

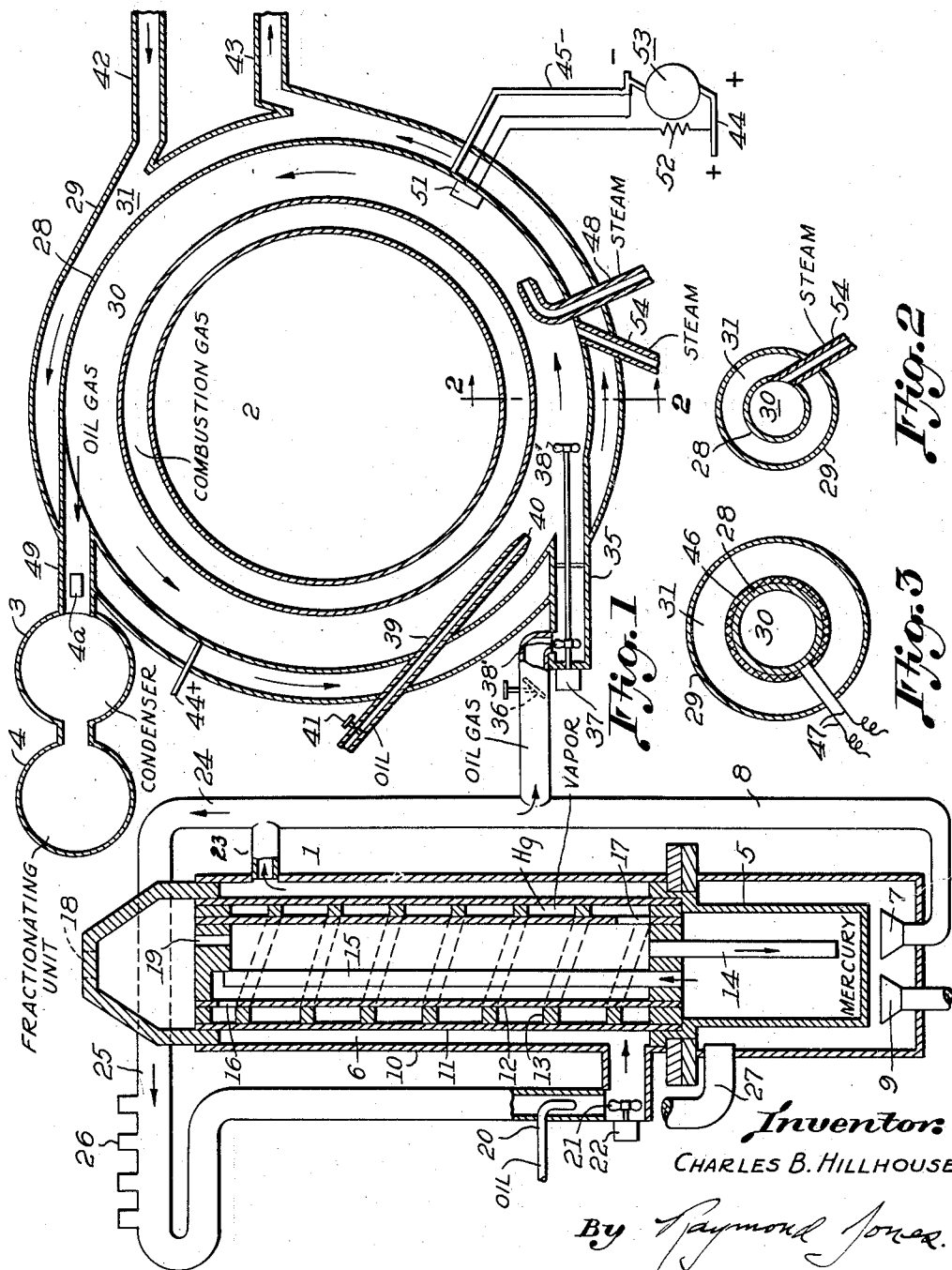
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METHOD FOR PRODUCING GASOLINE

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METHOD FOR PRODUCING GASOLINE

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1 Claim. (Cl. 196—66)

My invention relates to a method and apparatus for producing gasoline and/or a fixed gas from petroleum, and more particularly to a method of obtaining gasoline from hot oil vapors or gas in an unstable form, and is an improvement on my application Serial No. 32,443, filed July 20, 1935, and which has matured into Patent No. 2,125,921, in that a steam spray or shield is used in the gasoline generator.

Gasoline is made by keeping a quantity of heated oil gases in motion at high velocity, and raising the temperature of these gases to and maintaining it at a gasoline producing temperature of about 1100° F. and, if desired, under suitable pressure.

One object of my invention is to convert a portion of petroleum into gasoline in a manner to present a maximum of surface of petroleum to contact with a body of hot oil gas or combustible gas, the maximum surface being secured by atomizing the petroleum and mixing with said gases.

Another object is to provide a continuous process of converting a maximum portion of petroleum into a gasoline or other light derivative product without reliance upon the well-known methods which depend upon distillation of the petroleum in bulk.

Another object is to maintain the temperature of the heated gases substantially constant while permitting a definite control of this temperature throughout a fixed practical working range and by means of a heat supply derived from an external source, preferably electrical.

Another object is to provide a continuous process of producing gasoline that is simple, efficient, and relatively economical.

One of the principal objects of this process is to obviate, so far as possible, carbon deposits on the walls of a container, or passages leading to or from it, where gasoline is made or the unstable oil gases are fixed.

Oil vapors or unfixed gases as usually obtained carry with it oil particles, sometimes only microscopic, which are unvaporized or ungasified, and are commonly called wet.

When such particles strike a hot solid surface, as the walls of a container, they adhere and bake and form agglomerations of carbon, causing annoyance, and often stopping the operation of the generator.

If the oil gases and oil particles are dry when cracked, the carbon is dry and if there is enough velocity in the current, and there are no corners or retarding bends, there should be no carbon

deposited in the apparatus before the gases reach the receiver.

This object is secured by having the cycle of unstable oil gas of proportionately large volume as compared with the inflow of oil spray, so there will be little fluctuation in its temperature by the addition of oil and over 90% of bulk of the cycle will be reheated many times in the course of its circuits, so that when these gases pass to another chamber they should be almost completely dry.

To still further protect against carbon deposit, the dried oil gases which leave the first chamber at about 700° F. are brought into the gas fixing or gasoline chamber so as not to directly strike the hot walls. This is accomplished by passing the dried oil gas through the axis of a sleeve of highly heated steam or other suitable gas, if a heated pipe system is used, or onto a thin sheet of highly heated steam hugging the hot walls, if a dust catcher system is employed.

The object is to keep the oil vapor or gas away from the heated walls until the vapor or gas is completely dry and to use steam or other gas mechanically to accomplish this separation, or heated steam may combine with any free carbon present.

Other objects will appear in the specification which follows and in the accompanying drawing, wherein—

Figure 1 is a schematic or conventional view, partly in section, of a gasoline generator;

Fig. 2 shows a cross-section on line 2—2 of Fig. 1;

Fig. 3 is a detail view of a modification.

Referring to the drawing in detail, the method contemplated is preferably carried out by means of an apparatus which comprises an auxiliary gas generator 1, a gasoline generator 2 and a gasoline condenser 3 with an accompanying fractionating unit 4. The gas generator 1 comprises a mercury boiler 5 and a gas forming contact chamber 6. A gas burner 7 which is supplied with gas by a conduit 8 connected to the main gas cycle conduit, is arranged to heat the mercury boiler 5. If desired, a burner 9 may be provided and used as a heater to start the gas cycle. A pair of spaced concentric walls 10 and 11 provide the gas forming chamber 6. An inner concentric wall or cylinder 12 is spaced from the cylindrical wall 11 and spiral ribs 13 are arranged between walls 11 and 12 for a purpose to be described. Return mercury is fed to boiler 5 by a pipe 14 and a pipe 15 serves to conduct mercury vapor to the top of the generator to be passed through a port 16, then spirally around the wall

12 to a second port 17. The mercury vapor is condensed along this spiral path and the condensed mercury passes through port 17 and then downwardly through pipe 14. Additional mercury can be supplied through a filler opening 18 and through a port 19 to the space within inner wall 12.

The boiler 5 is arranged to heat the mercury to a temperature of about or above 800° F. and the temperature and pressure of this mercury vapor may be controlled in any well known manner. The gas cycle is maintained in quantity by means of a feed of partly heated oil sprayed through a nozzle 20. The gas cycle and sprayed oil are carried along by means of an impeller 21 operated by a motor 22. This oil spray admitted before or after impeller 21 is mixed into a volume of heated gas or oil vapor in the cycle of sufficient quantity to furnish most of the heat required, as sensible heat, to gasify the oil sprayed into it without greatly lowering the temperature of the gas itself, while compensating heat is supplied to the gas and oil added as the current passes along the wall 11 of the mercury chamber. The gases pass up along wall 11 to the gas outlet 23, thence through a conduit 24 and a conduit 25. If desired, additional gas may be withdrawn at any point in its cycle, but preferably at a point where the gas burner jets 26 are shown. The gas generator, in effect, provides a continuous closed replenishing cycle whereby, as fast as gas is consumed at outlets, more gas forming materials are supplied. A flue 27 is arranged to carry off products of combustion from burners 7 and 9.

My improved gasoline generator 2 is formed preferably by an inner conduit 28 of continuous ring shape and an outer conduit 29 spaced from and concentric with the conduit 28 to provide a gasoline generating chamber 30 and a heat jacketing chamber 31 which will add to the economy of the operation.

To begin the operation, hot oil gas from generator 1 is passed to the chamber 30 through a conduit 35, through a control valve 36. A motor 37 and fan 38 serve to circulate this gas supply. The supply of petroleum, preferably slightly heated, is by means of inlet pipe 39 and the atomizing jet 40. Petroleum supply is controlled by a valve 41. Hot combustible gas from any other source would do as well as gas from generator 1.

After the cycle has become established and a current of heated gasoline in gaseous form fills the chamber 30, it may no longer be necessary to carry hot made gas from generator 1 to generator 2.

Two distinct means are shown for heating the conduit 28 and chamber 30, one being a jacket of hot gases and the other an electrical heating means. The principal supply of heat is by means of hot gases admitted to the chamber 31 through an inlet 42. This hot gas supply may be derived from any source desired and is preferably at a temperature of not over about 1200° F., and this temperature may be maintained or even raised by the controlled electric current. These hot gases, after passing through chamber 31, are drawn off at outlet conduit 43.

In order to provide an auxiliary heating means of a type that may be more readily regulated, I form the conduit 28 preferably of a resistance alloy known to the trade as "Nichrome". This conduit may be heated electrically in either one of two ways. As shown in Fig. 1, a heavy current is passed through the wall of this conduit, the current entering at plus terminal 44 and leaving

at negative terminal 45. The conduit 28 may be heated also as shown in Fig. 3, by means of heating coils 46 that are arranged to surround the conduit wall, the current being supplied by leads 47.

A steam supply 48 may be used to prevent carbon deposits or to purge the chamber 30, if necessary. The hot vapors are drawn off through an outlet conduit 49 and are passed into the condenser 3 where the gasoline etc. vapors may be condensed. Then the gasoline is separated out by usual fractionating apparatus 4. When combustible gases are shut off at 36, the velocity in the current is maintained by suction pump 4a.

In order to automatically maintain a desired constant temperature in chamber 30, etc., I prefer to provide a temperature responsive device, for example, a carbon pile, 51 arranged to vary the current in the shunt field 52 of generator 53 which supplies the current to terminals 44 and 45. The field current is varied by device 51 in a manner to control the voltage of the generator.

Inasmuch as the conversion into lighter derivatives of petroleum or hydrocarbon oil sprayed from conduit 39 is due to contact of minute particles thereof with a larger volume of heated gases, it is contemplated that the supply of hot gas from inlet 35 may be reduced or entirely cut off by valve 36 whereby to rely solely upon the cycle or current of hot gases and gasoline vapors present in the chamber 30. A feature of economy in the operation of generator 30 is due to the fact that the main source of heat may be derived from the hot gaseous jacket 31 which, if desired, may be maintained somewhat below the conversion temperature, in which case the remaining heat necessary will be supplied automatically from electric current in the walls of conduit 28 or from the coils 46 shown in Fig. 3. If desired to better maintain currents in chamber 30, a second fan 38' may be driven by motor 37 and positioned in chamber 30 close to the chamber end of the conduit 35.

The provision of the endless chamber 30 with the heat supply jacket shown insures that the gases in chamber 30 will be maintained at the conversion temperature and, if desired, solely by an indirect supply of heat thereto. By the use of the auxiliary electrical supply of heat, an efficient control of the conversion temperature is provided.

Deposition of carbon on the walls adjacent the gas inlet or at other points desired is prevented also by feeding highly heated steam into chamber 30 through steam inlets 54, which inlets are positioned at a tangent to the walls of chamber 30 in a manner to provide a very thin sheet or film of steam close to said walls to surround the hot gases. If any carbon should be cracked out, it would be taken up and combined with the protecting coat of hot steam.

In the event that a small percentage of the heated oil gas or vapor entering the fixing chamber should be cracked, it might be supposed that particles of free carbon being heavier than the encasing shield of heated steam along the wall might work through the steam and strike and perhaps adhere to the walls. However, such is not the case. Though free carbon will not change its structure at very high temperatures in a non-oxidizing atmosphere even as high as 5000 degrees F., yet in the presence of highly heated steam carbon will puff up several hundred times its normal size like vapor and mix and combine with the steam, hence no free carbon will get

through to the wall when surrounded by a steam shield as described.

5 A ready means of starting the operation is to fill the circulating chambers and connecting pipes with hot gases of combustion or hot combustible
10 gases and raise them to oil-gas making temperature, that is, about 700° F., and in the gasoline-making section to about 1100° F. When this is done, shut off the feed of hot gases for starting
15 and begin spraying oil into the hot gases, and for gasoline making in the second stage, raise the oil gas from 700° F. to about 1100° F.

What I claim is:

15 The method of producing gasoline from petroleum which comprises supplying to a chamber a volume of hot combustible oil gases at about 700°

F., causing said gases to flow over a closed path in a cycle and back to the point of entry thereof to the chamber, supplying heat to said gases indirectly throughout the length of the cycle at about 1100° F., spraying into said gases in atom- 5 ized form a quantity of petroleum whereby said petroleum is converted into a light derivative of gasoline vapor, feeding a shield of steam tangentially along and in contact with the inner wall of the chamber adjacent the inlet of the oil gases, 10 said oil gases, petroleum and steam flowing in a direction away from said inlet, withdrawing said vapor from the chamber and condensing the vapor to a liquid form.

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