller 110, that bears on the point of a short lever 111, attached to the shaft 85, turning the latter until the pawl 101 engages at 102, at the same time raising the lever 90 and weight 92 into the position shown at B in Fig. 2. In this position at B the shaft 85 has turned until the cam 83 has released the stem 88 and permitted the water-exhaust valve to close and brought the cam 84 in contact with the stem 87 ready to open the water-induction valves, which takes place between the positions A and B of the lever 90. In this manner the vessels 7 and 17 are alternately filled and raised, and the chamber 60 in the pump 28 is alternately filled and discharged through the pipe 70, causing corresponding pulsations of the diaphragm 68, drawing oil into the chamber 62 through the pipe 29 and the check-valves 30 and expelling the oil through the check-valves 33 and the pipe 32 to the spray-nozzle 5 in the chamber 11 of the carbureting vessel 1. When the water-pressure is relieved in the chamber 60 of the pump 28, the diaphragm 68 is pressed downward and oil drawn into the chamber 62 by action of the spring 73, which can be so adjusted by the screw 78 as to admit the desired amount, the pump 28 being made of sufficient size to meet all requirements. As the spring 73 pushes downward the tube 74 this transmits the pressure through the plates 72, diffusing such pressure over the diaphragm-plates 68 and preventing injury to them by concentrating the force at one point.

Having thus described the nature and objects of my invention and the manner of constructing and operating the same, what I claim as new, and desire to secure by Letters Patent, is in gas-producing machines the following features and parts, or others substantially the same, as specified, illustrated, and described:

1. A carbureting or gas-producing vessel, a gas-impelling vessel and a gas-holding vessel connected and coöperating in the manner described, a heating-chamber exterior to said carbureting vessel, a diaphragm-pump to supply oil to the carbureting vessel, a pipe connecting these two and passing through said heating-chamber so the oil will enter at a predetermined and controlled temperature, substantially as specified.

2. A carbureting vessel or chamber, a diaphragm-pump to supply oil thereto, a pipe connecting the pump and carbureting-chamber and pipes therefrom to gas-impelling and gas-holding vessels, a tank to hold an oil-supply and a pipe therefrom connecting to the diaphragm-pump, a drainway from the carbu-

reting vessel to this pipe, a float and valve in this drainway by which surplus oil is returned to the supply-pipe and to the carbureting-chamber, substantially as described.

3. The carbureting, gas-impelling and gas-holding vessels connected by pipes and operating dependently, an oil-impelling hydraulic diaphragm-pump connected with the carbureting-chamber by means of a pipe passing through a heating-chamber and terminating in a spray-nozzle within the carbureting-chamber, a burner to heat the oil on its passage from the pump to the carbureting-chamber and a thermostat to regulate the amount of gas supplied to the burner, so the temperature of the oil and of the carbureting-chamber will be automatically maintained, substantially as specified.

4. A carbureting vessel provided with the spray-nozzle 5, an air-inlet pipe at the top thereof and an interposed baffle-plate to protect the air-inlet valve from and to spray the oil, a pipe leading from the carbureting-chamber to a gas-impelling vessel, a second air-inlet on this connecting-pipe sealed by non-congealable fluid and having an upward extended siphon-pipe connecting to the gas-pipe between the carbureting and impelling vessels and a cock to regulate the amount of air admitted, all combined and operating in the manner substantially as specified.

5. A carbureting vessel, gas-holding and gas-impelling vessels connected and dependently operating, a hydraulic cylinder and piston to impel the gas-impelling vessel and distributing-valves for the same, an oscillating shaft to operate the distributing-valves alternately by means of cams, a weight to turn this shaft in one direction and a connection to the gas-holding vessel to turn the shaft in the other direction, combined and operating substantially as specified.

6. Carbureting, gas-impelling and gas-holding vessels connected and dependently operating, a hydraulic piston to operate the gas-impelling vessel and a diaphragm-pump to supply oil to the carbureting-chamber, distributing-valves for water serving the piston and pump conjointly operated by an oscillating shaft and cams having the rod 95 and the lever 89 to open the induction-valve, the pawl 101 to turn the cam-shaft and the pawl 107 to engage the end of the lever, all combined and operating substantially as described.

7. The carbureting vessel 1, gas-impelling and gas-holding vessels 7 and 17, the latter mounted in the sealing water-tanks 8 and 18, a water-supply pipe connecting to these tanks, a heater 44 and coil 66 to heat the water supplied thereto, substantially as specified.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

VALENTINE J. A. REY.

Witnesses:
ALFRED A. ENQUIST,
ELMER WICKES.