C. L. STOKES.

CARBURETER.

APPLICATION FILED AUG. 5, 1915.

1,353,288.

Patented Sept. 21, 1920.

2 SHEETS—SHEET 1.

FIG.3

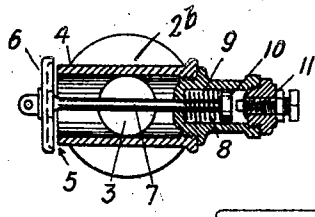


FIG.1

FIG.1A

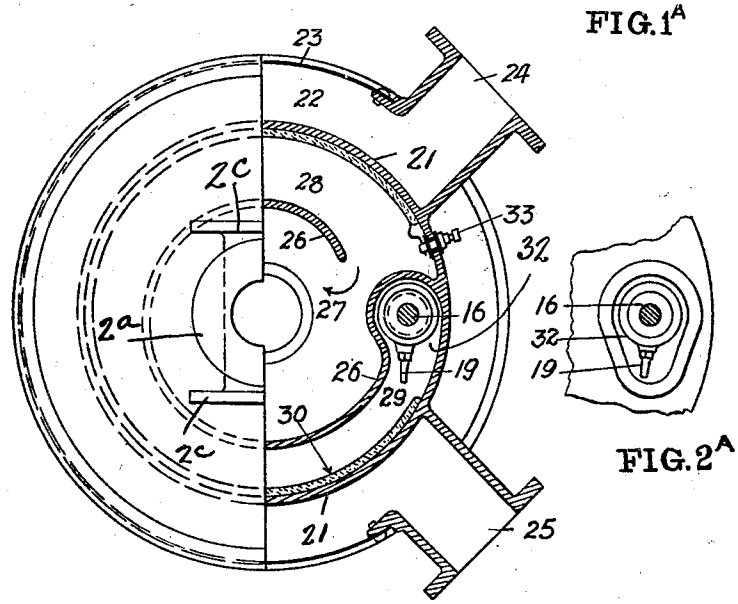


FIG.2

FIG.2A

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2 SHEETS—SHEET 2.

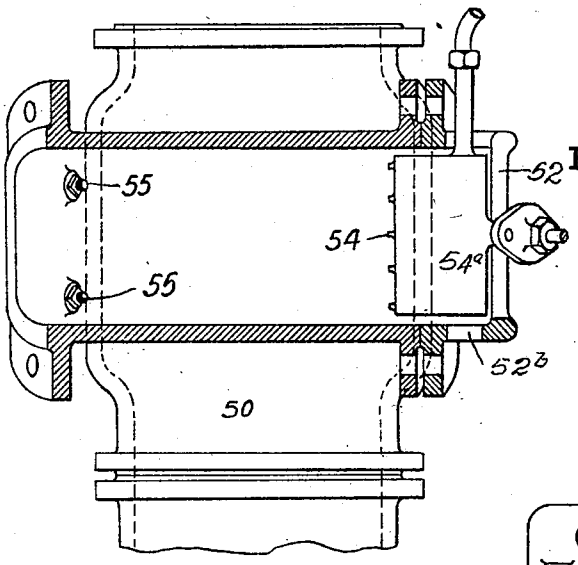


FIG. 5.

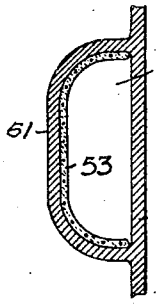


FIG. 6

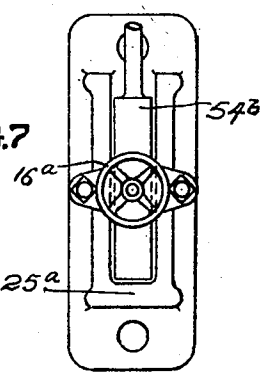


FIG. 7

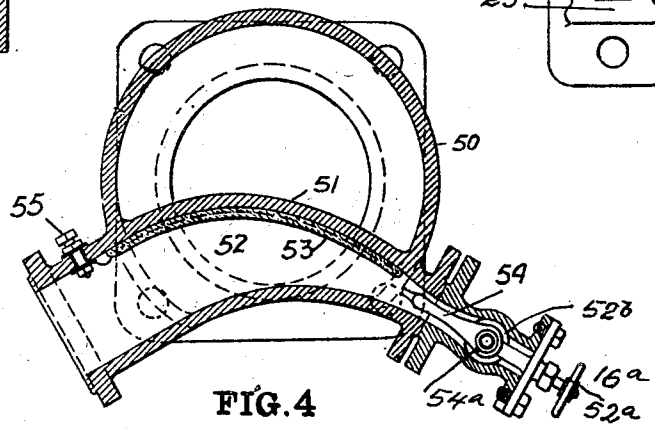


FIG. 4

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UNITED STATES PATENT OFFICE.

CHARLES LAWRENCE STOKES, OF MILLONG, VIA YOUNG, NEW SOUTH WALES, AUSTRALIA.

CARBURETER.

1,353,288. Specification of Letters Patent. Patented Sept. 21, 1920.

Application filed August 5, 1915. Serial No. 43,761.

To all whom it may concern:

Be it known that I, CHARLES LAWRENCE STOKES, a citizen of the United States, residing at Millong, via Young, New South Wales, Australia, have invented certain new and useful Improvements in Carbureters, of which the following is a specification.

This invention relates to "carbureters" for producing power gas from kerosene and like heavy gravity vaporizable oil, or from lighter gravity oils.

To attain the above object the invention comprises directing a stream of difficultly vaporizable oil on to a woven or felted absorbent means which latter forms a heater for the oil as long as it is absorbed or held in its meshes. Not only is the oil stream nozzle not brought into close proximity to the heated absorbent means but the latter is so arranged that the lighter oil portions will be swept past the same by the mixing air and only the heavier particles because of their greater inertia will be enabled to reach the heated absorbent means and held till the heat of such absorbent means causes their evaporation.

In order further to aid in the separation I provide a heated absorbent mat with the nozzle directed horizontally across its upper end so as to enable the force of gravity acting substantially at right angles to the mixing stream to give to the non-vaporized particles a longer heating trail within the absorbent mat. I thereby insure that the heavier liquid particles do not accumulate at any point but rather spread over the heating mat.

A further object of the invention is to provide further nozzles acting at different levels of the screen, so that when additional power is required the tendency of the oil to pass down the screen because of the force of gravity will still not interfere with the proper vaporizing action of the carbureter.

By causing the final mixture to take a double elbow bend upward I am enabled to practically free the mixture from any unvaporized oil which separated oil can be freed from the carbureter by the provision of a draining cup.

Three forms of carbureter according to the invention are illustrated in the accompanying three sheets of drawings respectively.

In Figures 1, 1^A, 2, 2^A, and 3 are shown details of construction of a self contained carbureter having attachments adapted for coupling to an engine exhaust circuit thereby to utilize the waste heat in the exhaust gases for the purpose of effecting vaporization of the fuel oil. These views also disclose a control system on the multiple jet principle interlocked with the engine throttle, and also means for starting the vaporization under cold conditions in which carburation of air with heavy oil fuels is usually impracticable.

Figs. 4 to 7 illustrate the application of a similar principle of construction in connection with a carbureter forming part of a muffler or exhaust pipe. In this case the details of the interlocking means for controlling the feed are not fully illustrated.

Fig. 1 is a vertical sectional elevation;

Fig. 1^A fragment sectional elevation of jet fitting for the carbureter shown in Fig. 1;

Fig. 2 half top plan and horizontal section;

Fig. 2^A fragment top plan corresponding with Fig. 1^A;

Fig. 3 detail sectional elevation of "extra air" control.

Fig. 4 is a sectional view of a modified form of the invention;

Fig. 5 a sectional view at right angles to view shown in Fig. 4;

Fig. 6 a fragment section through the carbureter chamber showing the preheater for starting purposes, or running purposes;

Fig. 7 elevational view illustrative of hand controllable feed governor.

Referring to Figs. 1 to 3—the carbureter comprises a casting having vertical walls and a cover through the top of which the eduction pipe 1 proceeds to the engine. Above the cover 2 is a flanged branch 2^a, Fig. 2, in the eduction pipe 1 which accommodates the manually controlled extra air supply fitting illustrated in detail in Fig. 3, in which 3 is the air passage, and 4 a tubular member opening into the passage way 3 and adapted to be opened as shown at 5 by drawing back a cap valve 6. The stem 7 of the cap valve is fitted with a return spring 8 in the pocket 9, and its back end 10 forms a stop engageable with the pin 11 which may be set to provide any definite minimum opening at 5 required for the purpose of allowing sufficient ingress of air for starting and slow running purposes. The flange 2^b

of the member 4 is adapted to be secured to either of the flanges 2^c, 2^c, of the branch 2^a, the other flange being closed in any suitable manner. In the eduction pipe 1 a butterfly throttle 12 is carried on a spindle 13 fitted with a lever arm 14, by means of which said spindle 13 may be turned by suitable rod connections 15. At its lower end the spindle 13 is integral with or attached to the rotatable fuel control valve 16 which is tubular, and is fed with fuel under pressure or gravity through the feed pipe 17. A casing 18 in which the rotary valve 16 works is fitted with a plurality of jet nipples 19 adapted to co-act with a plurality of slots 20 formed in the wall of the rotary valve 16. The slots 20 occupy different circumferential positions in the valve 16 with the ends of successive slots overlapping and forming the step-like arrangement shown in Fig. 1^A. Thus when the throttle 12 is closed back to the slow running position, one jet 19 only is opened, and a minimum of fuel is then discharged into the carbureting chamber. If desired of course two or other number of jets might be opened in the slow running position to provide the necessary amount of fuel. Progressively, as the throttle is moved open, one after another of the remaining jets 19 is thrown into service, until ultimately upon the full opening of the throttle all the jets are opened and deliver fuel into the carbureter.

The vertical wall 21 forms a back for an annular chamber 22 which is closed by a detachable front plate 23 secured to and conforming in curvature to the flanges of the wall 21. The chamber 22 terminates at either end in flanges or other connections 24 and 25 which may be respectively connected in the exhaust circuit so that the engine exhaust or portion of it will blow through the heating chamber 22 and warm the vertical wall 21 thereof.

The body of the carbureter contained within the circular wall 21 is formed into a spiral chamber 28 of progressively increasing transverse section by the spiral septum wall 26, a central pocket 27 forming a chamber below the eduction pipe 1. The mouth 29 of the chamber 28 is contracted and accommodates the jet nipples 19. 30 is a heating mat consisting of asbestos fiber or other suitable insulating fibrous material, woven over positive and negative circuit wires of high resistance led to terminals which are wired through a switch to an electric battery to effect preheating of the mat when starting the engine. Only one terminal 33 is shown in Fig. 2, the other being vertically beneath the same. The mat 30 is fixed against the hot wall 21 and is heated thereby. The nipple jets should be directed tangentially through the mouth 29 so that the oil spray will be directed onto the heating mat 30 and not onto the wall 26. The inclosing pocket 32 in which the valve case 18 is located is open at the top 31 to admit just sufficient air to accompany the oil spray to insure sufficient velocity to the mixture after vaporization of the oil.

The chamber 32 should be arranged in relation to the chamber 28 so that the fuel is sprayed directly onto the mat 30 and is swept over the mat, utilizing the velocity of the air entering through 31 to throw the heavier particles of fuel onto the heated surface of the mat. The heating chamber in all the figures is made circular or of an arc of a circle for this purpose.

It is found that vaporization of heavy oils is not effected satisfactorily by contact with heated metal surfaces or in a sluggish air draft; the oil flows off said surfaces, with the result that oil is wasted and floods the carbureter or cylinders and passes to the cylinders in an unvaporized condition. When however the oil is sprayed onto a fibrous mat which is heated to the necessary temperature, and a rapid draft passes over the mat, it is held by the mat while it remains liquid and when converted to vapor passes away to the eduction pipe in a substantially completely vaporized condition. It is important that only a limited amount of air shall be introduced into the carbureter with the oil; the necessary addition of air to produce the required explosive mixture should be made after the oil has been vaporized.

The modified form of the apparatus shown in Figs. 4 to 7 is an adaptation of the principle of construction already described. In this case 50 is a muffler or other chamber in the exhaust circuit; one wall 51 of this chamber forms a septum dividing it from the vaporizer chamber 52. The wall 51 is heated by the exhaust gases and maintains a sufficiently high degree of temperature in the resistance wire containing fiber mat 53 to effect vaporization of the oil sprayed onto the said mat from the jets 54. The chamber 52 is curved to better facilitate distribution of the oil spray on the mat 53 through utilizing the centrifugal action before mentioned. 55 are the contact plugs through which an electric circuit is established through resistance wires arranged in the mat 53 in a similar manner to those provided in the mat 30, for the purpose of preheating the same to enable starting up of the engine.

The jet nipples 54 may be one or more in number controlled by a valve such as 16, Fig. 1, which may be controlled by a wheel 16^a so that a proper number of jets to supply the required volume of fuel may be opened progressively to correspond with the opening of the engine throttle. In this modified form, air is admitted to the cham-

ber 52 through the slot 52[a] and the aperture 52[b] and it will travel around the casing 54[a] containing the hydrocarbon control valve and intimately mix with the hydracarbon.

I am not limited to a structure the elements of which are so disposed that the oil spray is driven directly by the jets onto a heated mat. Obviously the advantages attainable by the utilization of a hot mat vaporizer are procurable to a greater or lesser extent so long as the hot mat is located at any place in the induction system where it will intercept unvaporized particles of oil which are carried in suspension in the mixture, consequently it may be fitted at any place in an engine induction pipe and the exhaust gases then brought around that place in said pipe to transfer heat from such gases to said pipe and through it to said mat to promote vaporization of the intercepted oil particles.

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

1. A vaporizing device for internal combustion engines including a conduit having a curved inner wall formed to set up a centrifugal action on a fluid passing therethrough; means for heating said curved wall, a mat of absorbent material lining the interior surface of said curved wall and located where centrifugal action occurs, and means for introducing a current of fuel-laden air tangentially into said conduit, for causing the fuel-laden air to sweep through the conduit in a curved path over the surface of said mat to centrifugally deposit on said mat the heavier particles of the fuel carried by the air whereby such heavier particles may be vaporized.

2. A vaporizing device for internal combustion engines, comprising two chambers divided by a common curved wall presenting a concave interior surface to one of said chambers, means for introducing a heated fluid into the other chamber to heat said common wall, a mat of absorbent material lining the concave interior surface of the first chamber, and means for causing a current of fuel-laden air to sweep in a curved path through said first chamber over the surface of said absorbent mat to centrifugally deposit on said mat the heavier fuel particles carried by said air.

3. The combination with an internal combustion engine inlet pipe having a section of curved form for conducting fuel-laden air to said engine, of means for bringing exhaust gases into contact with the exterior of the concave wall of said pipe section to heat the same, and a mat of absorbent material lining the interior surface of said concave wall and heated thereby to vaporize the heavier fuel particles centrifugally deposited thereon from said fuel-laden air.

4. The combination with an internal combustion engine having an exhaust pipe section, of an inlet pipe section associated with said exhaust pipe section, the interiors of said sections being separated by a curved wall presenting a concave interior surface to said inlet pipe section, and a mat of absorbent material lining the concave surface of said dividing wall and heated by contact therewith, to vaporize the heavy fuel particles centrifugally deposited thereon from fuel-laden air passing through said inlet pipe section.

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

CHARLES LAWRENCE STOKES.

Witnesses:
VERNON RICHARDS,
H. C. CAMPBELL.