No. 699,830. Patented May 13, 1902.

D. BEST.

CARBURETER.

(Application filed July 3, 1901.)

(No Model.)

Fig. 5.

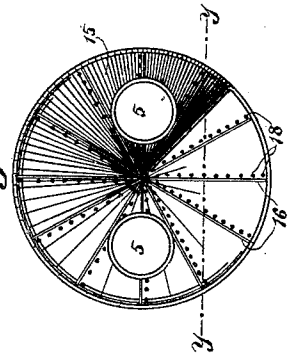


Fig. 6.

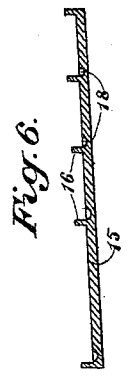


Fig. 3.

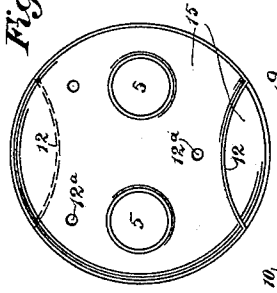


Fig. 4.

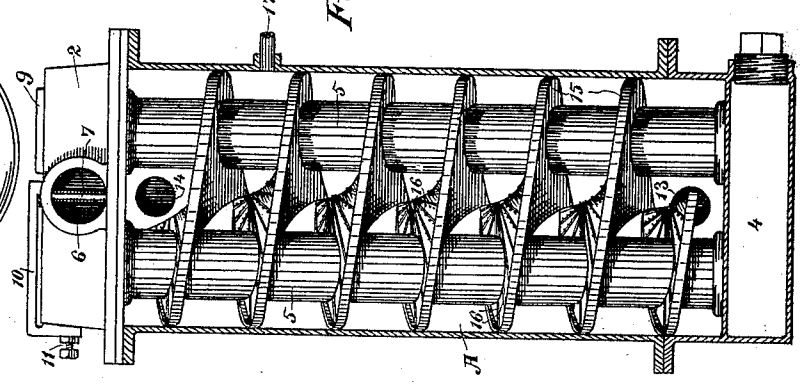


Fig. 1.

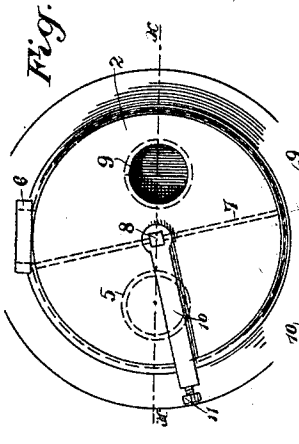
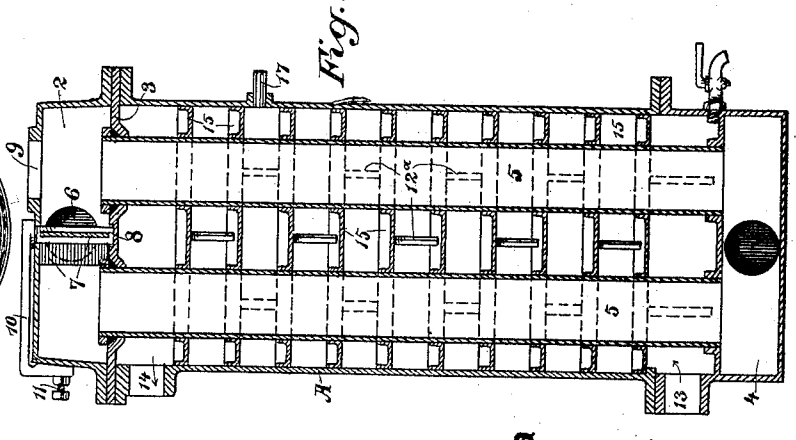


Fig. 2.



Witnesses,
H. F. Ascheck

Inventor,
Daniel Best
By Dewey Strong & Co.
Attys

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

DANIEL BEST, OF SAN LEANDRO, CALIFORNIA.

CARBURETER.

SPECIFICATION forming part of Letters Patent No. 699,830, dated May 13, 1902.

Application filed July 3, 1901. Serial No. 66,985. (No model.)

To all whom it may concern:

Be it known that I, DANIEL BEST, a citizen of the United States, residing at San Leandro, county of Alameda, State of California, have invented an Improvement in Vapor or Gas Generators; and I hereby declare the following to be a full, clear, and exact description of the same.

My invention relates to a device which is designed for producing or generating vapor or gas from liquids containing the same.

It consists of a closed casing having surfaces disposed within it over which the liquid is caused to flow, means for heating the interior of the casing and said surfaces whereby the liquid is vaporized, means for regulating the flow of the liquid through the apparatus, so as to sufficiently subject it to the heat, means for regulating the application of heat, means for introducing air to be mixed with the vapor, and means for superheating or drying the product before it leaves the apparatus.

My invention also comprises details of construction, which will be more fully explained by reference to the accompanying drawings, in which—

Figure 1 is a top view of the generator. Fig. 2 is a vertical section on line $x\ x$ of Fig. 1. Fig. 3 is a plan view of the disks. Fig. 4 shows the disks continuous in spiral form. Fig. 5 is a plan view of the same. Fig. 6 is a transverse section on line $y\ y$ of Fig. 5.

While this apparatus may be employed for vaporizing any liquid and mixing air therewith, it is especially illustrated in the present description and drawings as used for producing vapor from hydrocarbon liquids and mixing air therewith, so as to produce an explosive gas which may afterward be transmitted and used in engines of this class.

The exterior casing A may be made of any suitable or convenient shape and is here shown as having a cap 2 at the top, which is separated from the main chamber below by the top or head 3 of said chamber.

At the lower end of the apparatus I have shown a supplemental independent chamber 4, which serves two purposes: First, as a fireplace for preliminary heating of the apparatus to such a temperature that vaporization can commence before the regular supply of heated products of combustion can be obtained from the engine, and, secondly, it serves as a return-chamber, with which the flues 5 connect at the lower end. The upper ends of these flues connect with the chamber 2 at the top, and the object of this arrangement of flues is to provide for the passage of the exhaust products from the engine through the apparatus in two directions. The exhaust from the engine is admitted into the cap or upper chamber 2 through a passage, as shown at 6.

In this apparatus it is designed to vaporize the oil by the passage of the hot exhaust products from an explosive-engine passing through the chambers 2 4 and pipes 5, and the supply of oil into the upper part of the apparatus is designed to continue while the engine is running and to be arrested when the engine stops, so that the oil flowing through the apparatus will remain at whatever position it may occupy when the engine stops until the engine again starts. This prevents the oil from flowing down to the bottom after the engine has stopped and before all of the vapor has been extracted from it.

7 is a valve or gate centrally and vertically pivoted, as shown at 8. This valve or gate extends transversely across the interior of the chamber 2 and serves to direct the exhaust products so that they either pass through the flues 5 or the exhaust may be discharged directly from the chamber 2 through the exhaust-opening at the top, (shown at 9.) The shaft of this gate or valve 7 extends through the top of the chamber 2 and may have a lever-arm 10 extending to the side, with a suitable set-screw or equivalent means, as 11, for locking it at any point of adjustment. Thus by turning this lever, and with it the valve, the direction of the exhaust products entering the chamber 2 can be controlled. When a very heavy oil is to be employed, it is necessary to subject it to a greater and longer-continued heat. Therefore the return-pipes 5 are employed, and the products of combustion will have passed through the apparatus twice. When it is desirable to discharge the products of combustion directly out of the chamber without passing through the flues at all, this valve or gate enables me to effect these results.

The means for vaporizing the oil within the chamber, in conjunction with the devices previously described, is a surface or series of surfaces so disposed within the chamber as to retain and retard the flow of the oil over the surfaces in order to expose to the heat for a sufficient time to extract the gas or vapor, and in the use of crude heavy oils this is an important feature of the apparatus. As shown in Fig. 1, these surfaces consist of disks 15, which may have slightly-upturned edges or flanges, and they may be arranged as shown in Fig. 3, which is a plan view of one of the disks, showing the flues 5 passing through the disks, and one edge of the disk has a segment cut out, as shown at 12. The disks are then arranged successively one above the other within the chamber in such a manner that the cut-out segments 12 will be alternately on opposite sides of the chamber. Thus the gas or vapor produced at any point below the top will pass backward and forward through the spaces between the disks until it reaches the exit. The oil may pass from one disk to another through pipes, as at 12^a. These disks 15 may be arranged horizontally or slightly inclined, and the surfaces may be roughened or corrugated, so as to form little detaining pockets or receptacles, so that the liquid will flow slowly across the plates and be sufficiently subjected to the action of the heat. It will be manifest that the ordinary finish of the plates will provide a surface to which the liquid will adhere in a measure, because all such surfaces when subjected to the magnifying-glass show a roughness and a succession of elevations and depressions which practically form detainers such as I have described. In Fig. 4 I have shown the surfaces as being continuous or spiral in form, passing around the pipes or passages 5, which extend up through these surfaces in the same manner as previously described. The surface thus formed is roughened or so constructed as to detain the liquid and cause it to flow slowly over it, the angle of inclination being sufficiently low to prevent any rapid flow of the liquid and to particularly arrest its movement in a great measure when the feed into the upper part is cut off. The object of this is to retain the liquid at whatever point it may stand when the engine stops or the supply of heat by which the liquid is vaporized is cut off, so that when it starts again and the feed from above commences the liquid will then continue its flow until all available vapor has been extracted from it.

The amount of heat necessary to fully extract the vapor from the heavy or crude oil which is designed to be used in this apparatus is several hundred degrees, and the extraction is effected slowly, so that it is necessary to subject the oil to the action of the heat for a considerable time, and this arrangement of surfaces, with means by which the oil is caused to flow very slowly over them and to be partially or quite arrested whenever the engine stops or the heat is cut off, serves to retain it within the apparatus until the desired object has been effected.

For the purpose of making an explosive gas, which is afterward conducted to the engine in charges by suitable valve mechanism, it is necessary to mix a proportion of air with the gas. It has been customary to admit the air so that it would meet the gas which is being formed in the generator. In my invention the air-admission opening is shown at 13 at the bottom of the apparatus and at a point near where the oil is to be discharged. The object of this is to bring the air into contact with this final product while the air is fresh and unsaturated, so that it will tend to more readily take up the heavier gas which is the last product of the operation, and as it rises through the upper part of the apparatus the lighter and more easily absorbed gas will be added to it and taken up by the air, whereas if the air was admitted at the top, where it would soon become saturated and discharged at the bottom, it would not take up the heavier gases which were the last product of the operation. The mixed air and vapor forming explosive gas may be discharged through a passage, as at 14, and by suitable connections (not here shown) may be led to the engine where it is to be used.

In order to superheat the gas or to thoroughly dry it out in case it has carried any particles of liquid with it, I prefer to introduce the oil upon the vaporizing-surfaces at a short distance below the top of the apparatus, as at 17, leaving one or two of the surfaces or turns thereof above the point where the oil is introduced, and these surfaces being heated by the exhaust products passing through the pipes 5 will serve, as above stated, to thoroughly vaporize and superheat the gas before it is discharged from the apparatus.

This generator is especially useful on ships, where the rolling motion constantly changes the angles of the vaporizing-surfaces.

As shown in Figs. 4, 5, and 6, the detainers are in the form of low ribs 16, approximately radial within the outer rim or flange. On the upper side of each rib depressions or pockets 18 are made into which the oil settles, and when the vessel rolls the oil is prevented from too-rapid movement down the increased grade thus temporarily established.

Having thus described my invention, what I claim, and desire to secure by Letters Patent, is—

1. A vaporizing apparatus consisting of an exterior casing, detaining-surfaces arranged therein from top to bottom, a plurality of passages extending through said surfaces connecting with a common chamber at the bottom and the top, a passage through which hot vapors are introduced into one of said chambers and passed thence through one of the pipes and returned through the other.

2. A vaporizing apparatus consisting of a casing having detaining-surfaces arranged

therein between top and bottom, chambers located above and below the apparatus and separated therefrom, a plurality of pipes extending through the surfaces and connecting said chambers, an inlet-passage through which hot products are introduced into one of said chambers and passed through the said pipes, and a gate movable in the chamber whereby the direction of movement of the heated products through the pipes is controlled.

3. A vaporizing apparatus consisting of a casing having detaining-surfaces arranged between the top and bottom, separate chambers located respectively above and below the apparatus, a plurality of pipes connecting said chambers, an inlet-passage by which hot exhaust products are delivered into one of said chambers, a gate by which said products are caused to pass through one of the pipes to the opposite end, and thence returned through the other pipe, and an exhaust-passage through which they are finally discharged, and means for changing the gate to alter the direction of movement of the hot products through the apparatus.

4. A vaporizer and generator consisting of an inclosed casing having detaining-surfaces arranged therein between top and bottom, means for supplying oil to be vaporized upon one of the surfaces intermediate between the top and bottom, so as to form a superheater of the surfaces above, heating-pipes passing through the apparatus, and means for discharging the hot products of combustion from the engine through said pipes, an air-admission passage opening into the generator, and a gas-discharge passage located above the oil-admission passage.

5. A vaporizer and generator consisting of an exterior casing having detaining-surfaces arranged between the top and the bottom, pipes extending directly therethrough adapted to convey the hot exhaust products from the engine, a pipe for the admission of oil upon the surfaces near the top of the apparatus, a pipe for the admission of air near the bottom whereby the air is first brought into contact with the heavy products of vaporization, and a discharge-passage for the mixed products at the top of the apparatus.

6. In an apparatus for the production of explosive gas, a casing having detaining-surfaces arranged between the top and the bottom, pipes passing through said surfaces and adapted to conduct the hot products of combustion from the engine whereby the oil is vaporized, an air-inlet passage opening into the lower part of the generator, and a discharge-passage from the upper part whereby the air is first brought into contact with the gases evolved from the heavy oil near the bottom and successively with the lighter gases above before being discharged.

7. The combination in an apparatus for the production of explosive gas of a vertically-disposed closed chamber, a series of surfaces interposed between the top and bottom, with means discharging successively from the upper to the adjacent lower one, means for heating said surfaces, consisting of pipes passing therethrough, retarding-ribs and indentations formed upon the surfaces, and passages through which a hydrocarbon liquid is delivered upon the surface near the top.

8. The combination in an apparatus for the production of explosive gas of a normally vertical closed casing, a series of surfaces disposed between the top and bottom with serpentine discharges from the upper to the lower ones, heat-pipes passing through said surfaces, means for supplying a hydrocarbon liquid upon one of the upper surfaces, and detaining ribs and pockets upon said surfaces to prevent too rapid flow when the apparatus is tilted from a vertical position.

9. The combination in a vaporizing apparatus of a normally vertical closed casing, surfaces disposed therein between the top and bottom, said surfaces fitting against the interior of the casing and having a series of serpentine connecting passages, a hydrocarbon-inlet near the top, an air-inlet at the bottom and a gas-discharge at the top, and heating-pipes passing vertically through the surfaces interior to the casing.

10. The combination in an apparatus for the production of explosive gas, of a closed vertically-disposed chamber with a series of transverse surfaces between the top and bottom, having serpentine connections, a hydrocarbon-supply to a surface near the top, an air-inlet at the bottom, and a gas-discharge at the top, independent chambers exterior to the top and bottom of the main chamber and heat-conducting pipes connecting said chambers and passing through the interior of the main chamber and through each of the surfaces.

In witness whereof I have hereunto set my hand.

DANIEL BEST.

Witnesses:
S. H. NOURSE,
D. B. RICHARDS.