

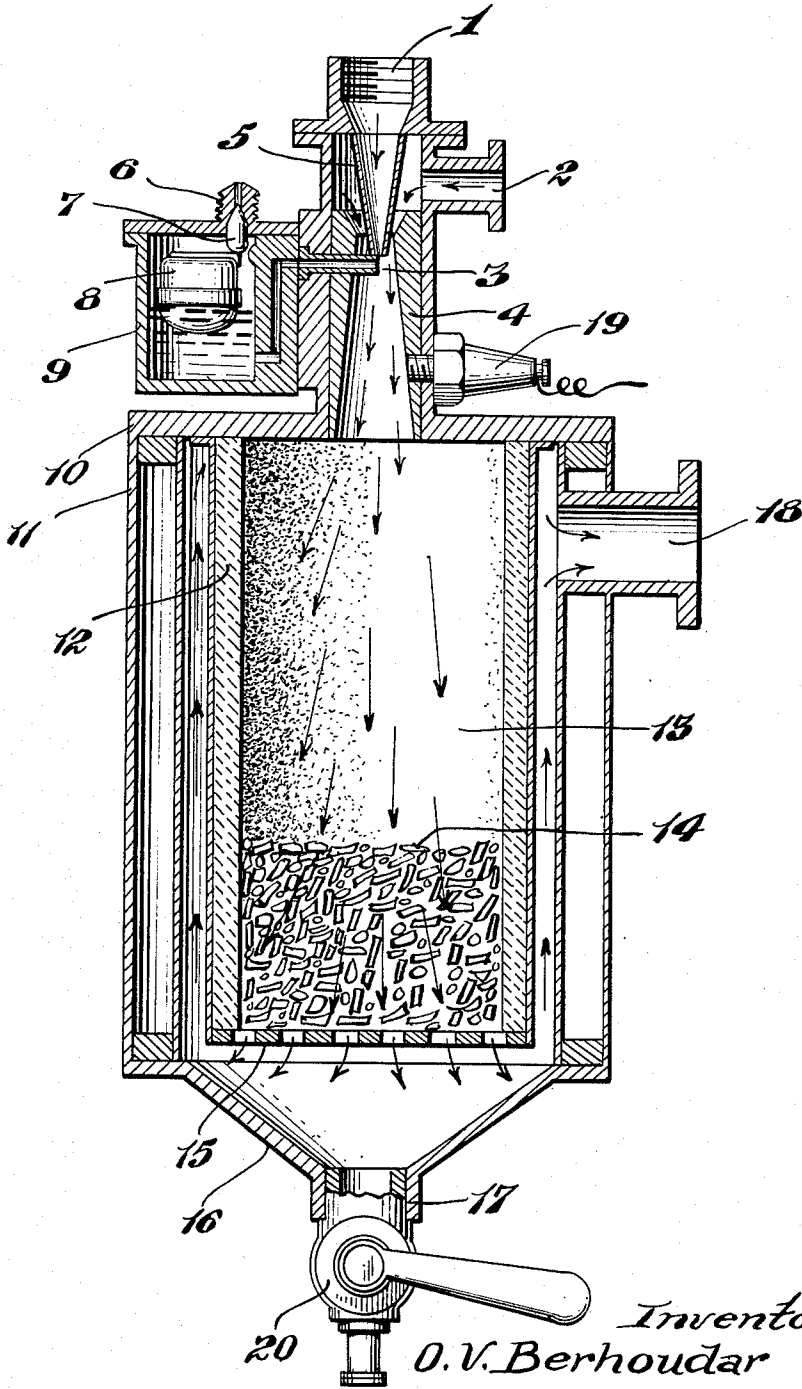
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CARBURETOR FOR HYDROCARBON FUELS

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CARBURETOR FOR HYDROCARBON FUELS

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1 Claim. (Cl. 48-74)

This invention has reference to an apparatus for producing combustible gases from heavy hydrocarbons, as residual petroleum, shale oil, vegetable oils, etc., for feeding internal-combustion engines, chiefly in motor-cars and like vehicles, and a method of spraying the said hydrocarbons into cloudlike particles as a preliminary to the cracking process.

The principle underlying the invention is, on one part, the division of the hydrocarbon into a cloud-like state and, on the other part, the cracking of the hydrocarbon atomized, inside a suitable chamber communicating with the suction and with the exhaust-pipe of the engine, under the influence of heat evolved by the combustion of only a small amount of hydrocarbon atomized, in the said chamber, through the mixture of a suitable amount of air.

A characteristic feature of the invention is that, the introduction and the spraying into small cloud-like particles (atomizing) of the heavy hydrocarbon into the said chamber is effected by means of a strong draught which is produced, on one part, by the reduction of pressure brought about in the said chamber through the engine-suction and, on the other part, by a draught produced through part of the exhaust-gases of the engine in conjunction with the aid of a small amount of air-current at the orifice of a constant-level receptacle opening into the said chamber, in such a way that the heavy-hydrocarbon particles driven by the strong draught and meeting with no resistance owing to the reduction of pressure produced in the chamber, and finding therein free and sufficient space, are diffused and divided into fine cloudlike atoms which facilitates the gasification under the influence of the heat, and, subsequently, its cracking.

Another characteristic feature of the invention is that, the gasification and partly the cracking of the heavy hydrocarbon are not made by contact of the hydrocarbon drops against the incandescent walls, but through the very flame produced by the combustion of a small amount of atomized hydrocarbon in said chamber and, subsidiarily, by the radiant heat of the chamber-walls, which prevents the effects of heating and their sequel: the depositing of a carbonized layer.

Another characteristic feature of the invention is that, through the connection of the cracking-chamber with the suction and with the exhaust of the engine there is obtained a proportionality between the amount of combustible material drawn from the constant-level receptacle

for consumption and the requirements of the engine, at all moments.

Another essential characteristic feature of the invention is that, the apparatus produces, at all rates of speed, a gas of an essentially constant composition, and that the amounts of oil introduced and of air drawn in are proportional to the engine-rate. As this proportionality always maintains inside the chamber a constant temperature, the quantity of carbonic residues is proportional to the quantity of combustible treated.

The above and other characteristic features will be made apparent by the description below in conjunction with the illustrative drawing attached hereto which shows by way of example, non-restrictive, an aspect of performance of my invention.

The figure of the drawing shows a vertical section through the apparatus. 13 shows the cylindrical chamber lined internally with refractory material 12. The bottom of the chamber is perforated as at 15, and it is loaded up to a certain height with refractory, porous material such as pumice-stone, brick and tile waste, asbestos etc. 14, or with catalytic material such as nickel, cobalt, copper etc. Said chamber 13 is surrounded with a double-walled casing 11 so as to form a heat-insulated interstice closed at the lower part with a cone-shaped bottom 16 provided with an orifice 17 on which a cock 20 is fixed. Said casing 11 leaves between its internal walls and the external walls of chamber 13 an annular space for the gases formed to pass through. Said annular space has at its upper portion a gas-outlet 18 which is connected with a radiator-filter not shown in the drawing, and then with the engine-suction.

The combination of the chamber 13 and the surrounding casing 11 are suitably attached to top 10 which is cylindrically or conically extended and communicates through orifice 2 with the external air and forms a Venturi-diffuser 4. Into said cylindrical extension opens orifice 3 of a constant-level receptacle 9 for the combustible material. Said receptacle contains a float 8 provided with a plug 7 to stop the inlet 6 from the main reservoir as soon as the level required in the receptacle is reached.

At the upper portion, rather at the upper extremity, of the cylindrical extension of the top-cover there is provided a joint 1 connected with a branch of the exhaust-pipe of the engine, not shown in the drawing, and bears at its lower end an injector-nozzle 5 reaching exactly above the

orifice 3 and forming there a spray. A little below orifice 3, on the cylindrical extension, there is provided a spark-plug 19 to ignite the mixture of combustible oil with air.

The above described apparatus is placed between the combustible-reservoir and the engine, if necessary by the interposition of a mixer or a condenser-purifier not shown in the drawing.

Now, to the mode of operation of the apparatus:

Through suction of the engine—which has been started for a few seconds by gasolene and the known original carburetor—a reduction of pressure is produced in chamber 13 and, at the same time, part of the exhaust-gas is driven by nozzle 5 on to orifice 3 carrying with it an amount of combustible material, proportional to the capacity of the cylinder, which is thus being diffused in fine cloud-like particles into the chamber 13. Also at the same time a certain amount of external air rushes in through orifice 2 and mixes with the atomized hydrocarbon. Said mixture of hydrocarbon with air, in passing at spark plug 19 is ignited and heats the chamber-walls 12 and also the heap of refractory porous material 14. It must be noted that the calibrated air-inlet into the Venturi-diffuser 4 is regulated so that the amount of air inlet each time be just enough for the combustion of only a small amount of atomized hydrocarbon in the chamber. The rest of hydrocarbon introduced in the chamber in a cloudlike state is transformed into vapour by the influence of the sensible heat in the chamber. In this form it is easily cracked under the influence of the ignition-flame. The heaviest parts of the cracked hydrocarbons in traversing the perforated bottom of the chamber pass through an incandescent layer of refractory, porous material 14 and undergo thus, so to speak, fractionated, cracking where each element has time to crack according to its particular nature. Tars and carbon residues, which might be evolved, are evacuated through the cock 20. The products of the cracking traverse the perforated bottom 15 and proceed through the annular space to exit 18, and, from there, through the suitable condenser-purifier are sucked by the engine. It must be noted that the dimensions and the general conformation of the apparatus are so chosen as to prevent the cloudy or vaporous cone formed from coming into contact with the walls of chamber 13, which contact would cause the effects of undue heating and the eventual results. Also, the distance between the spray-nozzle and the refractory

heap 14 is such as to allow the fine drops of sprayed hydrocarbon sufficient time to be transformed into vapour which will facilitate the cracking of the hydrocarbon.

It is understood that this apparatus is, so to speak, a self-regulating gasifier for fluid combustible substances, and is intended for the cracking of the fluid fuel, always in accordance with the requirements of the engine. In practice, the apparatus yielded very good results.

I do not confine myself to such dimensions, materials or details of construction as described above, taking into consideration that several modifications might be made without departing from the invention. Thus, for example, the atomization of the oil and the introduction of the air to ignite part of the oil introduced can be made by the aid of a pump started by the engine and operating according to the requirements of the engine. Further, besides the air entering through orifice 2, one can provide the introduction of additional air at the lower portion 14 or at another place, to burn, as required, the carbons produced by the cracking. Further, a device can be provided in the upper portion of the cracking-chamber to introduce into the chamber water in drops or in steam from the radiator or from a small reservoir. Further, the layer of refractory, porous material 14 can be impregnated with a suitable catalytic substance.

Having now particularly described and ascertained the nature of my said invention, and in what manner the same is to be performed, I declare that what I claim is:—

Apparatus for preparing hydrocarbon fuel for consumption in internal combustion engines comprising, a receptacle having a lining of refractory material, a grate at the lower end of the receptacle supporting granular refractory material thereon, a tube in communication with the top end of the receptacle having an orifice for admitting air to said receptacle, means for supplying liquid hydrocarbon fuel transversely to said tube below said orifice, a nozzle arranged axially of the tube terminating adjacent the fuel supply means for supplying exhaust gases of the engine to the tube to diffuse the fuel into minute particles and spray the same into the receptacle towards the granular refractory material without engaging said lining, and a casing wall surrounding the receptacle having an outlet at the top end thereof adapted to be connected to an inlet manifold of the engine.

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