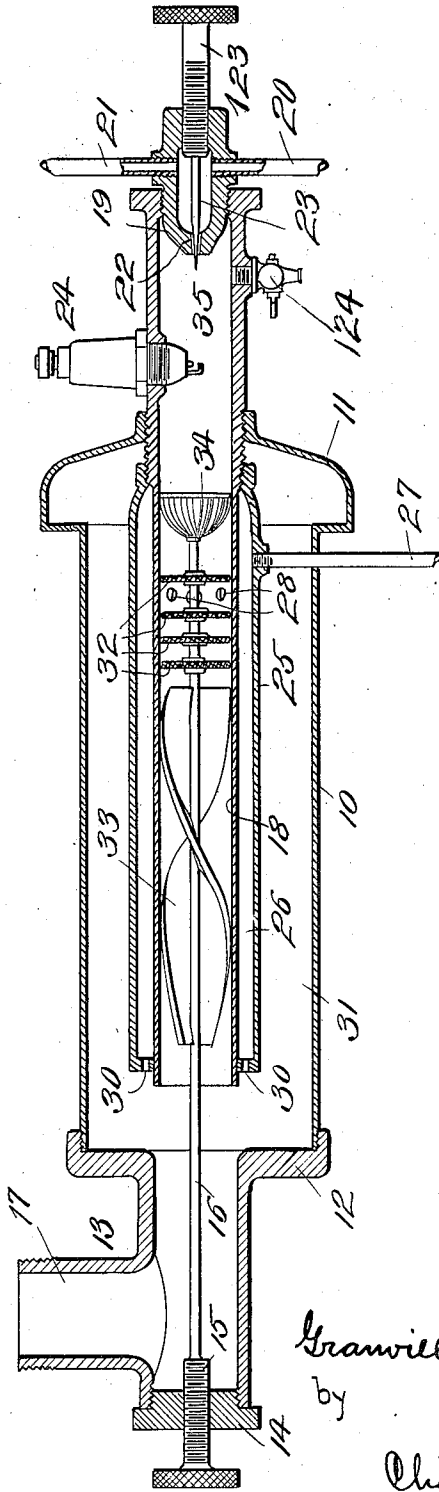


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 METHOD OF AND MEANS FOR THE PRODUCTION OF GASEOUS VAPOR,
 APPLICATION FILED JAN. 4, 1912.

1,262,846.

Patented Apr. 16, 1918.



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UNITED STATES PATENT OFFICE.

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METHOD OF AND MEANS FOR THE PRODUCTION OF GASEOUS VAPOR.

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Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, GRANVILLE S. RIDER, a citizen of the United States, and a resident of Brooklyn, in the county of Kings and State of New York, have invented certain new and useful Improvements in Methods and Means for the Production of Gaseous Vapor for Internal-Combustion Engines and other Purposes, of which the following is a specification.

The invention comprises a new apparatus and method hereinafter described and claimed for preparing a gaseous vapor from air and oil (such as, for illustration, crude petroleum oil) to serve as an efficient fuel for internal combustion engines, and such other purposes to which the same may be applicable.

The invention consists broadly in the creation of vapors from oil by means of a momentary ignition of minutely divided particles of such oil followed, before the bulk of the oil affected by a flame so produced is consumed, by an extinguishment of the flame which causes the oil which has passed through the ignition zone to be converted into a vapor at a point in its travel where but for such extinguishment the flame could continue to burn.

The invention being primarily designed with reference to use in connection with internal combustion engines, an explanation of its operation in connection with the specific apparatus illustrated will most easily lead to a comprehension of the general-features of the invention. In this embodiment I provide intermediate the sources of supply for the oil and air and the engine to be furnished with the gaseous vapor, novel apparatus to one end of which the air and oil are supplied under pressure and in controlled volume and from the other end of which the prepared gaseous vapor is permitted to pass to the engine or other mechanism or device requiring it, while within said apparatus the oil and air are brought together and discharged in a fine jet into a chamber supplied with a sparking or igniting device and within which the mixed air and oil then in an atomized condition are ignited and burn during the momentary period of the flow of the same to an inflowing body or wall of air supplied under pressure and to wire screen disks or other flame-smothering means through which the vapor passes on

its way to the discharge end of the apparatus, the passage of the vapor being through an interior cylindrical member surrounded by a jacket which is supplied with air under pressure and from which the air adjacent to the flame-smothering point, flows into said cylindrical member and from which also adjacent to the discharge end of said cylinder the air is discharged and mixes with the vapor leaving said cylinder and in the general chamber about the same, for the supply of the engine. My invention therefore comprehends the continuous delivery of the air and oil in the form of a jet to a chamber within which constant ignition exists, the continuous flow of the air and oil through said chamber and the momentary flaming of that part of the same in transit through said chamber, the smothering of the flaming vapor by a controlled supply of air, by baffles, by both acting conjointly or by other equivalent means at a point beyond that where ignition is started and where but for such smothering the flame could continue to burn, and the discharge of the vaporous gas in a cool state ready for use (preferably with an additional volume of air fed to the vapor) as fuel for an internal combustion engine or other purpose.

While I can use inflammable oil in its several stages of refinement in carrying out my invention, my process enables me to employ petroleum as it comes from the ground in the production of a highly efficient combustible vapor, and this feature of my invention is of great importance, since thereby the necessity, in other processes, of separating the by-products from the volatile or lighter elements to prevent the by-products from being precipitated, is wholly avoided. In accordance with my invention I utilize the by-products as well as the more volatile or lighter elements contained in the oil and convert the whole thereof into a vaporous gas of varied utility.

The invention will be readily understood from the detailed description hereinafter presented, reference being had to the accompanying drawing, which presents a central vertical longitudinal section through a novel apparatus embodying my invention.

In the drawings, 10 designates an exterior casing or cylinder having at one end an enlarged chambered head 11 and at its other end a cap 12 carrying an elbow 13 which is

provided with a plug or cap 14 having a screw-threaded hole receiving the threaded portion 15 of a rod 16. The elbow 13 at its outlet member 17 will be connected by the usual or any suitable piping and connections with the cylinder of the engine or other device, not shown.

Within the casing or cylinder 10 is provided a longitudinal cylinder 18 which extends from near the cap 12 out through the head 11 and beyond said head, where the outer end of said cylinder 18 is provided with a hollow plug 19 into whose interior chamber leads a pipe 20 for the supply of oil under pressure and a pipe 21 for the supply of air under pressure. The plug 19 is formed with a small conical discharge orifice 22 and also with a control needle valve 23, whose point is within and projects inwardly beyond the orifice 22 and whose shank end is carried by an adjusting screw 123, which is longitudinal of the plug 19 and employed for controlling the relation of the point of the needle 23 to the walls of the orifice 22. That portion of the cylinder 18 which projects outwardly beyond the head 11 is also provided with a spark-plug or suitable ignition device 24 and, at a point near the plug 19 between the end of the cylinder 18 and the ignition device 24, with a hand regulated valve 124 by which communication between the interior of the cylinder 18 and the outside atmosphere may be established and controlled.

That portion of the cylinder 18 within the exterior casing 10 is surrounded by a sleeve or cylinder 25 between which and the exterior surface of the cylinder 18 is formed an air-jacket 26 which is constantly supplied with air under pressure through a pipe 27 and has for its outlets a ring of holes 28 in and extending around the cylinder 18 and a set of holes 30 leading into the general chamber 31 of the casing 10 near the discharge end of the cylinder 18. The chamber 31 extends around the sleeve 25 and into the head 11 and is in the nature of a reservoir adapted to hold a quantity of the gas produced with the use of the apparatus. The chamber 31 opens at its outer end into the elbow 13.

Within the cylinder 18 inwardly from the plane of the head 11 I provide any suitable baffling and flame smothering devices, those shown being a series of perforated or wire-screen disks 32 transversely fitting said cylinder, a spiral blade 33 and a rotary cowl 34 of the kind commonly used on ventilating chimneys. These baffling devices may vary widely in form and construction, and I do not confine my invention to any special character of these devices, since their duty is to retard the flow of the vapor toward the discharge end of the cylinder 18, avoid any back-flow through said cylinder and smother

the flaming mixture flowing to them from the ignition or retort chamber 35 which I create within that portion of the cylinder 18 extending outwardly beyond the head 11 and which receives the atomized oil and air from the chamber of the plug 19.

In the employment of the apparatus, when in the form shown, the oil and air under pressure are fed through the respective pipes 20, 21 into the chamber of the plug 19 and thence pass into the flaming-chamber or retort 35, and air is fed through the pipe 27 to the air-jacket chamber 26 and escapes through the holes 28 into the cylinder 18 at the discharge end of the said chamber 35 and through the holes 30 near the outlet end of the cylinder 18. The air passing into the cylinder 18 through the holes 28 is delivered transversely of said cylinder and forms a transverse wall or disk of air at the flame-smothering or outlet end of the chamber or retort 35. When the apparatus is set in operation, the atomized oil and air discharged from the plug 19 is ignited by the use of the sparking device 24, and the flaming of the atomized mixture will continue so long as the mixture is constantly fed to the chamber 35 but this flaming while continuous in the supply end of the chamber 35 is smothered or extinguished at the discharge end of said chamber, so that the mixture is only aflame during its passage through said chamber and hence only momentarily in flame, this flaming of the mixture being sufficient however to convert the oil and air into a vapor, which then mixes with the air from the holes 28 and the whole flows from the apparatus as a cool, highly efficient vaporous gas ready for instant use.

The air fed through the pipe 27 keeps the greater portion of the cylinder 18 cool and that with the air fed through the holes 28 being cool, results in assuring that the formed vapor being discharged from the apparatus shall be in a cool state.

I regard it of great importance that the cylinder 18 be kept cool and that the flame be smothered on its entrance to said cylinder, since if the walls of said cylinder became of high temperature as the result of the continuous heat in the chamber 35 the vapor would become "burnt" and of poor quality and little value. The cooling action against the cylinder 18 acts through the same to keep the walls of the retort chamber 35 from becoming incandescent and this is of value, since only a momentary flaming of the mixed air and oil is desired, this invention comprising more especially the production of a vapor, as distinguished from a fixed gas, by means and methods which involve the one (momentarily only) flaming and instant smothering of the entire supply of atomized oil and air, no further oil being added after the flaming. One result of my invention is

that I obtain a highly efficient combustible vapor suitable for internal combustion engines and one which leaves no material if any deposits along the conduits through which it passes and has no disagreeable odor.

I thus secure a continuous production of the vapor, and the essential feature of my invention resides in the momentary flaming at a given point of the moving atomized oil and air. The flaming is continuous at the supply end of the chamber and ceases at the other end thereof at or adjacent to which fresh air is delivered to the vapor and the whole caused to leave the apparatus as a cool vaporous gas efficient for several uses, including its employment as a fuel for internal combustion engines.

I will employ suitable automatic control devices or regulators for the feed of the oil and air, and do not of course limit my invention to the details of form and construction shown in the drawing, since obviously the apparatus may be modified in many particulars without departing from the spirit of my invention.

What I claim as my invention and desire to secure by Letters Patent, is:

1. The method of producing a combustible vapor for internal explosion engines which consists in passing atomized oil and air into and through a chamber, keeping the mixture momentarily aflame during its travel through said chamber, extinguishing the flame before a substantial amount of the fuel is consumed or changed to a condition other than that of vapor at a point in its travel where but for such extinguishment it could continue to burn and forcing the resultant vapor to its point of delivery, all of the oil used being subjected to the said atomizing and momentary flaming actions.

2. The method of producing a combustible vapor for internal explosion engines which consists in passing atomized oil and air into and through a chamber, keeping the mixture momentarily aflame during its travel through said chamber, extinguishing the flame before a substantial amount of the fuel is consumed or changed to a condition other than that of vapor at a point in its travel where but for such extinguishment it could continue to burn, forcing the resultant vapor to its point of delivery and cooling the vapor on its passage from said chamber, all of the oil used being subjected to the said atomizing and momentary flaming actions.

3. The method of producing a combustible vapor for internal explosion engines which consists in passing atomized oil and air into and through a chamber, keeping the mixture momentarily aflame during its travel through said chamber, extinguishing the flame before a substantial amount of the fuel is consumed or changed to a condition

other than that of vapor at a point in its travel where but for such extinguishment it could continue to burn, there feeding air to the resultant vapor to admix therewith, and forcing the vapor to its point of delivery, all of the oil used being subjected to the said atomizing and momentary flaming actions.

4. The method of producing a combustible vapor for internal explosion engines which consists in passing atomized oil and air into and through a chamber, keeping the mixture momentarily aflame during its travel through said chamber, extinguishing the flame before a substantial amount of the fuel is consumed or changed to a condition other than that of vapor at a point in its travel where but for such extinguishment it could continue to burn, there feeding air to the resultant vapor to admix therewith, causing the thus created vapor to flow through a cooling chamber, feeding an additional quantity of air to the vapor at the discharge of said cooling chamber to deprive said vapor of some of its richness, and conducting the final vapor to its point of delivery, all of the oil used being subjected to the said atomizing and momentary flaming actions.

5. The method of producing a combustible vapor for internal explosion engines which consists in passing atomized oil and air into and through a chamber, keeping the mixture momentarily aflame during its travel through said chamber, extinguishing the flame before a substantial amount of the fuel is consumed or changed to a condition other than that of vapor at a point in its travel where but for such extinguishment it could continue to burn, there feeding air to the resultant vapor concentrically around and transversely to the flow of the body thereof to create an air-wall through which the vapor must pass and mix therewith, and forcing the vapor to its point of delivery, all of the oil used being subjected to the said atomizing and momentary flaming actions.

6. Apparatus for producing a combustible vapor for internal explosion engines, comprising a chamber, means for forcing atomized oil and air into and through said chamber, means for igniting the mixture in said chamber, a conduit for vapor leading from said chamber, and means operative near the igniting means for smothering the flaming vapor before a substantial amount of the fuel is consumed or changed to a condition other than that of vapor, said means being arranged to act on the ignited mixture at an early point of its travel where but for such extinguishment the mixture could continue to burn.

7. Apparatus for producing a combustible vapor for internal explosion engines, comprising a chamber, means for forcing at-

omized oil and air into and through said chamber, means for igniting the mixture in said chamber, a conduit for vapor leading from said chamber, means for cooling said conduit and thereby the vapor passing through it, and means operative near the igniting means for smothering the flaming vapor before a substantial amount of the fuel is consumed or changed to a condition other than that of vapor, said means being arranged to act on the ignited mixture at an early point of its travel where but for such extinguishment the mixture could continue to burn.

8. The method of producing a fuel vapor adapted for use in internal combustion engines, which consists in (1) providing a substantially continuous supply of finely subdivided fuel liquid, (2) producing a flame and subjecting such liquid in its finely divided condition to the direct action of said flame for a length of time sufficient to effect only a vaporization of the liquid, (3) extinguishing the flame at a point in the progress of the vaporized material before any substantial amount of the material has been consumed, and (4) collecting the resulting product for use.

9. The method of producing a fuel vapor adapted for use in internal combustion engines, which consists in (1) providing a substantially continuous supply of finely subdivided fuel liquid, (2) producing a flame fed by a comparatively small portion of such finely divided liquid to vaporize only the remaining larger quantity of such liquid by means of and in the presence of such flame, (3) extinguishing the flame before any substantial amount of the material has been consumed, and (4) collecting the resulting product for use.

10. The method of producing a fuel vapor adapted for use in internal combustion engines, which consists in (1) providing a substantially continuous supply of finely subdivided fuel liquid, (2) producing a flame and subjecting such liquid in its finely divided condition to the direct action of said flame for a length of time sufficient to effect only a vaporization of the liquid, (3) extinguishing the flame at a point in the progress of the vaporized material before any substantial amount of the material has been consumed, (4) bringing the extinguished product at this stage into contact with a supply of superheated air which is mixed therewith, and (5) collecting the resulting product for use.

11. The method of producing a fuel vapor from oil, adapted for use in internal combustion engines, which consists in providing a substantially continuous supply of finely subdivided particles of oil and carrying them forward in the presence of air, producing a flame and subjecting such liquid in its finely divided condition to the direct action of said flame, momentarily, and then before a substantial amount of the oil affected by said flame is consumed or changed to a condition other than that of a vapor, physically terminating the burning condition of the oil particles at an early point of their travel where but for such extinguishment they could continue to burn, and finally collecting or passing the resultant product for use.

Signed at New York city, in the county of New York and State of New York this 3rd day of January, A. D. 1912.

GRANVILLE S. RIDER.

Witnesses:

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CHAS. C. GILL.