March 17, 1936. W. T. FARROW ET AL 2,034,430

CARBURETOR

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Fig. 1

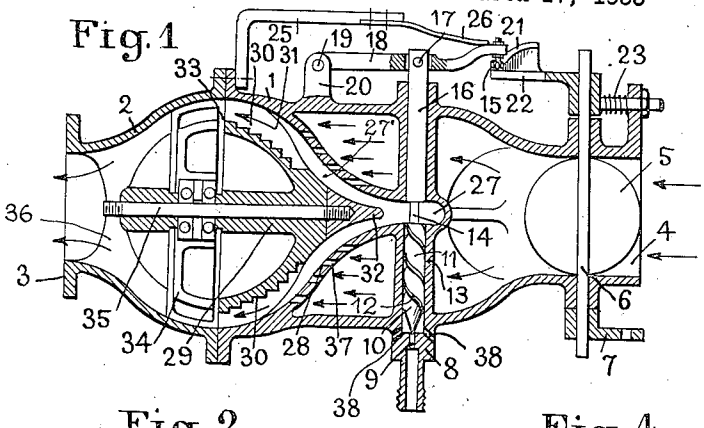


Fig. 2

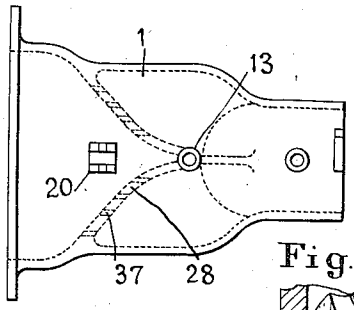


Fig. 4

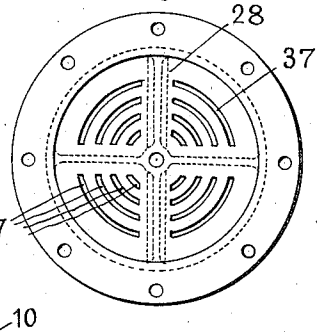


Fig. 13

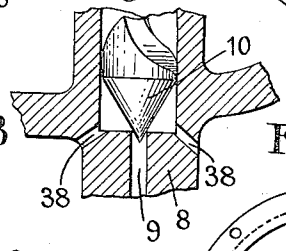


Fig. 3

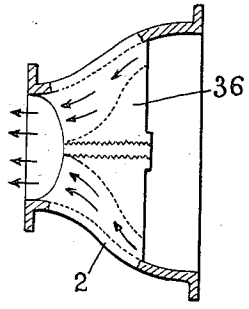


Fig. 5

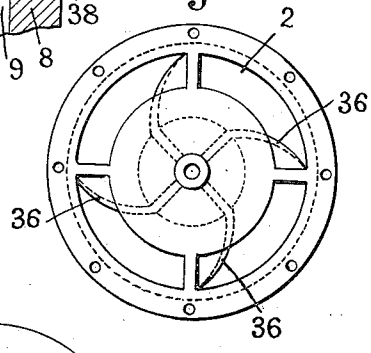
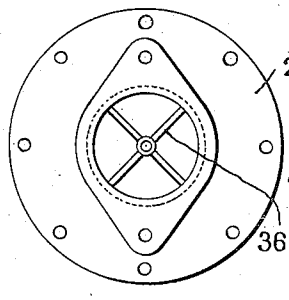


Fig. 6



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Fig. 7

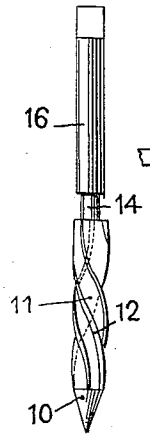


Fig. 8

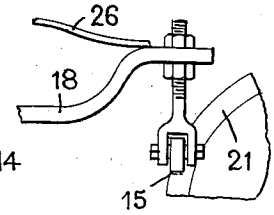


Fig. 11

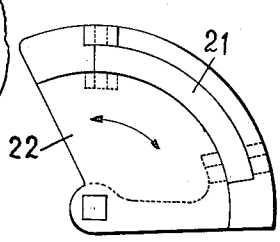


Fig. 9

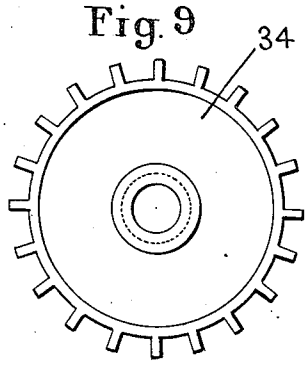


Fig. 10

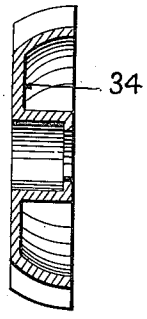
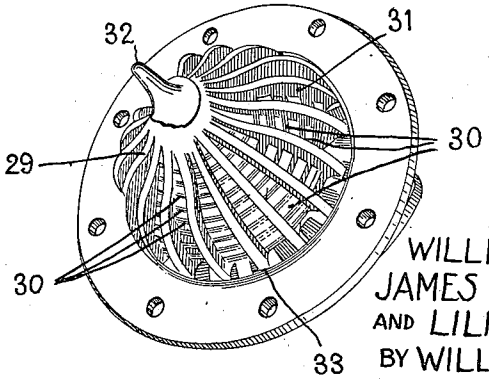


Fig. 12



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Patented Mar. 17, 1936 2,034,430

UNITED STATES PATENT OFFICE

2,034,430

CARBURETOR

William Thomas Farrow, Parkstone, Lilian Farrow, deceased, late of Parkstone, by William Thomas Farrow, administrator, Parkstone, and James Cyril Harvey Boyce, Parkstone, England

Application March 17, 1933, Serial No. 661,422
In Great Britain and France October 26, 1932

7 Claims. (Cl. 261—50)

The invention has for its object a method of feeding internal combustion engines operated by means of fuels of all kinds and densities and a device for applying said method.

The carburetors used for feeding internal combustion engines comprise, generally speaking, a distributing device or nozzle for said liquid fuel which is swept into a manifold by the air sucked by the motor. Said arrangement allows only a very small part of the air sucked by the motor to be brought into contact with said liquid fuel which does not secure the composition of a sufficiently homogeneous mixture and prevents a good operation of the motor while causing a consumption of the fuel which is greater than is really necessary.

The method according to this invention which remedies above cited drawbacks, consists in separately bringing each of the constituents of the combustible mixture, into a state of an extreme division, said constituent parts being allowed to contact with each other only once said division has been obtained, with a view to securing the intimate contact of said constituents and the formation of a homogeneous mixture which allows a better operation of the motor and a reduction of the consumption of fuel, due to the more complete combustion which is obtained.

In carrying the invention into effect, a dividing or atomizing surface is located in the path of the liquid fuel, said surface being provided with conveniently staggered protuberances or steps which, under the suction effect of the motor, secure the division in the shape of fine particles of liquid fuel, and said surface thus covered with said particles is met with streams or sheets of air corresponding to the deposit lines of the particles of fuel, the whole of the constituents thus mixed being afterwards acted upon by the pallets or blades of a wheel conveniently rotated which secures the homogeneity of the mixture before the same passes into the manifold of the motor.

In the accompanying drawings which show by way of example an embodiment of a carburetor according to this invention, said carburetor being designed for an internal combustion engine:—

Fig. 1 is a diagrammatical longitudinal section of the carburetor.

Fig. 2 is a plan view of the fore part of the carburetor casing.

Fig. 3 is a similar view of the rear part of said casing.

Fig. 4 is an end view of Fig. 2 seen from the left hand,

Fig. 5 is an end view of Fig. 3, seen from the right hand,

Fig. 6 is an end view from the left hand of Fig. 3.

Fig. 7 is an elevation of the regulating device for feeding the liquid fuel.

Fig. 8 is a detail on a larger scale of a device controlling the opening of the jet control pin.

Figs. 9 and 10 are a front view and an axial section respectively of the paddle wheel located in the path of the combustible mixture.

Fig. 11 is a plan view of a cam for the automatic control of the lever of the distributing regulator of liquid fuel.

Fig. 12 is a perspective view of the atomizing device for liquid fuel which is shown together with its carrying device.

Fig. 13 shows a part in section on a larger scale of Fig. 1.

The carburetor comprises a casing or body made of two sections 1, 2, connected by a collar 3 at one end with the feeding manifold of the motor not shown in the drawings and having at the other end an opening 4 provided with a regulating throttle valve 5 for the air. Said throttle valve 5 is conveniently keyed on a spindle 6 provided with an operating lever 7 connected with a controlling device not shown in the drawings and located near the hand of the driver.

The body or casing 1 has a nozzle 8 which is connected by means of convenient piping, not shown in the drawings, with a fuel supply tank not shown, said tank being preferably a constant level tank or float chamber of any approved arrangement. Said nozzle has a distributing orifice 9 provided with an obturating needle valve 10 which, as shown in Fig. 7, comprises a body 11 provided with helical wings or ribs 12. Said body 11 is slidably located in a sleeve 13 (Fig. 1) solid with casing 1 and constitutes a part of a stem 16 which is guided in the upper part of sleeve 13 and is connected by a pin 17 (Fig. 1) with an arm 18 one end of which is pivoted on a pin 19 located in ears 20 of casing 1.

The free end of arm 18 freely rests through the medium of a roller 15 (Fig. 8) upon a cam 21 forming a part of a sector 22 (Figs. 1 and 11) which is keyed upon the operating spindle 6 of the air regulating throttle valve 5, the movement of which is conveniently limited by a screw 23 (Fig. 1). Roller 15 is maintained in contact with cam 21 by means of a spring 26, arranged at the end of a bracket 25, secured on the body 1.

Cam 21 may be solid with plate 22, or it is preferably secured upon the latter by any means thus allowing both plate and cam to be made of conveniently different metals or substances.

As it is more particularly seen in Figs. 1 and 7, the part 11 is connected with the stem 16 through a reduced part 14 which, for the normal position of the carburetor parts shown in Fig. 1, is located in a space 27 provided in sleeve 13 and conveniently insulated from the air inlet 4 of casing 1.

The space 27 is connected with a divided chamber provided between a wall 28 and an atomizing cone 29 shown in perspective view in Fig. 12 and provided with circular steps 30 in any convenient number which are crossed by ribs 31 thus constituting channels, the cross section of which increases from the point 32 of the cone 29 to the base 33 of said cone.

The wall 28, located in front of the atomizing cone 29, is provided with annular perforations or slots 37 constituting dividing canals which direct upon steps 30 the air entering from the air inlet 4.

Behind the atomizing cone 29 is located in the part 2 of the casing a blade or paddle wheel 34 (Figs. 1, 9 and 10) which is carried preferably by means of ball races on the pin 35 of the cone 29. The casing 2 is provided with stationary directing wings 36 with a view to causing the combustible mixture to be whirled in the feeding manifold of the motor not shown.

The operation is as follows:—

When at rest, the motor being stopped, the throttle valve 5 closes the opening 4 of air inlet, the spindle 6 of said valve occupies, by reason of the position of its controlling lever 7, a position such that the lower part of cam 21 of blade 22 is located under the free end of arm 18. The needle 10 is applied, by its own weight and the spring 26, on the orifice 9 of the fuel inlet, both air inlet and fuel inlet being thus closed.

During the normal operation of the motor, the speed of same is regulated by the position of the throttle valve 5 controlled by the device not shown in the drawings which, by rotation of the spindle 6, causes the cam 21 to slide under the roller 15 of arm 18, and raise the stem 16, which in time raises the needle valve 10 from its seat. Due to the suction of the motor transmitted through chamber 27, the needle 10 which is raised, allows a quantity of liquid fuel to pass through the nozzle 9 and rise in the sleeve 13 between the helical wings 12 of body 11, to reach space 27. Said liquid fuel is caused, under the suction effect of the motor, to be sprayed on the dividing cone 29 from the point 32 of same, to the circular steps 30 (Figs. 1 and 12) along the canals constituted by the ribs 31, the breaking surfaces constituted by steps 30 being thus uniformly covered with a thin liquid film constituted by extremely finely divided particles or droplets of fuel.

The secondary air sucked in by the motor and which separately enters the casing 1—2 through the air inlet 4 in a quantity regulated by the position of the throttle valve 5, passes around the sleeve 13 and enters the perforations or slots 37 provided in wall 28 and is thus projected as in sheet formation on the steps of the atomizing cone 29 which are covered with liquid fuel as aforesaid thus causing said fuel to be perfectly vaporized and constituting a thorough homogeneous mixture by reason of the extreme division effected as well on the secondary air as on the liquid fuel prior to the contact of both constituents.

The combustible mixture constituted by the secondary air loaded with fuel, is further agitated by the blades or paddles of wheel 34 thus perfectly securing the homogeneity of said mixture which afterwards receives from stationary blades 36 a whirling movement which favors the maintenance of the homogeneity of said mixture which afterwards passes to the motor, thus securing a good ignition and a complete combustion inside the cylinders of said motor.

The arrangement of the needle 10, the raising of which is regulated by the operation of the throttle 5, secures the constant retention of the proportion desired between air and liquid fuel, that is to say that, at all openings of the throttle, a correct mixture is provided for the motor.

In order to allow the feeding of the motor at low speeds, throttle 5 being shut, auxiliary air inlets 38 are provided on the lower end of sleeve 13 as shown in Fig. 13, a convenient flow of fuel being thus provided for. Said auxiliary air inlets, aside from the jet of liquid fuel entering into the lower end of sleeve 13 to be atomized, and thus provide the primary air which with said fuel forms an emulsion which facilitates the carrying of the same into said sleeve and its spraying upon the atomizing cone 29.

The number of ribs 31 provided on the cone 29 may vary according to the needs as well as the thickness of said ribs. The number and the height of the circular steps 30 may also vary according to needs and the shape of orifices or perforations provided in wall 28 could be different from the shape shown in Fig. 4 and be constituted by rows of for instance circular perforations located according to directions corresponding to the shape of the circular steps 30.

Steps 30 as well as the orifices or slots 37 may have any other shape than circular, though circular shape gives satisfactory results for a good division as well of air as of liquid fuel. Ribs 31 may have a straight, helical or other shape or arrangement. The carburetor may be made of any dimension in any convenient substance and comprise any number of parts for feeding internal combustion engines. It could also be used for producing any mixture or combination of gases or vapors for any use.

What is claimed is:—

1. A carburetor for producing a combustible charge for an internal combustion engine from air and a liquid fuel, comprising a casing having an interior partition wall dividing the casing into two separate compartments, one of which compartments is adapted at one end to receive fuel and at the other end open for discharging the charge mixture, and is furthermore interiorly provided with a fixed atomizing body spaced from the walls within said casing, leaving an atomizing space between said body and the interior of the casing, which body has an atomizing surface adapted to receive the fuel thereon, means for introducing fuel into said atomizing space and into contact with the atomizing surface of said body, and means for introducing air for the charge into said one compartment from the other compartment including in the partition wall intermediate said compartments a plurality of perforations serving to divide the air entering from said other compartment into a plurality of streams directed against said atomizing body in order to cause the air thus introduced to absorb fuel from the atomizing surface of said body.

2. A carburetor according to claim 1 wherein the fixed atomizing body is approximately conical in form and provided with spaced ribs converging toward the apex of said atomizing body and subdividing the space about the body within the casing into a plurality of channels for the passage of fuel and air and serving to promote mutual mixture thereof.

3. A carburetor according to claim 1, wherein the fixed atomizing body is approximately conical in form and provided with spaced and exteriorly curved ribs converging toward the apex of said atomizing body and subdividing the space about the body within the casing into a plurality of channels for the passage of fuel and air and serving to promote mutual mixture thereof.

4. A carburetor according to claim 1, having a pivoted air throttle member provided with an exterior cam member moving rigidly with said throttle member, an axially movable needle valve controlling the inlet of fuel into that end of the one compartment receiving the liquid fuel and having an axial stem projecting to the exterior of the casing, and a lever pivoted at a fixed point upon said casing and both pivotally connected to the axial stem of said needle valve and extending into contact with said cam, so that movement of the air throttle member will cause predetermined correspondence in movement of said needle valve.

5. A carburetor according to claim 1, wherein the perforations in the partition wall are provided in the form of concentric rows of apertures, while the conical portion of the atomizing body faces said apertures and is formed into a series of concentric steps in order to further promote the mixture and carburetion of the fuel with the air.

6. A carburetor according to claim 1, wherein not only a main air intake is provided in the casing for supplying the bulk of the air intended for the charge, but also one or more auxliary air inlet ports to the fuel are provided for starting and for low speeds.

7. In a method for producing a combustible charge for an internal combustion engine, the steps which consist in utilizing the suction of the engine to separately produce an extremely subdivided condition of both the liquid fuel and secondary air intended to form the charge, primarily introducing the fuel and subdividing the same by means of primary air drawn in by said suction of the engine bringing the fuel in its subdivided condition into direct contact with a fixed object providing an atomizing surface, introducing secondary air and subdividing the same, and bringing said secondary air in its subdivided condition into contact with said object, preparatory to causing the secondary air and the fuel to make mutual contact and form the charge mixture at the atomizing surface of said fixed object.

WILLIAM THOMAS FARROW,
Pro se and as Administrator for Lilian Farrow, Deceased.
JAMES CYRIL HARVEY BOYCE.