D. L. F. COOMBS.

CARBURETER.

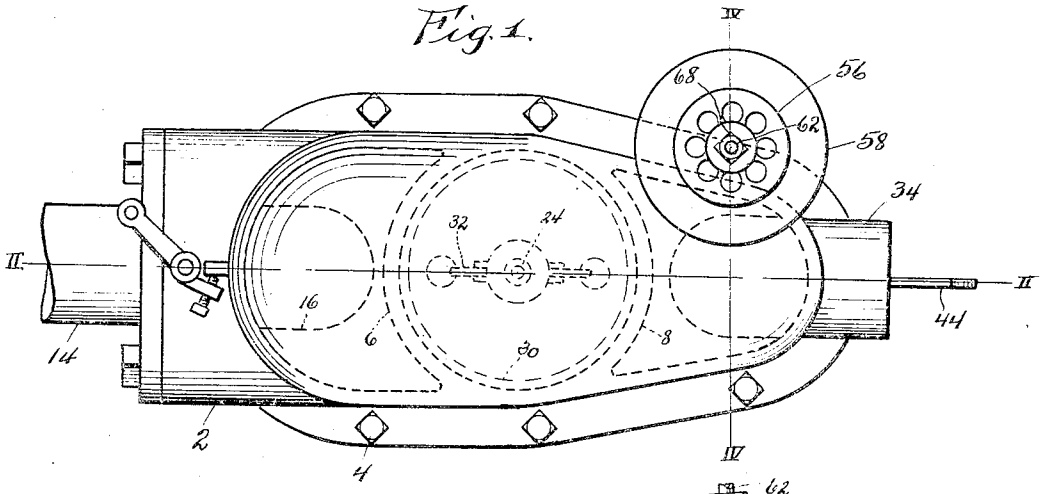
APPLICATION FILED FEB. 14, 1917.

1,336,070.

Patented Apr. 6, 1920.

2 SHEETS—SHEET 1.

Fig. 1.



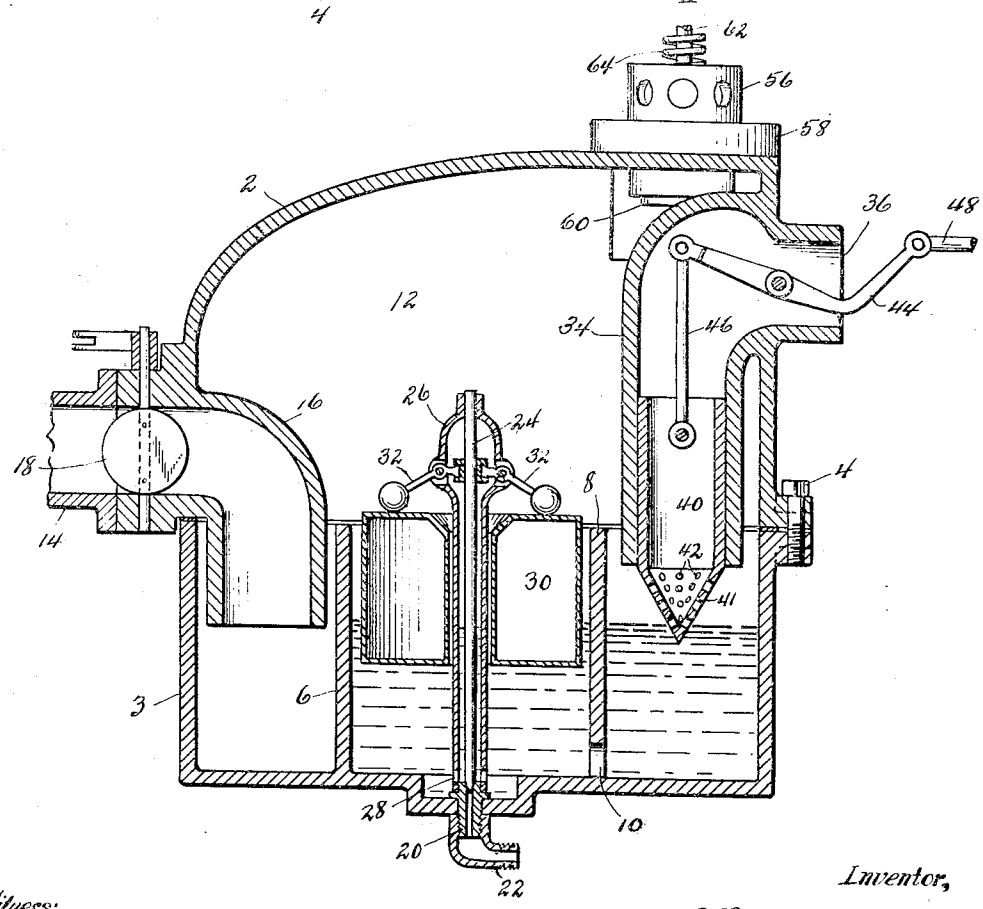


Fig. 2.

Witness:

R. Hamilton

Inventor,

D. L. F. Coombs,

By Chas. W. Gerard,

Attorney.

D. L. F. COOMBS.

CARBURETER.

APPLICATION FILED FEB. 14, 1917.

1,336,070.

Patented Apr. 6, 1920.

2 SHEETS—SHEET 2.

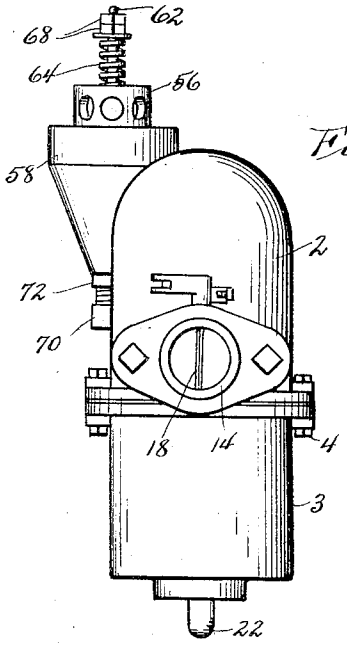


Fig. 3.

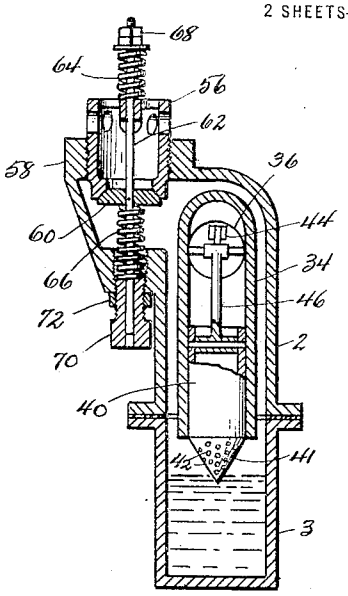


Fig. 4.

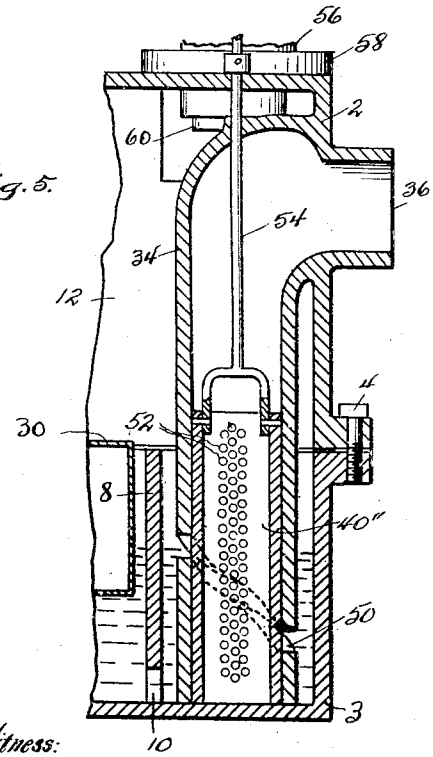


Fig. 5.

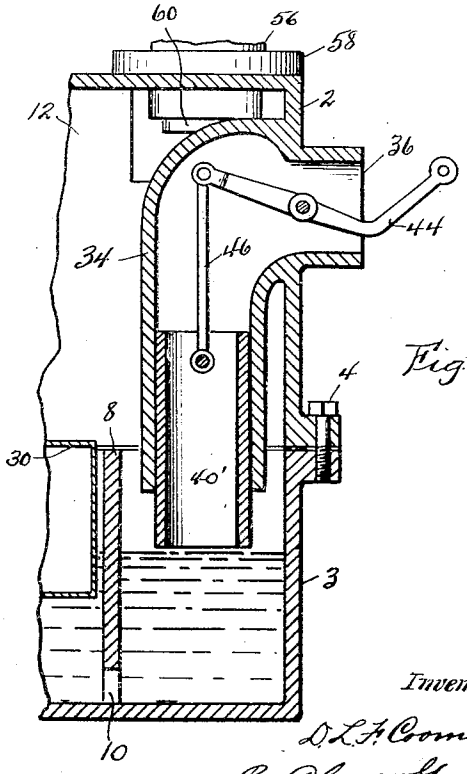


Fig. 6.

Witness:

R. C. Hamilton

Inventor,

D. L. F. Coombs,

By Chas. W. Knauff

Attorney.

UNITED STATES PATENT OFFICE.

DANIEL L. F. COOMBS, OF KANSAS CITY, MISSOURI.

CARBURETER.

1,336,070. Specification of Letters Patent. Patented Apr. 6, 1920.

Application filed February 14, 1917. Serial No. 148,599.

To all whom it may concern:

Be it known that I, DANIEL L. F. COOMBS, a citizen of the United States, residing at Kansas City, in the county of Jackson, State of Missouri, have invented certain new and useful Improvements in Carbureters, of which the following is a full and exact specification.

The present invention relates to means of carburation, and aims to devise an improved construction of such means with a view to producing a more effective and intimate mixing action between the liquid fuel used and the air which is supplied thereto, with the ultimate object of deriving a satisfactory grade of dry gaseous fuel from practically any of the available grades of liquid fuel.

To this end an arrangement has been provided whereby the engine suction is so utilized as to deliver air to the liquid fuel supply in such a manner as to produce a flow of air into or through said liquid and effect a turbulent churning action on the latter and a consequent complete and thorough intermingling of the air and liquid.

It is also sought to devise a construction of the general character indicated in which proper provision is made for varying the action of the air on the liquid fuel and the consequent intermingling effect, for the purpose of regulating the character of the explosive mixture.

It is a further object to produce an extremely simple and efficient arrangement and construction for accomplishing the desired purpose, having no complicated mechanism to get out of order, and which will be economical and inexpensive to manufacture.

With these general objects in view, the invention will now be described with reference to the accompanying drawings illustrating means for embodying the improvements in actual practice, after which those features and combinations deemed to be novel will be set forth and defined in the appended claim.

In the drawings—

Figure 1 is a plan view of a carbureter embodying the present improvements;

Fig. 2 is a vertical section taken on the line II—II of Fig. 1;

Fig. 3 is an end elevation of the device, but on a reduced scale;

Fig. 4 is a transverse section taken on the line IV—IV of Fig. 1, but also on a smaller scale;

Fig. 5 is a fragmentary vertical section showing a modified form of mixture controlling means; and

Fig. 6 is a similar section showing a still further alternative form of mixture controlling means.

Referring to the said drawings in detail, these illustrate a carbureter casing suitably cast in upper and lower sections 2 and 3, respectively, adapted to be sealed and secured together in the relation shown by means of bolts or screws 4. The lower section 3 is formed with partitions 6 and 8 for inclosing a liquid fuel supply chamber, the space between said partitions being arranged as a float chamber (see Fig. 2) in communication with the remainder of the fuel supply chamber by way of the opening 10 in the base of the partition 8. The remainder of the space forming the interior of the casing may be designated as a vacuum chamber 12, the vacuum action within which is maintained by the engine suction through the connection 14 leading from the intake manifold of the engine (not shown) and communicating with the chamber 12 by way of the elbow conduit passage 16 which is provided with the ordinary butterfly valve control 18 and extends down into the section 3 of the casing between the partition 6 and the outer wall of the casing. Therefore, it will be apparent that the carbureter shown consists of a casing having a substantially circular liquid chamber in which operates the float 30, a second chamber for the perforate portion 41 of the valve which communicates with the liquid chamber through the port 10, and a suction port diametrically opposite the second chamber from which the tube 16 leads, and that an air inlet port on the casing above the liquid level in the inner chamber and a sliding, perforate, air-controlled valve member 40 is movable toward and away from the liquid in the second chamber.

Fuel is supplied to the float chamber through the bottom thereof which is fitted with the valve plug 20 having its outer end secured to a pipe connection 22. The inner end of the valve plug 20 provides a valve seat for a needle valve 24 and also supports a tubular guide member 26 having the ports 28 adjacent said valve seat. The valve 24

is automatically actuated to maintain a substantially constant level of the fuel in said fuel chamber by the action of a float 30 having a central passage for accommodating the guide member 26 and adapted to engage valve-actuating arms 32 which are pivotally mounted within the upper end portion of the member 26 where said arms are provided with suitable connections with the stem of said valve.

Air for carburation purposes is admitted from the exterior of the casing by way of an elbow passage 34 formed by a conduit constructed integral with the upper section 2 of the casing, said conduit having the inlet opening 36 and extending down into the fuel supply chamber to a level somewhat above the surface level of the liquid fuel. An adjustable member is associated with this conduit whereby the flow of air may be carried on down into the body of said liquid fuel and a part or all of the air delivered to the liquid below the level of its surface. One form of such adjustable member is illustrated in Figs. 2 and 4, and comprises a tubular slide 40 operating within the vertical portion of said conduit 34 and having its lower end formed as an inverted cone extension 41 provided with perforations 42 for distributing the flow of air as it enters the liquid. The adjustable slide member 40 may be regulated by means of a lever 44 pivoted within the horizontal portion of the conduit 34 and connected by a link 46 with the slide 40, said lever being operated by a rod 48 from the driver's seat. The arrangement is such that the slide may be elevated practically clear of the surface of the liquid or be lowered sufficiently to submerge the extension 41 to any desired extent below the level of the liquid, the drawings illustrating said slide member in its raised position.

Alternative forms of construction for regulating the degree of intermingling of air and liquid fuel are illustrated in Figs. 5 and 6. The form shown in Fig. 6 differs from that already described merely in constructing the adjustable slide member 40′ as a hollow cylinder of uniform diameter and raising and lowering the same to bring its lower end to the proper elevation with reference to the surface of the liquid fuel, but omitting the feature of the air distributing openings. In the modified construction represented in Fig. 5, the conduit 34 is extended entirely to the bottom of the liquid fuel supply chamber and the lower half of said conduit provided with a helically arranged slot opening 50. The adjustable slide member 40″ in this case is also lengthened to extend to the bottom of the fuel supply chamber and provided with a longitudinal series of perforations 52 for coöperating with the slot opening 50 in the delivery of the air to the fuel liquid. The adjustment of the slide member 40″ is effected by rotating it through the medium of a rod 54 extending up through the section 2 of the casing where any suitable connection (not shown) may be associated with the rod for operating the same. Obviously rotating the slide member 40″ into different positions serves to present different openings 52 in register with the opening 50, and this register of the openings, and consequent delivery of the air, may be made to take place at any desired elevation.

An auxiliary air valve construction is provided in communication with the vacuum chamber 12, the same comprising a valve cage 56 adapted to be threaded into an offset portion 58 of the section 2 of the casing, said valve cage carrying the check valve 60 secured to a valve stem 62 and operating under the influence of the engine suction against the action of two springs 64 and 66, the tension of which may be adjusted in an obvious manner by means of the nuts 68 retaining the spring 64 and the guide plug 70 threaded into said offset portion 58 into engagement with the spring 66 and held set by the lock nut 72.

It will thus be apparent that a simple and effective arrangement and construction have been devised for carrying out the aforesaid objects of the invention. With the vacuum chamber 12 subjected to the influence of the engine suction by way of the connection 14, it will be understood that a reduced pressure is maintained in said chamber, for compensating which air will of course be drawn in through the conduit 34. By means of the form of conduit shown, having the adjustable extension or slide member, the principle of the spray method of carburation is dispensed with and the air is conducted down into the body of the liquid fuel below its surface, and forced to surge through the liquid with the result that a vigorous churning or ebullition of the liquid is produced so that the air is intimately mingled therewith. The degree of richness of the explosive mixture which is formed may be conveniently and accurately controlled by means of the adjustable slide member or extension, and where this member is formed with the perforations for distributing the air flow, this produces somewhat of a nozzle effect, distributing the air flow and dividing it into strong vigorous currents greatly accelerated in velocity, which simply surge through the fuel liquid and violently agitate the same. The arrangement of perforations as in Figs. 2 and 5 permits the slide member to be adjusted so that the air flow may be caused to take place entirely through the mass of liquid, or entirely over the surface of the same, or partly above and partly below said surface,

as conditions may require. By this novel arrangement for feeding the air through the fuel liquid, an improved gaseous product is obtained, as compared with that formed by spray carburation, in that the present construction produces a dry gaseous mixture adapted for more perfect combustion. The spray method appears always to produce a more or less moist mixture, due to its retaining fine particles of the liquid fuel, the presence of which may always be discovered by burning some of the mixture, which will throw a flaring and sparkling flame; whereas a burning test of a mixture as produced by the improved carbureter will show a clear blue flame. This would appear to be due to the fact that with the spray type of device the fuel is subdivided into fine particles which are carried along bodily with the air and outside the mass of the liquid fuel, and some of these particles never become completely volatilized; but with the present construction the vaporizing action all takes place either within the body or mass of the liquid fuel or directly from its surface, so that the fuel product thus formed leaves the liquid mass as a dry mixture without any appreciable amounts of liquid particles of the fuel being carried along with the current. The action of the improved construction has proved to be of such a thorough and effective nature that any of the common forms of hydrocarbon fuels, including the inferior grades, may be utilized, as well as denatured alcohol and the like.

It will also be seen that the form and arrangement of the parts of the device are such as to facilitate the manufacture of the same in an economical and inexpensive manner.

While the foregoing represents what have been found to be practical and efficient forms of construction for embodying the improvements, the right is reserved to such formal departures therefrom as may fairly be embraced within the scope of the appended claim.

I claim:—

A carbureter comprising a casing, a liquid chamber in the casing having a float-control valved-inlet opening therein, a second chamber communicating at its lower portion with the first chamber and having a space above it, a third chamber diametrically opposite the second chamber, a suction pipe depending within said third chamber and communicating with said space, an air inlet port in the casing above the liquid level in the second chamber, a sliding air-controlling member in the air-inlet port and movable toward and away from said liquid and an auxiliary air valve adapted to admit air to said space.

In witness whereof I hereto affix my signature.

DANIEL L. F. COOMBS.