C. M. KEMP.

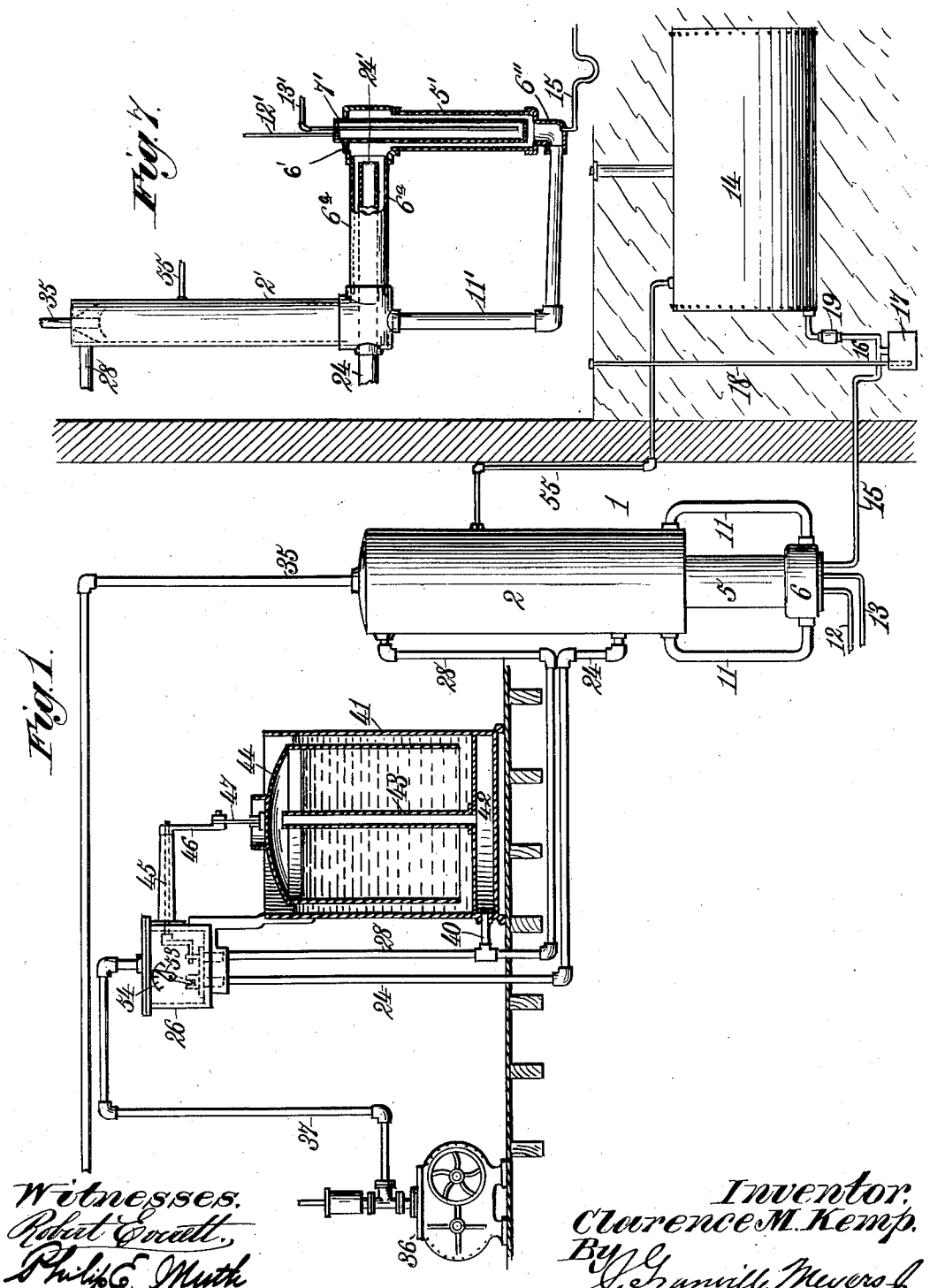
CARBURETING APPARATUS.

APPLICATION FILED NOV. 18, 1901.

**976,885.** Patented Nov. 29, 1910.

2 SHEETS—SHEET 1.

Fig. 1.



Witnesses.
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C. M. KEMP.

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2 SHEETS—SHEET 2.

Fig. 2.

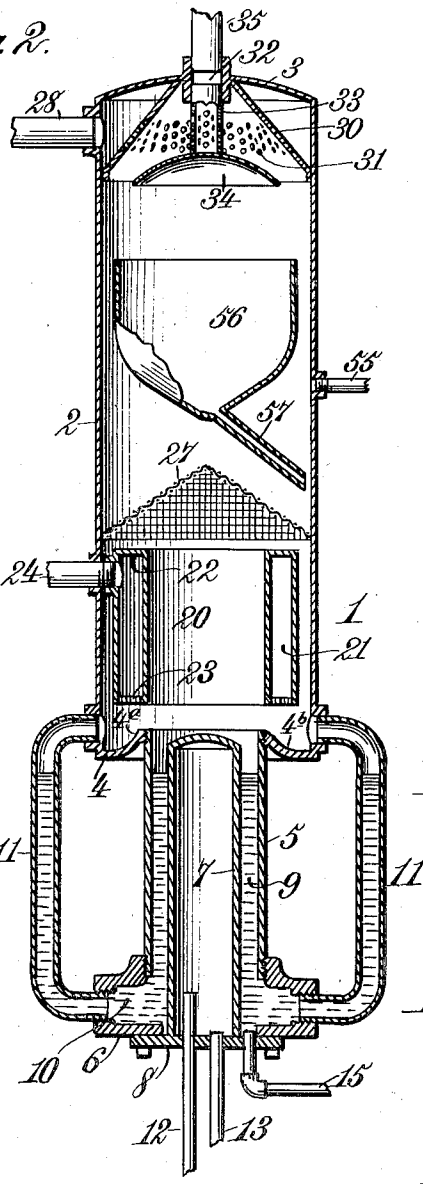



Fig. 3.

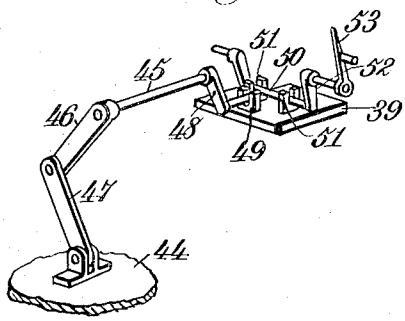



Fig. 4.

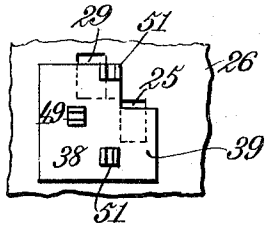



Fig. 5.

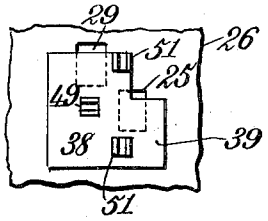
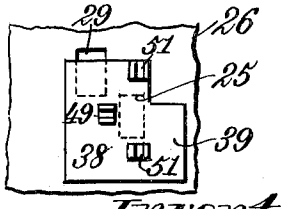



Fig. 6.

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# UNITED STATES PATENT OFFICE.

CLARENCE M. KEMP, OF BALTIMORE, MARYLAND.

## CARBURETING APPARATUS.

976,885. Specification of Letters Patent. Patented Nov. 29, 1910.

Application filed November 18, 1901. Serial No. 82,751.

*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 new and useful Improvements in Carbureting Apparatus, of which the following is a specification.

This invention relates to apparatus for producing carbureted air and especially to that type of apparatus in which the carbureted air is manufactured from the more highly volatile hydrocarbons, such as gasolene, commingled with air, such admixture of air and volatilized gasolene producing a gaseous mixture which, when the air and hydrocarbon are correctly proportioned, is well adapted for lighting and heating purposes.

My present invention has for its object to provide a novel carbureting apparatus of the type referred to in which the hydrocarbon will be quickly converted into vapor and the latter intimately mixed with air to form an initial mixture of air and vapor and the mixture thus formed then intermixed with a diluent supply of air to form a gaseous mixture in which the atmospheric and hydrocarbon elements are properly proportioned for consumption.

It also has for its object to provide in such an apparatus improved means for proportioning the supplies of air utilized for absorptive and diluent purposes; to provide improved means for volatilizing the hydrocarbon; for condensing the surplusage of the volatilized vapors and conveying them back to the volatilizing chamber, for converting the watery vapors of the air to water of condensation and removing the latter from the carbureter.

It also has certain other objects in view which will hereinafter become apparent.

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 the description, reference being had to the accompanying drawings forming a part of this specification, wherein—

Figure 1 is a view in side elevation, partially in section, of my improved gas generating apparatus. Fig. 2 is a vertical sectional view of the carbureter. Fig. 3 is a detail perspective view of the means for actuating and adjusting the regulating valve in the air-chest. Figs. 4, 5 and 6 are detail views showing said valve in different positions relative to the air ports which it controls. Fig. 7, is a view showing a slightly modified form of vaporizer.

Referring to the drawings the numeral 1 indicates a carbureter comprising a vertical cylindrical metallic vessel 2, closed at its upper end by a head 3, and at its lower end by a head 4. The head 4 is provided centrally with an upwardly projecting flange $4^a$, internally threaded as shown, forming in connection with the lower end of the vessel 2 an annular trough $4^b$ to catch the condensed watery and hydrocarbon vapors. Screwed into an aperture formed centrally in the head 4 is the upper end of a cylindrical casing 5, open at its opposite ends, the lower end of which is screwed into a hollow collar 6.

Disposed concentrically in the casing 5 is a smaller cylindrical casing 7, closed at its opposite ends and provided at its lower end with a circumferential laterally projecting flange 8 which is bolted or otherwise tightly clamped or fastened to the underside of the collar 6. An annular space 9 is thus formed between the casings 5 and 7 which communicates at its upper end with the interior of the vessel 2 and at its lower end with the interior or annular space 10 in the collar 6. Tapped through suitable apertures in the collar 6 are pipes 11 which extend vertically upward and at their upper ends are tapped through the sides of the lower end of the vessel 2 and communicate with the trough $4^b$. Extending through the bottom of the casing 7 is a steam supply pipe 12, and tapped into said bottom is a pipe 13 for conveying from the casing its water of condensation.

The numeral 14 indicates a storage tank for containing the hydrocarbon to be fed to the carbureter. In practice said tank is preferably buried underground and in the same horizontal plane with the heater 7. A pipe 15 leads from the bottom of the storage tank and is tapped through the flange 8 into the space 10 in the collar 6, said pipe at a suitable point being trapped, as indicated at 16, and connected with the bottom of said trap is a sediment and settling vessel 17, which serves to collect the heavier portions of the hydrocarbon and any foreign matter that may be contained therein, and also serves to collect water that results from the condensation of any watery vapors in the

carbureter, as hereinafter explained. A pipe 18 extends vertically upward from the vessel 17 through which the contents of said vessel may be pumped from time to time, and a check valve 19 is arranged in the feed pipe 15 and operates to prevent any back-pressure from passing to the storage tank. The gasolene, or other hydrocarbon, is fed by the pipe 15 to the casing 5, which I term a "boiler" and rises in the latter and in the pipes 11 to the same level as the gasolene in the storage tank.

Arranged in the lower end of the casing 2 is an air distributer consisting of an annular cylindrical casing comprising two concentric cylindrical shells 20, between which is an annular space 21 that is closed at its upper end by an annular plate 22, and at its lower end by a foraminous or reticulated annular plate 23. An air pipe 24 is connected to the upper end of the air distributer and extends through the wall of the vessel 2, and at its other end said pipe communicates with a port 29 formed in the bottom of an air-chest 26, hereinafter described. Arranged over the said distributer is a conical foraminous or reticulated disk or diaphragm 27. Fitted in one side of the upper end of the vessel 2 is one end of an air pipe 28, the other end of which communicates with a port 25 formed in the bottom of the air-chest 26 before referred to. Arranged in the upper end of the vessel 2 is a frusto-conical partition 30 that abuts at its upper end the underside of the head 3, and at its lower end abuts the interior of the vessel 2 at a point below the pipe 28. Said partition is perforated intermediate its ends, as at 31. Fitted in an aperture 32 formed centrally in the head 3 is a depending perforated tube 33, on the lower end of which is fixed an imperforate and preferably slightly concavo-convex disk 34, which is of slightly less diameter than the adjacent portion of the conical partition, and constitutes a deflector. A pipe 35 is fitted in the aperture 32 in the head 3 and leads to the burners or to a gasometer.

The numeral 36 indicates a blower or air pump of any approved or preferred construction and driven from any suitable prime motor. Leading from the blower is an air pipe 37 that is connected with and operates to deliver air to the air-chest 26. Within the air-chest is a single slide valve 38, consisting of a main body portion having an offset or wing 39 at one side thus rendering the valve approximately L-shaped, as clearly shown in Figs. 4 to 6 of the drawings. Normally the main portion of said valve 38 controls the port 29 in the air-chest, while the offset or wing 39 controls the port 25, the valve occupying the position shown in Fig. 4 relative to the ports. The longitudinal position of the valve 38 relative to the ports 25 and 29 is automatically controlled by the following means: Leading from the air pipe 28 is a branch pipe 40 which enters the bottom of a reservoir 41, said reservoir being of the liquid-seal bell type, the pipe 40 entering a compartment 42 in the bottom of the reservoir, which compartment is provided with a vertical outlet pipe 43 which discharges into a bell 44 placed in a body of liquid in the upper part of the reservoir, in a manner similar to an ordinary gasometer, so that pressure of air within the reservoir will raise the bell 44, and when the pressure falls the bell will descend. Mounted in a fixed sleeve or bearing on the air-chest is a rock-shaft 45, the outer end of which is provided with a crank-arm 46 which is connected by means of a link 47 with the top of the bell 44, so that the rising and falling movements of said bell will, through the medium of said link and crank-arm, rock the shaft 45 in its bearing. The other end of said rock-shaft enters the air-chest and carries at its inner end a second crank-arm 48 which engages lugs 49 on the valve 38, so that the rocking movements are imparted to the valve, such rocking movements being converted into a reciprocating motion through the connections just described. The result of such construction is that the amount of air passing to the carbureter through the ports 25 and 29 will always be automatically proportioned to the demand on the plant, for it is apparent that if the blower supplies air in excess of what is required by the carbureter, such excess of air will pass into the reservoir 41 and will raise the bell, which latter, through the rock-shaft and its connections will move the valve 38 so as to restrict the ports 25 and 29, and thereby reduce the volume of air passing to the carbureter, so that only a sufficient amount of air for the immediate need of the carbureter will be supplied to the latter. When the demand on the system increases, however, pressure within the reservoir falls and the bell descending will open the valve 38 so as to increase the air supply and consequently the output of the plant. In order that the size of the port 25 which leads to the upper part of the carbureter may be varied to suit varying conditions, means for a lateral adjustment of the valve 38 are provided, such means consisting in a cranked shaft 50 having its bearings in the sides of the air-chest. The cranked portion of the shaft 50 engages lugs 51 on the said valve so that when the shaft 50 is rotated in its bearings the valve will be moved sidewise or at right angles to its other line of movement within the air-chest, and the offset or wing 39, which normally controls the port 25, will be so disposed relative to the said port as to diminish or increase the operative area of the said

port. The cranked shaft 50 is provided with a handle 52 outside the air-chest by means of which it may be turned and the valve adjusted, and a pointer or finger 53 on the shaft serves to indicate on a graduated index 54 on the side of the air-chest the several adjustments and exact position of the valve relative to the port 25. By this construction the valve may be adjusted to give the exact proportion of air for the upper and lower portions of the carbureter desired. In Fig. 4, the valve is shown in its normal position and reciprocation of the valve through the automatic valve-operating means described above will open both ports 25 and 29 for their full width. The cut off edges of the valve are made so that both ports are closed exactly at the same time and when the valve is moved to open the ports—both ports are opened to the same definite extent. Movement of the cranked shaft 50 in the proper direction will throw the valve to the position shown in Fig. 5, in which position the operative area of the port 25 is diminished so that reciprocation of the valve will uncover only a part of the full width of port 25. A further movement of the cranked shaft 50 will result in covering the port 25 with the main body portion of the valve, as shown in Fig. 6 in which position both ports 25 and 29 will be controlled by the body portion of the valve, and the function of the offset or wing 39 will, for the time being, be intermitted.

The operation of the apparatus as above described is as follows: The gasolene is fed to the carbureter from the storage tank 14 through the trapped pipe 15 and rises in the boiler to the level of the gasolene in said storage tank. The heavy unvolatilizable portions of the gasolene and foreign matter contained therein settle down into the sediment vessel 17, from which they may be removed from time to time, in the manner before described. Steam is admitted to the heater 7 and quickly boils and volatilizes the gasolene which surrounds it in the boiler 5 and the resultant hydrocarbon vapors ascend into the vessel 2. The pure vapors, or those unmixed with air quickly condense when they come in contact with the cooler portions of the vessel 2 and run down the interior of the latter and are caught and conveyed by the pipes 11 back to the bottom of the boiler. The vapors arising from the boiler, however, are met by a finely divided spray of absorbent air which issues from the lower foraminous end of the air distributer 20, the incoming jets of air commingling with the hydrocarbon vapors and becoming fully charged therewith.

Normally the heater evolves more hydrocarbon vapor than the air supplied by the distributer can absorb, and the surplus vapors, as before stated, are condensed and returned to the boiler in their liquid state where they are again volatilized. The air or other cooling medium encompasses the pipes 11 and keeps the gasolene therein in a liquid state, so that volatilization will occur only in the boiler, and as the vapors meet the incoming jets of air the air and vapors are intimately intermixed, as before stated, and pass to the upper part of the vessel 2, coursing the foraminous diaphragm 27 which aids in effecting the intimate intermixture of the air and vapors. When the mixed air and vapors reach the upper part of the vessel 2 the mixture is met by innumerable fine sprays of air which issue from the perforations 31 in the conical diaphragm 30 and readily intermix therewith, the previous mixture heavily charged with hydrocarbon being thereby diluted with an admixture of fresh air which reduces the gaseous mixture to the proper condition for practical use. The perforated partition 30 divides the incoming diluent air into a fine spray-like state so that it will readily intermingle with the previously formed mixture of air and vapor, and the resultant mixture in passing through the perforated tube 33 is again finely divided causing the constituent elements of the previously mixed air and vapor to be once more intimately intermixed and thoroughly commingled before finally passing off to be consumed. The disk 34 acts as a deflector to cause the mixed air and vapors to pass around in a circuitous course as it mixes with the diluent air and also tends to retard the mixture to a slight extent at this point to afford time for the intermixture to be thoroughly effected. The perforated diaphragms, partitions and the like, before described, not only operate to finely divide the air and vapors in their passage through the carbureter, but also act as condensers which aid in condensing the surplus vapors absorbed by the air and return the same to the boiler in liquid form. The condensing surfaces of the carbureter also operate to condense the watery vapors to water which drops by gravity to the bottom of the vessel 2 from which it is conveyed by the pipes 11 to the bottom of the boiler, and owing to its being much heavier than the gasolene passes by the pipe 15 to the settling vessel 17. All water of condensation is thus removed from the carbureter and is not permitted to interfere with the operation of the latter. A pipe 55 leads from the upper part of the storage tank 14 and is connected with the carbureter whereby any vapors resulting from volatilization occurring in the storage tank will be led off from the latter and discharged into the carbureter. This pipe can attach as well to any pipe connected with the pipe 35 and is intended also to equalize the pressure whereby the same level of gasolene will be found in both storage tank and

chamber 9. A drip-basin consisting of a cup-shaped metallic vessel 56 open at its upper end is suspended in any suitable manner in the vessel 2 and is provided at its bottom with an outlet or drain-pipe 57 that is deflected to one side as shown. The liquid resulting from condensation in the upper part of the carbureter drops into the basin 56 and is discharged by the pipe 57 against the inner side of the vessel 2 down which it flows to the pipes 11.

When the apparatus is in operation the blower 36 is kept in constant rotation and operates to supply air to the carbureter through the supply pipes 24 and 28. Should the air be supplied through these two pipes faster than the demand upon the carbureter necessitates, then the pressure would accumulate in the reservoir 41 and lift the bell and through the mechanism before described shift the valve 38 and partially or fully close the ports 25 and 29 and thereby automatically control the supply of air to the carbureter. By means of the hand operated mechanism described the relative operative areas of the openings of the ports 25 and 29 can be varied to regulate the relative proportion of the volumes of air supplied to the lower and upper portions of the carbureter whereby a gaseous mixture of air and vapor may be furnished that will practically be of a constant quality.

The heater 7, used in connection with the boiler is shown as being supplied with steam but where steam is lacking, any other suitable heating device can be applied.

In Fig. 7 of the drawings I have shown a slightly modified form of vaporizer. Referring to said figure the numeral 2′ indicates the carbureting vessel provided with an air inlet 28 and gas outlet 35 at its upper end, and an air inlet 24 at its lower end, in the manner before described. In such arrangement, however, the air distributer 20 before described is dispensed with and instead of arranging the vaporizer directly under the lower end of the carbureting vessel I arrange it to one side as shown, the numeral 5′ indicating the cylindrical boiler casing provided at its upper and lower ends respectively with elbows 6′ and 6″, the former of which is connected by a horizontal pipe $6^a$ with the bottom of the carbureting vessel, and the latter is also connected with the bottom of said vessel by a bent pipe 11′, the horizontal member of the latter being preferably given a slight downward dip or inclination toward the elbow 6″ to cause the water of condensation to drain off by gravity. Arranged concentrically within the boiler casing 5′ is the heater comprising a cylinder 7′ closed at its opposite ends and fitted in and projecting through the upper end of the elbow 6′. Extending into the top of the heater casing is a steam inlet pipe 12′ and extending from the lower end thereof is a steam exhaust pipe 13′, by means of which a circulation of steam or other suitable heating medium may be maintained through the casing 7′ to keep the latter heated. The air inlet pipe 24 extends horizontally through the bottom of the carbureting vessel 2′ and is disposed concentrically within the horizontal pipe $6^a$, terminating at a point adjacent to the elbow 6′ where said pipe 24 is provided with a perforated cap 24′, by which means the air is introduced into the elbow 6′ in a finely divided condition. The hydrocarbon is fed into the bottom of the boiler casing by a trapped pipe 15, as before.

The operation of the modified construction of vaporizer immediately above described will be readily understood. The hydrocarbon is fed to the boiler in the manner before described and is there heated and vaporized by the heater 7. The air from the blower is fed through pipe 24 into the elbow 6′ where the air and vaporized hydrocarbon meet and commingle and pass by pipe $6^a$ into the bottom of the carbureter 2′. The vaporized air rises in the carbureting vessel where it meets and is diluted by the air introduced through the pipe 28 and then passes off by the pipe 35. The heavy portions of the vapor that fail to be absorbed by the air condense and return to the boiler through the pipe 11′ and elbow 6″ and are again volatilized; so, also, any watery vapors that condense in the carbureting vessel drain off through the pipe 11′, elbow 6″ and trapped pipe 15 to the settling chamber before described. The principal operation, it will be noted, is identical with that first described, the details of construction only being slightly modified.

What I claim is—

1. In a carbureting apparatus, the combination of a carbureter, an air pump means leading therefrom for supplying absorbent air to the carbureter, means also leading from said pump for supplying diluent air to the carbureter, and a regulating means connected with the diluent air supply to control the amount of air admitted to the carbureter.

2. In a carbureting apparatus, the combination of a carbureter, an air pump means leading therefrom for supplying absorbent air to the carbureter, means also leading from said pump supplying diluent air to the carbureter, and a regulating means connected with the diluent air supply, operating by the variations of demand on the apparatus.

3. In a carbureting apparatus, the combination of a carbureter, a means for supplying air thereto, a regulating means connected to said air supply and said carbureter, said regulating means controlling the

air supply to both the upper and lower parts of said carbureter, an automatic valve associated with said regulating means to control said air supplies to said carbureter, and a manually operable means connected with said valve to proportion the air supply to both the said parts of said carbureter.

4. In a carbureting apparatus, the combination of a carbureter, a means for supplying air thereto, a regulating means connected with said air supply and said carbureter, said carbureter having upper and lower air supply ports which have respective connections with said regulating means, said regulating means controlling the air supply to the upper and lower ports of said carbureter, an automatic valve associated with said regulating means to control the air supplies to both ports of said carbureter, and a manually operable means connected with said valve to proportion the said air supplies to said carbureter.

5. In a carbureting apparatus, the combination of a carbureter, a means for supplying air thereto, an air chest having a valve therein, said air chest connected to said air supplying means, separate connections leading from said air chest to said carbureter to supply air thereto, a manually operable means connected with said valve to proportionately regulate the air supply to said carbureter through said separate connections, and said valve being automatically controlled by the variations of demand on the apparatus.

6. In an apparatus for carbureting air, the combination of a carbureting vessel, a trough therein, portions of the trough engaging the wall of the vessel, a receptacle within the vessel to receive liquid of condensation and an outlet opening from the receptacle against the wall of the vessel to permit said liquid to flow down the same and into the trough.

7. In an apparatus for carbureting air, the combination of a carbureting vessel provided at one end with an outlet and at its opposite end with an interior annular flange, a hydro-carbon receptacle supported by said flange and opening into the vessel, a heater arranged within the receptacle, and pipes connecting the vessel and hydro-carbon receptacle.

8. In an apparatus for carbureting air, the combination of a carbureting vessel provided at one end with an outlet and at its opposite end with an interior upwardly curved annular flange constituting a trough to catch liquid condensation, a hydro-carbon receptacle supported by said flange and opening into the vessel, a heater within the receptacle and pipes to convey liquid of condensation from said trough to the hydro-carbon receptacle.

9. In an apparatus for carbureting air, a carbureting receptacle, means for supplying vaporized hydro-carbon to said receptacle, and an air distributer arranged within the receptacle and consisting of an annular body comprising concentric shells inclosing an annular space, which is closed at one end by an imperforate head and at the other end by a head having openings therethrough.

10. In an apparatus for carbureting air, the combination of a carbureting vessel, a boiler comprising a heating receptacle independent of the said vessel but communicating therewith, a second receptacle arranged within the first named receptacle, and means for causing a circulation of steam within said second receptacle, and means for collecting liquid of condensation in the carbureting vessel and returning it to the heating receptacle.

11. In a gas generating apparatus, the combination with a carbureting vessel provided at one end with a hydrocarbon inlet, a heater for volatilizing the hydrocarbon in the boiler, a gas outlet at the other end of the vessel, an air distributer arranged in the vessel in proximity to the boiler, a perforated diaphragm arranged in the vessel between the air distributer and the gas outlet and near the former, means for feeding air to the distributer, and means for feeding air to the said vessel at a point remote from the distributer.

12. In a gas generating apparatus, the combination with a carbureting vessel provided at one end with a boiler in communication with said vessel and provided with a hydrocarbon inlet, of a heater for volatilizing the hydracarbon in the boiler, a gas outlet at the other end of the vessel, a conical perforated partition surrounding the gas outlet at one end and contacting with the sides of the carbureting vessel at its other end, an air distributer arranged in the vessel in proximity to the boiler, means for feeding air to the distributer, and means for feeding air to the vessel around the perforated partition.

13. In a gas generating apparatus, the combination with a carbureting vessel provided at one end with a boiler in communication with said vessel and provided with a hydrocarbon inlet, of a heater for volatilizing the hydrocarbon in the boiler, a gas outlet at the other end of the said vessel, a perforated pipe arranged in the vessel about the gas outlet and closed at its inner end, an air distributer arranged in the vessel in proximity to the boiler, means for feeding air to the distributer and means for feeding air to the vessel at a point remote from the boiler.

14. In a gas generating apparatus, the combination with a carbureting vessel provided at one end with a boiler in communication with said vessel and provided with a

hydrocarbon inlet, of a heater for volatilizing the hydrocarbon in the boiler, a gas outlet at the other end of the said vessel, a perforated pipe arranged in the vessel about the gas outlet, an imperforate disk fitted on the inner end of said pipe and projecting laterally beyond the latter, an air distributer arranged in the vessel in proximity to the boiler, means for feeding air to the vessel at a point remote from the boiler.

15. In a gas generating apparatus, the combination with a carbureting vessel provided at one end with a boiler in communication with said vessel and provided with a hydrocarbon inlet, of a heater for volatilizing the hydrocarbon in the boiler, a gas outlet at the other end of the vessel, a conical perforated partition surrounding the gas outlet at one end and contacting with the sides of the vessel at its other end, a perforated pipe communicating at one end with the gas outlet and closed at its other end by a concavo-convex disk projecting laterally beyond the pipe toward the conical partition, an air distributer arranged in the vessel in proximity to the boiler, means for feeding air to the distributer and means for feeding air to the vessel around the perforated partition.

16. In a gas generating apparatus, the combination with a carbureting vessel provided at one end with a boiler in communication with said vessel and provided with a hydrocarbon inlet, of a heater for volatilizing the hydrocarbon in the boiler, a gas outlet at the other end of the vessel, an air distributer arranged in the vessel in proximity to the boiler, means for feeding air to the air distributer, means for feeding air to the vessel at a point remote from the boiler, a catch-basin arranged in the vessel between the inlet and outlet end thereof and arranged to catch the liquid of condensation, and a pipe leading from the catch-basin and arranged to discharge the contents thereof against the interior of the carbureting vessel.

17. In a gas generating apparatus, the combination with a vertical carbureting vessel provided with a gas outlet in its upper end, of a cylindrical boiler opening at its upper end into the bottom of said vessel, a cylindrical heater fitted concentrically in the boiler and closed at its ends, means for introducing a heating medium in the heater, means for introducing hydrocarbon into the boiler, and means for introducing air into the carbureting vessel.

18. In a gas generating apparatus, the combination with a vertical carbureting vessel provided with a gas outlet in its upper end, of a cylindrical boiler having an open upper end opening into the bottom of the carbureting vessel to permit hydro-carbon vapors to pass directly from the boiler into said vessel, a cylindrical heater fitted concentrically in the boiler and closed at both its ends, a steam supply pipe leading into the heater, an exhaust pipe leading from the bottom of the heater, pipes arranged exteriorly of the boiler and connected at their opposite ends respectively to the bottom of the carbureting vessel and the boiler to convey liquid of condensation from the vessel to the boiler, a hydrocarbon feed pipe connected with the bottom of the boiler, and means for introducing air into the carbureting vessel, substantially as described.

19. In a gas generating apparatus, the combination with a vertical carbureting vessel provided centrally in its lower end with an upturned annular flange and with a gas outlet in its upper end, of a cylindrical boiler having an open upper end fitted in said flange, a cylindrical heater fitted concentrically in the boiler and closed at its ends, means for introducing a heating medium in the heater, pipes arranged exteriorly of the boiler and connected at their opposite ends respectively to the bottom of the carbureting vessel and the boiler, a hydrocarbon feed pipe connected with the bottom of the boiler, and means for introducing air into the carbureting vessel.

20. In a gas generating apparatus, the combination with a vertical carbureting vessel provided at its upper end with a gas outlet, of a cylindrical boiler having an open upper end communicating with the carbureting vessel, a hollow annular collar fitted on the lower end of the boiler shell, pipes arranged exteriorly of the boiler and connected at their opposite ends respectively with the bottom of the carbureting vessel and the hollow collar, a cylindrical heater closed at its ends and inserted in the boiler through the annular collar, means for introducing a heating medium into the heater, means for introducing air into the carbureting vessel, and a hydrocarbon feed connected with said hollow collar.

21. In a carbureting apparatus, having its lower portion adapted to receive hydrocarbon to a height corresponding to the level of the hydro-carbon in the storage tank through a hydro-carbon pipe connection made at the lower portion of each of same, and another pipe connection to each at a point above the hydro-carbon levels, the lower end of the carbureter supplied with a heating medium, whereby vapor generates from the hydro-carbon fluid, and rises to a point above the level of the liquid hydrocarbon, in combination with an air supply entering the carbureter at a point above said liquid level as an absorber of said vapor and a gas outlet to the carbureter.

22. In a carbureting apparatus, a carbureter and a hydro-carbon storage tank, a pipe connection between the lower portion of said storage tank and carbureter respec-

tively, the said carbureter and tank being arranged in substantially the same plane so that the height of the hydro-carbon in both will be substantially constant, means for heating the carbureter to generate hydro-carbon vapors above the level of the liquid hydro-carbon, and an air supply entering the carbureter at a point above the liquid level to supply said vapor with absorbent air and a gas outlet leading from the carbureter.

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

CLARENCE M. KEMP.

Witnesses:
JULIA MCCANN,
TERESA M. BLONDELL.