R. H. SHOOBRIDGE & A. F. GUNSTONE.

CARBURETER.

APPLICATION FILED JAN. 11, 1913.

1,104,560.

Patented July 21, 1914.

2 SHEETS—SHEET 1.

Fig. 1.

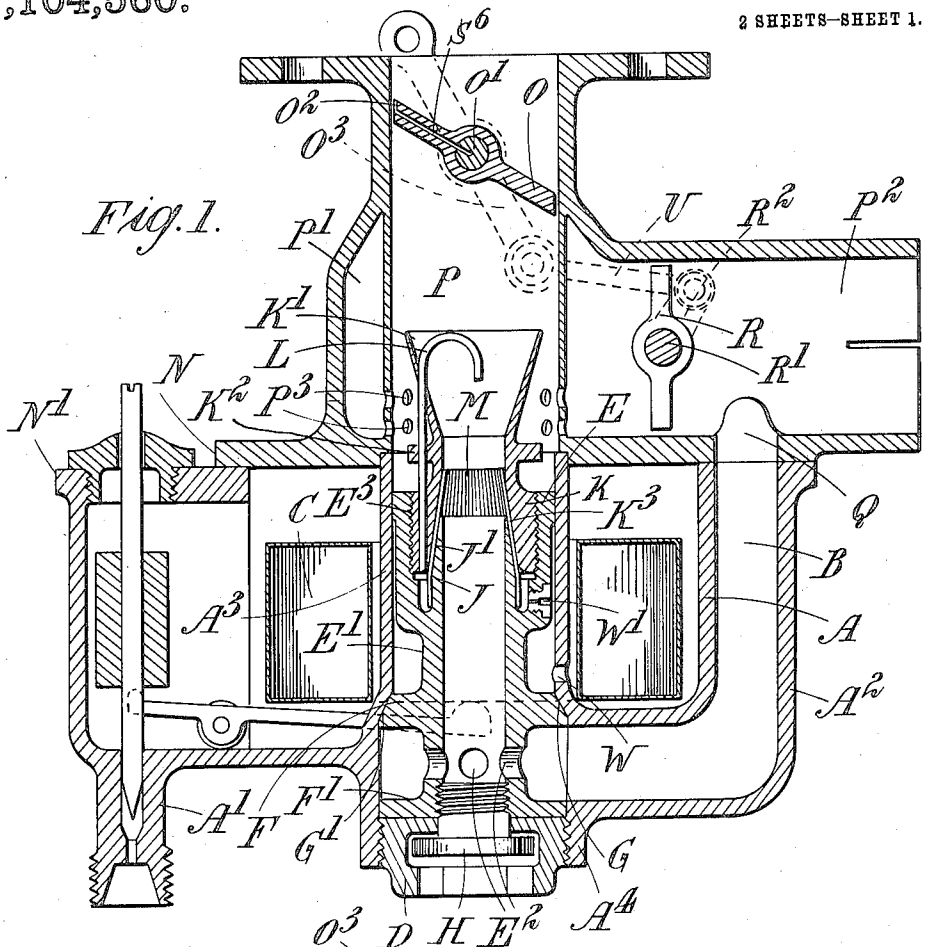
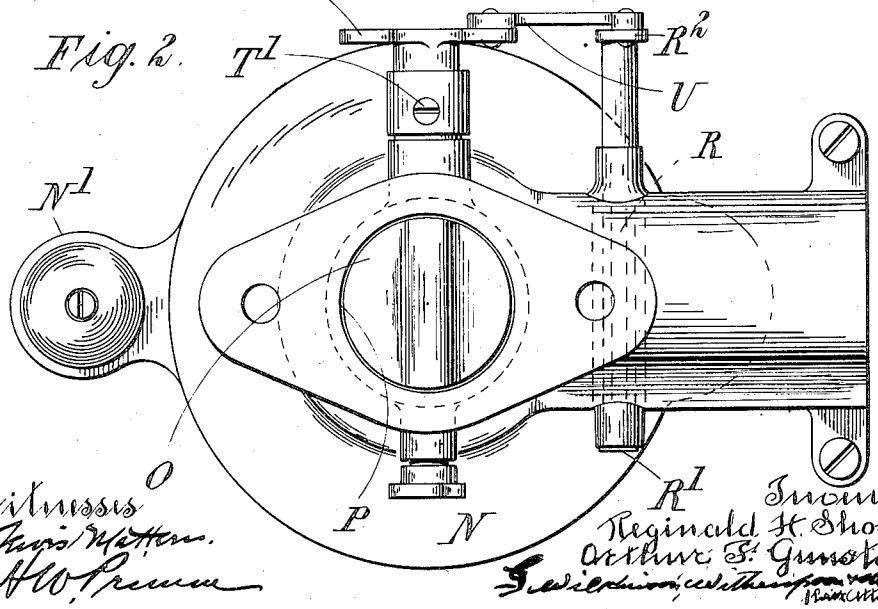


Fig. 2.



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2 SHEETS—SHEET 2.

Fig. 3.

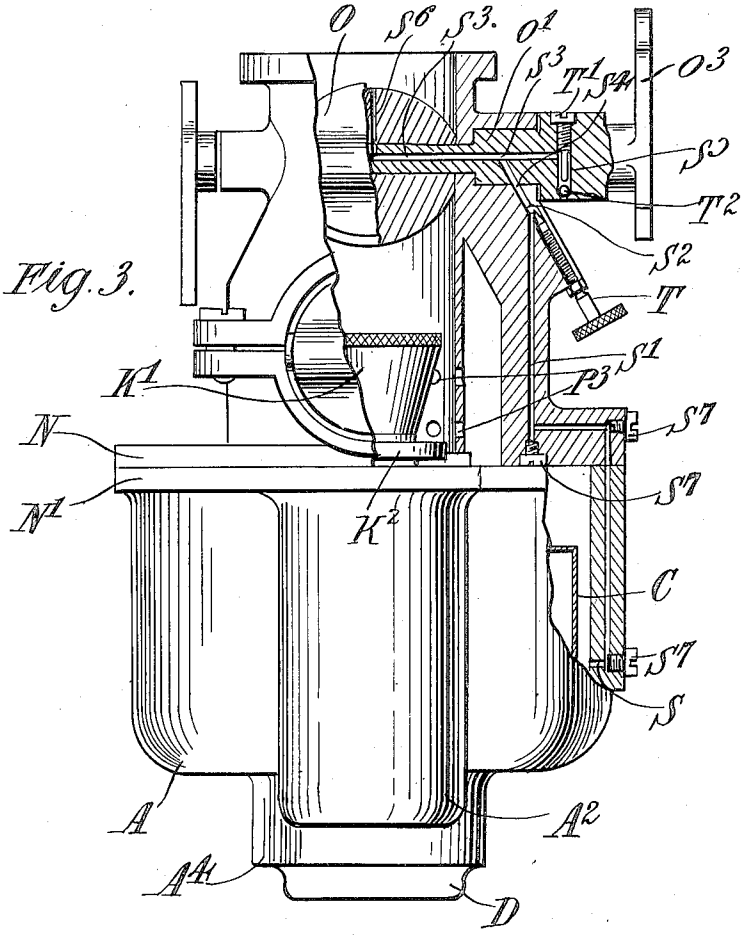


Fig. 4.

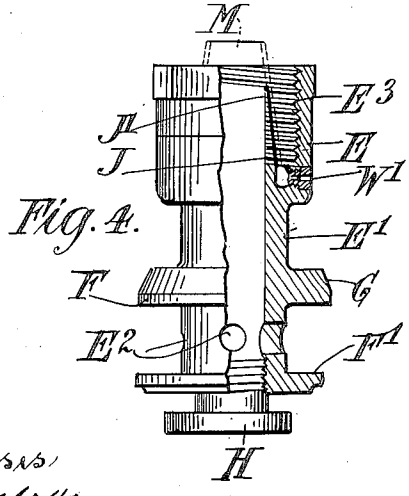
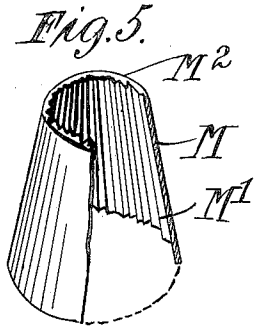


Fig. 5.



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UNITED STATES PATENT OFFICE.

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CARBURETER.

1,104,560. Specification of Letters Patent. Patented July 21, 1914.

Application filed January 11, 1913. Serial No. 741,518.

To all whom it may concern:

Be it known that we, REGINALD HOFFGAARD SHOOBRIDGE and ARTHUR FREDERICK GUNSTONE, subjects of the King of England, both residing at Bath, England, have invented certain new and useful Improvements in Carbureters, of which the following is a specification.

Our invention relates to carbureters, and consists in the constructions, combinations and arrangements of parts hereinafter described and claimed.

Our invention resides in the provision of a carbureter of the capillary feed type constructed to provide a hydrocarbon chamber in communication with a carbureting chamber under control of the engine, equalizing means being employed between said chambers to neutralize the effect produced by the suction of the engine, thereby insuring the proper delivery of hydrocarbon to the carbureting chamber partially or entirely by capillary action.

It is an object of our invention to provide a carbureter of the capillary action type in which the capillary action is exerted in the interstices formed between ribs of metal or other suitable material arranged side by side and united by a web to form a capillary member, the lengths of the said ribs being longitudinal of the capillary member; incoming air impinges against the capillary member, thereby readily absorbing the volatile hydro-carbon, thus coming into more effective contact with the latter and promoting a more intimate, rich and homogeneous mixture.

A further object of our invention is to provide a carbureter constructed of few and simple parts, united into a compact whole, which may readily be disassembled to give access for cleaning.

In describing our invention in detail reference will be had to the accompanying drawing, wherein like symbols refer to like or corresponding parts throughout the several views, and in which:

Figure 1 is a vertical sectional view. Fig. 2 is a top plan view. Fig. 3 is an end elevation partly in section. Fig. 4 is an elevation of a detail partly in section; and Fig. 5 is a perspective view of the capillary wick partly in section.

Referring more particularly to the drawings, our improved carbureter is preferably formed in two parts, including an upper or valve casing and a lower or hydrocarbon casing, each section being provided with meeting flanges N and N^1, respectively, between which suitable securing means may be engaged.

The lower casing may be constructed of a shell A, of any suitable contour, constituting a hydrocarbon reservoir and provided with a preferably central and vertical opening defined by the cylindrical wall A^3, which is advantageously extended slightly beyond the plane of the top of the shell A to occupy a seat formed in the upper casing, as shown, whereby the sections may be relatively centered with facility, and oppose lateral displacement, which is essential in maintaining the various openings in alinement, as will be understood. An annular float C, surrounding and guided by the wall A^3, provides, through well-known illustrated means located in an offset A^1, for maintaining a constant level of hydrocarbon in the reservoir.

Depending from the casing A, coaxial with the opening inclosed by the wall A^3, is a hollow boss A^4 of enlarged diameter provided with a lateral perforation in registry with a duct B formed between the casing shell A and an outer semicircular shell A^2. A conical seat G^1 is provided between the unequal diameters of opening and boss, and receives the correspondingly formed edge G of a circular flange F extending from a hollow core E^1 removably fitted in said opening through the boss A^4 and held against its seat by means of a hollow nut D threaded into the boss and engaging a plate F^1 constituting the base of the core. A flanged plug H closes the lower end of the core, as shown, and swivelly engages with the hollow nut D to withdraw the core upon the removal of the nut. A plurality of apertures E^2 admit of communication between the interior of the core and the duct B.

The upper end J of the core E^1 is preferably reduced and tapered, as shown at J^1, and a cup E merges from the core below the reduced portion J and provides with the latter an annular feeding chamber. As disclosed to advantage in Fig. 1, the body of the cup E is of slightly less diameter than the opening A^3, but is provided with a rim closely fitting the same. Communication is established between the hydrocarbon reservoir A and the annular intermediate cham-

ber formed between the flange F and the rim of the bowl through an orifice W in the wall A^3, a similar orifice being provided in the side wall of the cup E approximately at the base thereof. The latter orifice is, however, preferably threaded for the reception of a plug W^1 having a restricted orifice.

A metallic capillary member M formed of ribs arranged side by side with their lengths longitudinal of the capillary member is employed to transfer the hydro-carbon from the feeding chamber to a carbureting chamber hereinafter referred to. We preferably utilize the form of capillary member illustrated in Fig. 5 wherein a supporting web M^2 is provided formed in the frustum of a cone and provided with longitudinally running ribs M^1. In practice the member is fitted over the end J^1 of the core E^1, as clearly shown in Fig. 1, with its lower end extending approximately to the base of the cup E, where it exposes a relatively large surface to the hydrocarbon.

The interior of the cup E is threaded, as at E^3, for a distance from its upper end, and may be provided with a shoulder located immediately below the threads to form a stop for an exteriorly-threaded sleeve K having a conical interior wall K^3 coöperating with the conical end J^1 of the core E^1 to hold the capillary member M in place. A nice regulation of the capillary action may be obtained by means of the sleeve, which is provided with a milled flange K^2 for facilitating turning so as to get any required pressure on the member M. The member M may be made of a comparatively soft metal, and the sleeve K may be screwed down to such a degree that the ribs of the member are distorted to some extent. In this way the maker can adjust initially the rate of supply of fuel in a very accurate manner, but obviously such adjustment can be made only once as the member M will not assume its original position on the removal of the pressure.

We find that with a structure so far as set up the best possible results are attainable only through the employment of a distributing nozzle K^1 which, in the instance shown, is formed integral with the sleeve K and preferably takes the form of an inverted cone and operates in conjunction with an auxiliary air supply hereinafter described.

A tube L is carried by the sleeve K having its lower end opening into the feeding chamber and its upper end arranged in the distributing nozzle K^1, whereby to set up communication between the feeding and carbureting chambers to equalize the pressure in both chambers, and thereby neutralize the effect produced by the suction of the engine, which would otherwise exercise an undue influence upon the hydrocarbon in the feeding chamber through the wick and destroy the capillary action, which has been previously regulated to deliver the required quantity.

The upper section or casing embodies an intake passage P in axial alinement with the opening A^3, and surrounded at its lower portion with an annular auxiliary air chamber in communication with the passage P through a plurality of apertures P^3 and supplied through a duct P^2 opening to the atmosphere. The duct P^2 is provided with a lateral port Q in registry with the duct B. A valve R mounted on a spindle R^1 journaled in the walls of the duct P^2 controls inlet of air to the auxiliary chamber P^1 and is connected to operate with the main throttle valve O, as follows:—The spindle O^1 of the throttle valve O carries an arm O^3 which is connected through a link U to the arm R^2 carried on the extended spindle R^1. The arm O^3 is adapted to be operated by some suitable mechanism (not shown) to control the fuel supply to the engine, and simultaneously the valve R is oscillated to regulate auxiliary air.

In order to provide for a proper mixture on slow speeds we construct a by-pass, clearly illustrated in Fig. 3, leading from a point in the reservoir A below the liquid level to the passage P. In order to facilitate access for purposes of cleaning the by-pass is preferably formed of a plurality of rectilinear ducts, lettered S and S^1 in the drawing respectively for the lower and upper casings, which open out on the exterior of the parts in which they are contained and are provided with screws S^7 for closing the openings. The duct S^1 at the upper end of the valve casing is turned obliquely as at S^2 to accommodate a needle valve T arranged to be manipulated from the exterior of the casing. A transverse duct S^4 communicates with the axial duct S^3 in the spindle O^2 and is adapted to register with the duct S^2 when the throttle valve is closed. The duct S^3 continues outwardly beyond the duct S^4 and terminates in a transverse opening S^5 provided with a seat at one end for a ball valve T^2 and having mounted in its opposite end an adjusting screw T^1. The duct S^3 runs axially through the spindle preferably to a point substantially centrally of the valve O where it connects with a duct S^6 provided in the valve itself terminating at the edge thereof.

The action of our improved carbureter with all the parts assembled is substantially as follows: Hydrocarbon maintained at constant level flows out through orifice W and into the intermediate chamber about the core E^1 and thence through the restricted orifice W^1 to the cup E where the same comes under the influence of the member M which by capillary attraction raises the hydrocarbon to the upper exposed portion of the member. Air from the atmosphere under the control

of the engine is sucked through duct P^2, port Q, duct B and into the interior of the core through apertures E^2, where it rises and impinges directly against the member M. The air thereby absorbs and volatilizes the hydrocarbon held by the member, and carries the same upwardly into the distributing nozzle K^1 which, together with the pipe P, forms a carbureting chamber. Here the mixed gas is allowed area to expand and distribute itself and permit of further mixture with the auxiliary air drawn in through apertures P^3 which it will be seen are arranged concentric with the nozzle, so as not to introduce air while the initial mixing is in progress.

Upon the closing of the throttle valve O hydrocarbon is drawn by the engine up through the by-pass past the needle valve T and in through the ducts provided in the valve and spindle; at the same time air is being admitted past the valve T^2 and mixes with the hydrocarbon in the duct S^3 providing the proper carbureted combustible mixture.

We have described and shown preferred and satisfactory constructions, but desire it to be understood that slight changes may be resorted to without departing from the spirit of the invention, provided such changes fall within the scope of the appended claims.

We claim:

1. In a carbureter, a feeding chamber in communication with a source of liquid hydrocarbon, a carbureting chamber in communication with an air supply, capillary means comprising ribs arranged side by side to form unbroken capillary passages therein-between to constitute a member in which such passages run longitudinally of the same for transferring hydrocarbon from said feeding to said carbureting chamber, and means for equalizing the pressure between the two chambers.

2. In a carbureter, a feeding chamber in communication with a source of liquid hydrocarbon, a carbureting chamber, an air duct leading to said mixing chamber, a conical capillary member adjustably secured in said feeding chamber and projecting into said duct to provide a constricted passage for the air, said member being provided with ribs arranged side by side to form the capillary passages therein longitudinally of the same, and equalizing means arranged between said feeding and carbureting chambers to neutralize the effect produced by the suction of the engine.

3. In a carbureter, a hydrocarbon reservoir, a feeding chamber supplied from said reservoir, a carbureting chamber, an air duct leading to said carbureting chamber, capillary means comprising ribs arranged side by side to form unbroken capillary passages therein-between to constitute a member in which such passages run longitudinally of the same for transferring hydrocarbon from said feeding to said carbureting chamber, an auxiliary duct traversing the body of the throttle valve and communicating with said reservoir and adapted to deliver hydrocarbon through the body of the throttle valve to the engine on throttling of the throttle valve, and an air supply in said duct for vaporizing the hydrocarbon before delivery to the cylinders.

4. In a carbureter, a hydrocarbon reservoir provided with an opening therethrough, a hollow core fitted in the opening, an air duct communicating with the interior of said core, a cup carried by said core constituting an annular feeding chamber in communication with said reservoir, and a capillary member supported in said cup and projecting beyond the end of said core, said member being provided with ribs arranged side by side to form the capillary passages therein longitudinally of the same.

5. In a carbureter, a hydrocarbon reservoir provided with an opening therethrough, a hollow core removably fitted in the opening and provided with a conical upper end, a cup formed on said core and providing with the conical upper end an annular feeding chamber in communication with said reservoir, a conical capillary member mounted over the upper end of said core and projecting therebeyond, said member being provided with ribs arranged side by side to form the capillary passages therein longitudinally of the same, and an air supply in communication with the interior of said core.

6. In a carbureter, a hydrocarbon reservoir provided with an opening therethrough, a hollow core removably fitted in the opening and provided with a conical upper end, an air supply communicating with the interior of said core, a cup formed on said core and providing with the conical upper end an annular feeding chamber in communication with said reservoir, a conical capillary member mounted over the upper end of said core and projecting therebeyond, said member being provided with ribs arranged side by side to form the capillary passages therein longitudinally of the same, a conical sleeve fitting the upper end of said cup and adapted to retain said member in place, and a conical nozzle arranged reversely with respect to said member carried by said sleeve.

7. In a carbureter, a hydrocarbon reservoir provided with an opening therethrough, a hollow core of lesser diameter removably fitted in the opening and provided with a conical upper end, a cup formed on said core and providing with the conical upper end an annular

feeding chamber, a flange on said core providing between the same and said cup an annular communicating passage between said reservoir and feeding chamber, an air duct leading to the interior of said core below said flange, a conical member fitted over the upper end of said core, said member being provided with ribs arranged side by side to form the capillary passages therein longitudinally of the same, and means for regulating the action of said member.

8. In a carbureter, a hydrocarbon reservoir provided with an opening therethrough, a core of lesser diameter removably fitted therein and provided with a conical upper end, a cup formed on said core and providing with the upper end an annular feeding chamber, a flange on said core below the cup and providing therewith an annular communicating passage between said bowl and reservoir, an air chamber surrounding and communicating with the interior of the core below said flange, a capillary conical member fitted to the upper end of said core, said member being provided with ribs arranged side by side to form said capillary passages longitudinally of the same, a conical sleeve threaded on said cup for maintaining said member in place and regulating the action thereof, a conical nozzle carried by said sleeve, an annular auxiliary air chamber arranged above said core and substantially concentric with said nozzle, and a duct for supplying air to said auxiliary chamber.

In testimony whereof we have signed our names to this specification in the presence of two subscribing witnesses.

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ARTHUR FREDERICK GUNSTONE.

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