No. 843,692. PATENTED FEB. 12, 1907.

M. G. NORTON.

DEVICE FOR GENERATING GAS FROM CRUDE OIL.

APPLICATION FILED JULY 2, 1906.

2 SHEETS—SHEET 1.

Fig. 1.

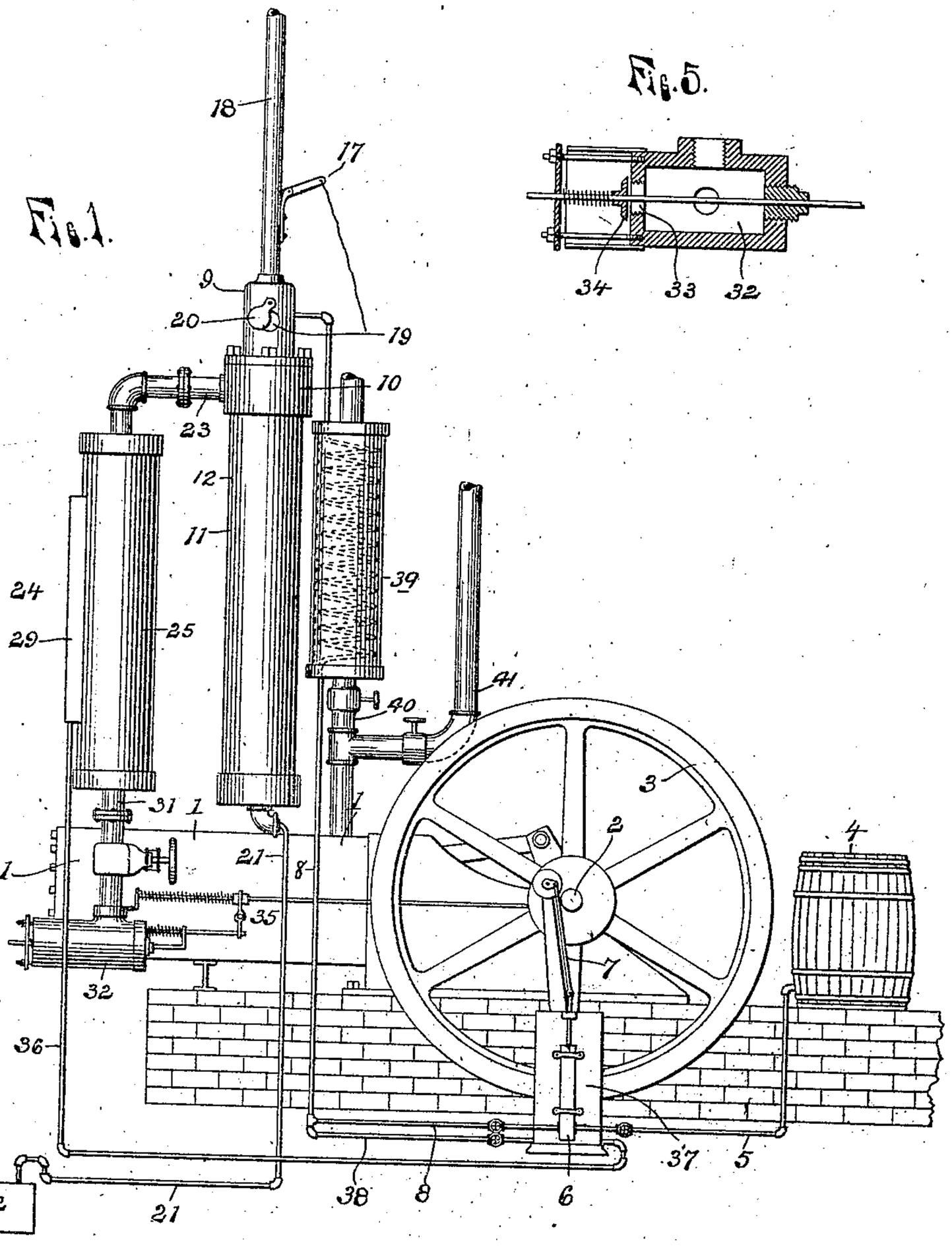

Fig. 5.

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2 SHEETS—SHEET 2.

Fig. 4.

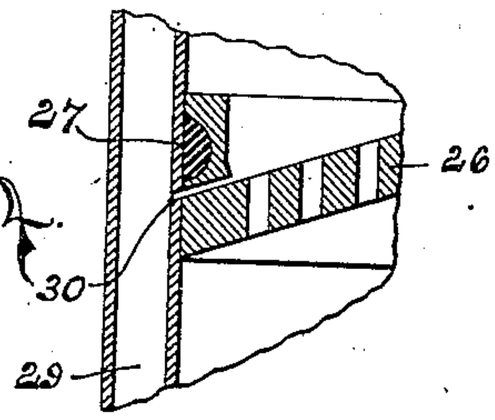
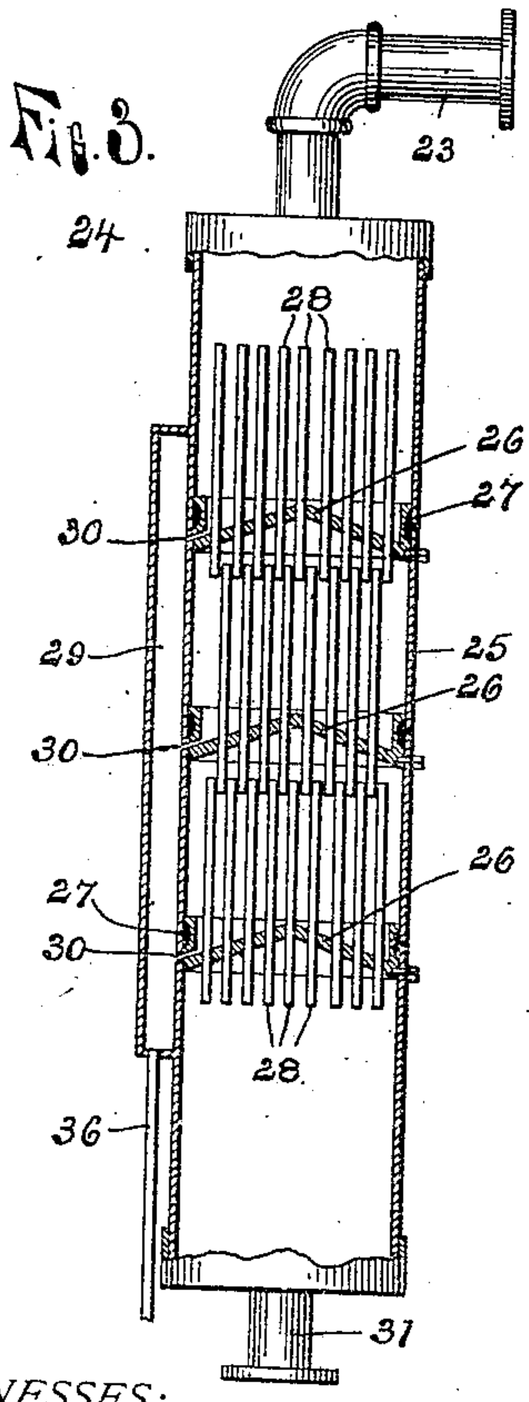


Fig. 3.



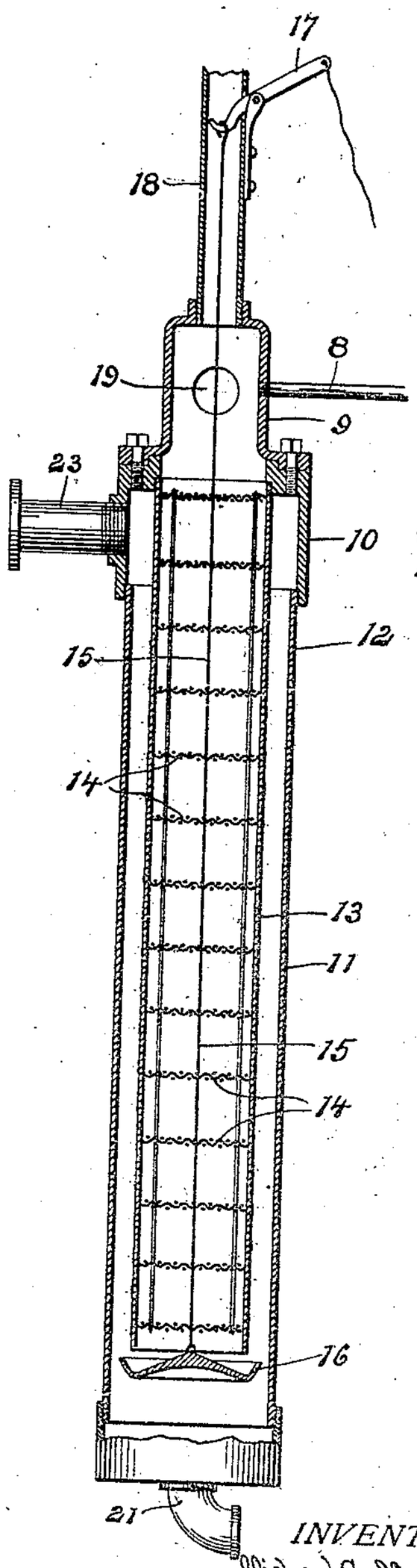


Fig. 2.

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UNITED STATES PATENT OFFICE.

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DEVICE FOR GENERATING GAS FROM CRUDE OIL.

No. 843,692. Specification of Letters Patent. Patented Feb. 12, 1907.

Application filed July 2, 1906. Serial No. 324,344.

To all whom it may concern:

Be it known that I, MICHAEL G. NORTON, a citizen of the United States of America, residing at Gibsonburg, in the county of Sandusky and State of Ohio, have invented certain new and useful Improvements in Devices for Generating Gas from Crude Oil, of which the following is a specification, reference being had therein to the accompanying drawings.

This invention relates to a device for producing a combustible gas or vapor from crude oil and which is especially adapted for use in conjunction with hydrocarbon-engines to supply the explosive charges thereto.

The object of the invention is to provide a very simple and efficient device for the purpose; and to this end it consists in providing a suitable carbureter in which the oil is thoroughly divided and mixed with air, drawing off the heavy part of the oil and causing the volatilized portion and air to pass through a separator where the heavy portions of the gaseous vapor are extracted and returned to the carbureter.

The invention further consists in the arrangement and combination of parts and in certain other new and useful features, all as hereinafter more fully described, reference being had to the accompanying drawings, in which—

Figure 1 is a side elevation of a device embodying the invention and showing the same operatively connected to an explosive-engine. Fig. 2 is an enlarged longitudinal vertical section of the carbureter: Fig. 3, a similar view of the separator. Fig. 4 is an enlarged sectional detail of a portion of the same, and Fig. 5 a longitudinal section of the controlling-valve.

As shown in the drawings, 1 represents the cylinder, 2 the crank-shaft, and 3 the fly-wheel, of any ordinary hydrocarbon-engine, and 4 is a suitable tank for supplying crude petroleum-oil through a supply-pipe 5 to an oil-pump 6, the piston of which is actuated by a crank on the crank-shaft of the engine, connected by a connecting-rod 7 to the piston-rod of said pump. From the oil-pump a pipe 8 leads into a dome 9, secured to a head 10 on the upper end of the cylindrical casing 11 of the carbureter 12, and screwed into a seat in the head and hanging down within the casing, with its upper end opening into the dome and its lower open end at a distance from the lower closed end of the casing, is a tube 13 of considerably less diameter than the diameter of the casing. Within this tube is secured a series of disks 14, made of wire-gauze or other suitable material, which fit closely in the tube and through which the oil entering the dome of the carbureter must pass on its downward course. A suitable wire or rod 15 extends downward in the axis of the tube through the disks and is attached at its lower end to a suitable cup-shaped cap 16, which forms a valve to close the lower end of the tube, and the upper end of said rod is attached to an operating-lever 17, pivoted in an opening in a pipe 18, extending upward from the upper end of the dome to conduct air thereto, said lever serving to raise and lower the valve 16. Openings 19, closed by flaps 20, are provided in opposite sides of the dome to admit air thereto, if desired, and through which the operator may reach and view the interior.

From the lower end of the carbureter-casing a pipe 21 leads to any suitable tank or reservoir 22, into which the heavy part of the oil not vaporized in passing through the screens flows by gravity, and leading from the side of the head of the carbureter is a large pipe 23 for conducting the mixed air and volatilized oil into the upper end of the separator 24, which consists of a vertical cylindrical casing 25, closed at each end and provided with a series of internal cone-shaped division walls or diaphragms 26, extending across the casing and secured therein by forming each with a circumferential groove 27, boring a hole in the casing, and pouring Babbitt metal through the hole into the groove. Each of the diaphragms is formed with a multiplicity of vertical holes within which are secured tubes 28, with their ends extending some distance above and below the diaphragms and their upper ends lapping by the lower ends of the tubes in the diaphragm above.

Extending from one side of the casing opposite the diaphragms is a chamber 29, communicating with the interior of the casing through small holes 30, each bored through the wall of the casing close to the upper surface of each diaphragm at its edge to draw off any unvaporized oil which may be carried over into the separator, and leading from the bottom of the casing is a pipe 31 for conducting the gas into a chamber 32 in direct communication with the engine-cylinder. This chamber 32 has an air-inlet opening 33 closed

by a valve 34, which is automatically opened and closed in the usual manner by any suitable governor mechanism 35, so that as the speed of the engine increases the valve will be opened to admit air to the chamber, and thus regulate the strength of the explosive charges and the speed of the engine. A pipe 36 leads into the bottom of the oil-chamber 29 and is connected at its opposite end to a pump 37, operated by a crank on the crank-shaft of the engine, and the delivery-pipe 38, leading from said pump, is connected to the delivery-pipe 8 of the oil-pump leading into the top of the carbureter, so that all oil carried over by the gas into the separator is separated out and pumped back into the carbureter.

The delivery-stroke of the oil-pump is set slightly in advance of that of the separator-pump, and as said separator-pump is of several times the capacity of the oil-pump each charge of oil is injected with considerable force into the dome of the carbureter by the volume of mixed oil and gas forced through the delivery-pipe of the separator-pump, and thus the charges are broken up and dissipated throughout the interior of the dome, where they are thoroughly mixed with air drawn in through the air-inlet pipe 18 by the suction-stroke of the engine and pass down through the screens, which further break up the charges and take out the globules of heavy oil. In passing through the separator the heavier parts of the gas and the oil contained therein settle down upon the diaphragms and are drawn off through the openings 30 b, the separator-pump, the pure gas passing up into the upper ends of the tubes, downward through the same, and out at the bottom of the casing to the engine, and thus all but the pure highly-explosive mixture is returned to the carbureter and does not find its way into the engine-cylinder.

A very strong, clean, and highly-explosive mixture is thus obtained from crude oil without the necessity of superheating the same, it being necessary to heat the oil only when the temperature is low, and for that purpose the pipe 8 is formed in a coil and inclosed within a closed cylinder 39, connected to the exhaust of the engine by a valve-controlled pipe 40, provided with a suitable valve-controlled by-pass pipe 41, adapted to exhaust into the atmosphere direct when it is not desired to heat the coil.

By means of the cap or valve 16 the opening into the lower end of the inner tube 13, through which the oil and air are drawn by the suction-stroke of the engine, may be restricted at will, and thus the suction and consequent agitating effect increased or diminished to change the quantity and quality of the charges, and the speed of the engine is automatically controlled by the opening of the governor-valve 34, which admits air directly into the chamber 32, thus lessening the suction in the separator and carbureter and also diluting the ingoing charges.

Having thus fully described the invention, what I claim is—

1. The combination with a carbureter adapted to receive crude oil and vaporize the volatile part thereof, of means for drawing the heavy part of the oil from the carbureter, a separator connected to the carbureter for separating the heavy from the lighter part of the mixture received from the carbureter, and means for returning the heavy part of the mixture to the carbureter.

2. The combination with a carbureter adapted to receive crude oil and vaporize the volatile part thereof, of an oil-pump, a delivery-pipe leading from said pump into the carbureter, a separator connected to the carbureter to separate the heavier from the lighter parts of the mixture received from the carbureter, a pump connected to the separator to draw the heavy parts of the mixture therefrom and connected to the delivery-pipe of the oil-pump to force the said parts into said delivery-pipe, said pump being operated so that the oil-pump will discharge in advance of the separator-pump.

3. The combination with a carbureter, of a separator consisting of a casing connected to the carbureter, a diaphragm extending across the casing, a plurality of open-ended tubes extending through the diaphragm, and means for drawing the oil from the upper surface of the diaphragm.

4. The combination with a carbureter, of a separator consisting of a casing connected to the carbureter to receive mixed air and gas therefrom, a diaphragm in the casing, a plurality of vertical tubes extending through the diaphragm, and a chamber at one side of the casing connected with the interior of the casing adjacent to the upper surface of said diaphragm to receive the heavy parts of the mixture.

5. The combination with a carbureter, of a casing, a pipe connecting the upper end of the casing with the upper end of the carbureter, diaphragms dividing the interior of the casing, a plurality of open-end tubes extending through each diaphragm, a chamber at one side of the casing communicating through openings in the casing with the interior of the casing at the upper sides of the diaphragms, and a pipe connecting the said chamber and carbureter.

6. The combination with a carbureter, of a casing, a pipe connecting the upper end of the casing with the upper end of the carbureter, and an outlet-pipe at the bottom of the casing, a series of diaphragms extending across the casing, a plurality of open-ended tubes extending through each of said diaphragms with the upper ends of the tubes lapping by the lower ends of the tubes of the diaphragm above, a chamber at one side of

the casing communicating with the interior thereof through holes at the upper sides of the diaphragms, and a pump connected to said chamber to draw the contents therefrom and deliver the same to the carbureter.

7. The combination of a casing closed at each end, an oil-supply pipe opening into the upper end of said casing, a tube of lesser diameter than the diameter of the casing suspended therein with its upper end open to receive the oil and its lower open end at a distance from the closed lower end of the casing, a series of screens in said tube, means for restricting the opening into the lower end of said tube, and a discharge-pipe for the gas leading from the upper end of the casing.

8. The combination of a casing having a dome at its upper end and closed at its lower end, an air-inlet pipe opening into the dome, an oil-supply pipe opening into the dome, a tube extending downward in the casing and its upper end open into the dome and its lower open end at a distance from the lower closed end of the casing, a series of discous screens in said tube, a valve to close the lower end of the tube, a rod extending upward in the axis of the tube and attached at its lower end to said valve, and an operating-lever attached to the upper end of said rod.

9. The combination of a casing having a closed lower end, a head on the upper end of the casing provided with an outlet for gas, an open-ended tube secured at its upper end within the head and extending downward within the casing to near the closed lower end thereof, a dome secured to the head over the open end of the tube and provided with openings in its sides closed by flaps, an air-supply pipe opening into the upper end of the dome, an oil-supply pipe opening into the side of the dome, a series of discous screens secured within the tube, an axial rod extending through the screens upward into the air-tube, a cup-shaped valve attached to the lower end of said rod to close the lower end of the tube, an operating-lever attached to the upper end of the rod, and an oil-pipe leading from the lower end of the casing.

10. The combination of a carbureter consisting of a vertical cylindrical casing, an open-ended tube in said casing, a dome over the upper open end of said tube having an air-inlet, a series of screens in said tube, a valve to close the lower end of said tube; a separator consisting of a tubular casing closed at each end, a series of cone-shaped diaphragms in said casing, a plurality of tubes extending vertically through each of said diaphragms, a chamber at one side of the casing communicating with the interior thereof through openings at the upper side of each diaphragm; an oil-supply tank; an oil-pump; a pipe connecting the tank and pump; a supply-pipe connecting the pump and dome of the carbureter; a separator-pump; a pipe connecting the separator-pump and the chamber of the separator; a pipe connecting the separator-pump and the oil-supply pipe; and means for operating said pumps.

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

MICHAEL G. NORTON.

Witnesses:

JOHN P. BARTLEY,

D. D. GRANT.