A. HUGGINS & W. J. PARKER.

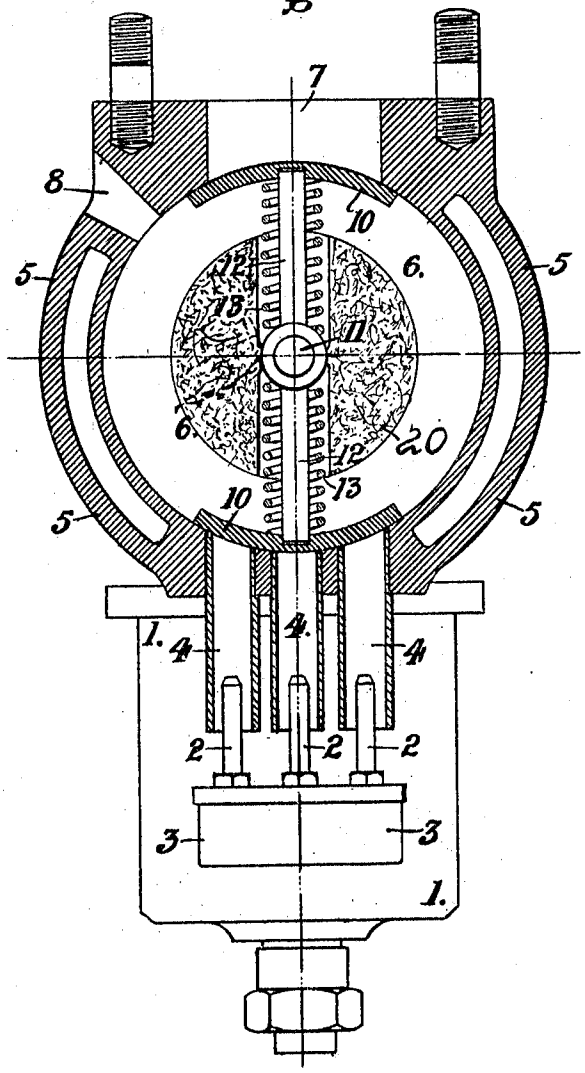
CARBURETER.

APPLICATION FILED APR. 20, 1908.

982,428. Patented Jan. 24, 1911.

2 SHEETS—SHEET 1.

Fig. 1.



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2 SHEETS—SHEET 2.

Fig. 2.

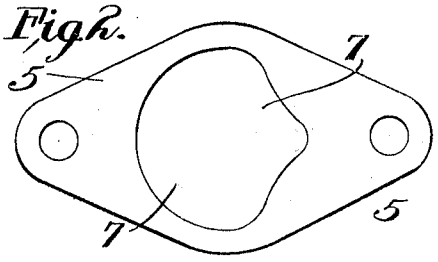


Fig. 2a

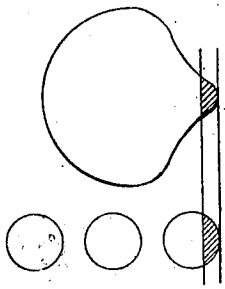


Fig. 2b

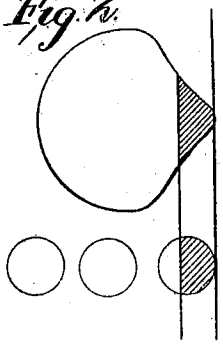


Fig. 3.

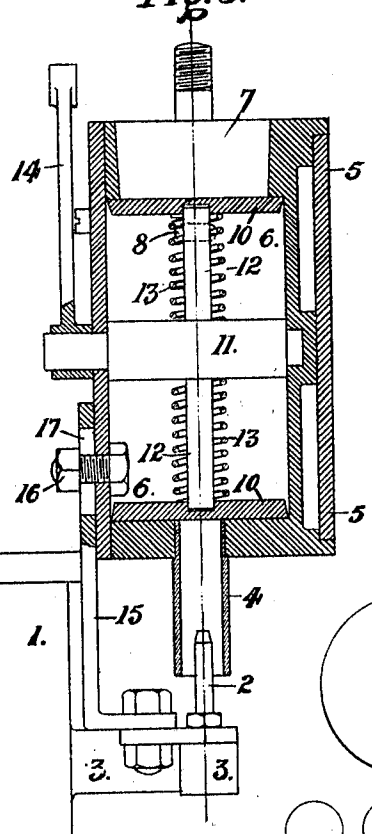


Fig. 2c

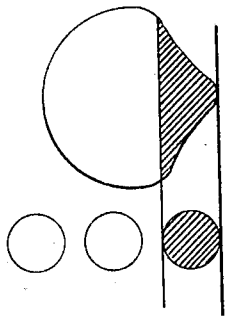
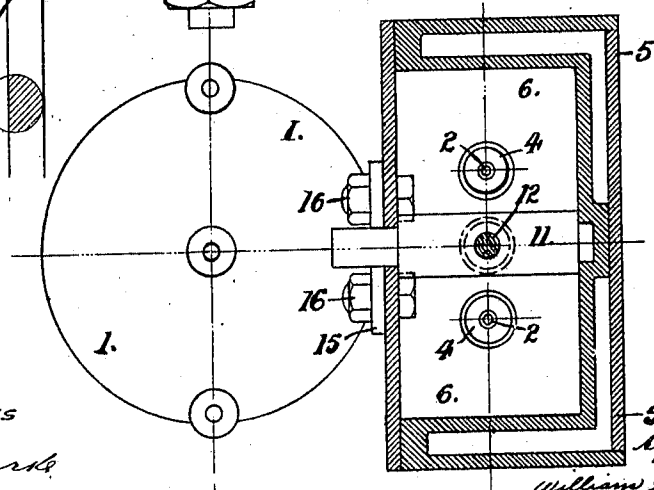


Fig. 4.



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UNITED STATES PATENT OFFICE.

ALFRED HUGGINS, OF KINGS NORTON, AND WILLIAM JAMES PARKER, OF MOSELEY, ENGLAND.

CARBURETER.

982,428. Specification of Letters Patent. Patented Jan. 24, 1911.

Application filed April 20, 1908. Serial No. 428,119.

To all whom it may concern:

Be it known that we, ALFRED HUGGINS and WILLIAM JAMES PARKER, subjects of the King of England, residing at Kings Norton, Worcestershire, England, and Moseley, Worcestershire, England, respectively, have invented new and useful Improvements in Carbureters, of which the following is a specification.

This invention has reference to carbureters for use in atomizing or vaporizing petrol, and other volatile or analogous liquids, suitable for use as fuel for actuating self-propelled vehicle engines, and other internal combustion engines and motors.

The invention will be described in connection with the accompanying drawings, which illustrate an apparatus in which the improvements hereunder are comprised; and with regard to the invention claimed as novel, this is set out in the statement of claim, comprising the several claiming clauses, concluding the specification. And as to these clauses, it is to be stated, that the several parts included in each of them are not individually or separately claimed as the invention, but that it—the invention—covered or claimed in said respective clauses is the several parts included in them, in combination, as therein specified.

In the drawings, Figure 1 is a front sectional elevation showing the carbureter; Fig. 2 is an illustration of the outlet orifice of the valve chamber; Figs. 2^a, 2^b and 2^c are diagrammatic views; Fig. 3 is a side elevation partly in section; and Fig. 4 is a plan in section.

In the carbureter hereunder, a plurality of petrol or liquid fuel supply jet pipes or nozzles are employed, each in connection with a separate air inlet tube, and the opening of these air inlet tubes is controlled or governed by a valve or valvular device operating in connection with such tubes. Then, on the egress part of this valvular device, the interior of which constitutes a mixing chamber, there is another valve or valvular part operating in connection with the discharge aperture or port, which will be connected with the inlet valve casing of the engine; and by this valvular device and inlet and egress apertures or ports, the induction or minus pressure within this chamber, created by the engine in drawing in its charge, the amount of combustible fluid or mixture introduced, and the port openings, are synchronized in accordance with the work of the engine to be done. That is to say, when only a certain quantity of power is required to be exerted in the engine cylinders, say for instance a comparatively small proportion of the whole that would be exerted by the whole or full supply of combustible mixture, then these valvular parts and ports are so arranged, that the induction or minus pressure in the valvular apparatus will be such that the quantity of mixture which will be drawn in to the valvular apparatus through the partially opened ports or port, will be in accordance with the power to be exerted in the engine. As an illustration of this, in the particular form of the carbureter shown in the drawings, there are three petrol or liquid fuel inlet jet pipes or nozzles, each having connected with it a separate air inlet and mixing tube, the entrance orifices of which in the valve casing, are also separate, and constitute so many ports; while the outlet to this valve chamber which is controlled by a portion of the valve or valvular device, is a common conduit; and this is of irregular formation, as shown in Fig. 2. When one of the combustible mixture inlet tubes is opened, say pro rata with the proportion of the total power of the engine required, the amount of opening of the outlet port or passage by the valvular or mixing chamber will be small, that is, choked, so that the induction or minus pressure within this mixing chamber will be small (that is, less than say that within the engine inlet valve conduit) as a quick balancing of the pressures within the cylinder and mixing chambers is prevented by the small opening of the outlet port; and so the amount of combustible mixture—consisting of the proper proportion of spirit and air—will be in accordance with the power required, and in accordance with the suction pressure in the mixing chamber, and not be wholly controlled by the pressure in the cylinder.

A further feature under this invention, consists of the application and use within a carbureter chamber, through which the combustible mixture of air and atomized or vaporized combustible passes on its way to the engine, of a porous body or medium, having for its objects and effects, to hold a certain quantity of the mixture when the engine is

stopped, so that at the first stroke of the engine in re-starting—even if cold, this mixture will be drawn into the cylinder; that is, the cylinder will receive from this source, a quantity of combustible mixture before it is supplied by the fresh supply of liquid or combustible from the supply nozzles or jets, as this supply will not take place until the engines have moved at a certain velocity, or a certain amount, and have produced a speed of air in the air inlet tubes of the carbureter, which is sufficient to lift the petrol or liquid in the jets or nozzles. Besides which, by arranging it in the manner hereinafter described, it promotes the production of a perfect combustible mixture which passes through it, and increases the velocity of the atomized fuel and air which passes about it, causing a better atomization of the fuel to be accomplished; and also enables the engine to run slower.

Referring now to the drawings, 1 is the petrol float chamber, which may be assumed to be of any known suitable kind and construction; and 2 are three separate petrol supply jet pipes or nozzles, disposed vertically upon the petrol supply branch 3 of the float chamber 1. These jet pipes or nozzles 1 operate in connection with three separate vertically disposed air inlet tubes 4, which are connected with, and open out into the cylindrical valve case 5, the interior 6 of which constitutes a mixing and pressure chamber, the inlet of air to which is at the bottom, below the liquid fuel discharge orifices, so that the flow of both fuel and air is vertically upward, and parallel; and the openings of the tubes 4 in this chamber constitute so many combustible mixture inlet ports.

The egress or exit conduit or port 7 is at the top of the casing 5, and opposite the tubes 4; and the casing itself is jacketed at the bottom and sides, for the circulation around it of hot water, or other heating medium. An aperture 8 is provided in the casing 5, through which extra air may be introduced into the chamber 6 at the times and in the manner, and for the purposes, hereinafter described.

The valves or valvular devices in the case shown, consist of segmental portions or slides 10, working upon the inner walls of the casing 5, and are operated from a central spindle 11 by arms 12, fixed to this spindle, and entering a hole in the segments 10; a spring 13 being employed behind the segments to press them with the required degree of pressure onto the walls of the mixing chamber 6. By turning this spindle 11 by means of an operating lever 14 in one or other direction, it will be seen that the ports or inlet orifices of the combustible mixture inlet tubes 4, and the orifice of the egress or discharge aperture 7—which is connected with the inlet valve of the engine—will be both by the one actuating means, uncovered and covered, more or less, in the manner above described.

In the case of the application of the invention to a motor-car or other self-propelled vehicle, the lever 14 of the valve may be operated by the controlling lever of the vehicle.

By the arrangement and construction of the valvular device shown, the combustible mixture entering and passing through the cylindrical mixing chamber 6, has a whirling motion imparted to it, with the effect that it causes a more uniform or homogeneous mixture to be produced.

The porous body or medium above referred to is marked 20, and it is passed around and carried on the spindle 11 and arms 12, leaving an annular space between its periphery and the inner walls of the casing 5, for the flow of mixture. The porous body or device may consist of a sponge, wire caged silicate of cotton, porous brick, or any equivalent substance or device.

In passing through the chamber 6, the mixture, as above stated, receives a whirling motion, and without the central medium 20 the velocity at the center of the chamber would be much lower than at the circumference; but by the presence at the center of this medium 20, the velocity of the mixture at the outer part is always high, and the mixing effect, tending to produce a good mixture, is increased, and produces a degree of homogenity of a high order.

The liquid fuel jets or nozzles 2 are adjustable vertically in relation to the tubes 4, the adjustment being for the purpose of enabling the best positions of these two parts in relation to each other, to be attained, to produce the most efficient mixture of fuel and air. This is effected by connecting the valvular device, namely, the casing 5, to the float chamber 1 by means of an adjusting plate 15, which, at its lower end, is fixed on the fuel supply branch 3, in which the jets or nozzles 2 are separately screwed; and its upper end is secured to the cover of the valve casing 5, by two or more bolts 16, the parts of the slide 15 through which these bolts pass, being vertically slotted at 17, so as to enable it—the slide—to be moved up and down upon the cover. Thus the jets or nozzles 2 can be raised or lowered to any required position within the air supply tubes 4, and secured in that position.

When only a small quantity of combustible fluid is required to be delivered to the engine, the relative areas of the inlet and egress conduits or ports uncovered by the valve at the commencement of such opening, are such that the choking is substantial—that is, the egress is considerably less than the inlet; while when a greater power is required, and the valves are opened more, the

proportion of the outlet area, to that of the inlet—is increased to say approximately equal; and when fully open, the area of the outlet port or conduit is greater than that of the inlet tubes. Figs. 2ª, 2ᵇ and 2ᶜ show how this is accomplished by means of the peculiar shape of the port 7, the shaded portions in these figures indicating the open parts of these ports.

When the engine is required to be run at a very low speed, and very little opening of the first inlet tube port 4 is given, the egress by way of the outlet conduit 7 is much choked, (see Fig. 2ª) and the induction or minus pressure within the chamber 6 is small; and therefore the amount of combustible mixture introduced is correspondingly small. But, while the quantity of mixture is small, yet it is rich, owing to the fact that the suction effect caused in the carbureter chamber is comparatively small. Also when the inlet port is only slightly open, the suction effect on the air inlet is reduced by the shape of the outlet port, and therefore large quantities of air cannot be drawn in with the small quantity of petrol, and thereby renders the efficiency of the engine at this speed relatively high. In this way, the proportioning of the amount of combustible fluid drawn in to the valvular device, and the engine, and the power required to be exerted in the engine, will be accomplished.

The air port or hole 8 is placed in that side of the casing 5, in which it will become closed by the egress valve segment 10, when these parts 10 open the inlet and egress conduits 4 and 7. It may be opened when inlet conduits 4 are closed, so as to allow air to pass into the engine cylinder, by way of this apparatus, when running down-hill, say, or under other circumstances, by moving the valve slides 10 in the opposite to the normal direction when supplying combustible mixture; that is when the upper part 10 is so moved so as to uncover both the port 8, and the outlet port or passage 7 to the cylinder. By this manner of supplying air and controlling it, as just described, an effective scavenging of the cylinders takes place, as well as serving as a controller of speed, and brake for the engine.

By this apparatus and invention, a good and effective mixture of air and petrol or other liquid fuel is obtained at all speeds of the engine, without the aid of extra air valves, or of automatic valves of any description; and the consumption of the petrol or liquid fuel is relatively low. Furthermore, by it, the control of supply of petrol or liquid fuel and air admitted to the carbureter, together with the control of the induction or suction of the engine is very effective, enabling a very rapid acceleration of the engine, with a proportional increase of horse-power, to be obtained. A further advantage is, that by this apparatus, complete immunity from flooding of the petrol or the like is provided; and complete and uniform atomizing of the petrol or liquid is obtained, by the disposition of the fuel supply jets or nozzles, and the inlet and flow of air into and through the tubes 4. And there is an absence in this apparatus of suction noises. Furthermore, when the engine is running at high speeds, say in the neighborhood of 1500 revolutions per minute, the power of the engine is not diminished below that when running at slower speeds.

What is claimed is:—

1. In a liquid fuel internal combustion engine carbureter, the combination of a chamber having a plurality of combustible mixture orifices, and a combustible mixture outlet orifice of partly circular and partly irregular and approximately triangular shape; and valves operating in conjunction with the inlet and outlet orifices whereby the opening of the outlet is relatively small to that of the inlet at the commencement of the opening operation of the valves, and relatively large during the finish of the operation.

2. In a liquid fuel internal combustion engine carbureter, the combination of a chamber having a plurality of combustible mixture inlet orifices, and a combustible mixture outlet orifice circular for one half of its area and approximately triangular for the other half of its area; and valves operating in conjunction with the orifices whereby the opening of the outlet is relatively small to that of the inlet at the commencement of the opening operation of the valves, and relatively large during the finish of the operation.

3. In a liquid fuel combustion engine carbureter, the combination of a chamber having a plurality of inlet orifices, constituted by vertically disposed air tubes, and an outlet orifice circular for one half of its area, and approximately triangular for the other half of its area; a plurality of vertically disposed liquid fuel jet pipes partly projecting into the air tubes; means for adjusting the jet pipes relatively to the air tubes; and a segmental valve operating in conjunction with the inlet and outlet orifices for opening the same differentially.

4. In a liquid fuel combustion engine carbureter, the combination of a chamber having a plurality of inlet orifices, constituted by vertically disposed air tubes, and an outlet orifice circular for one half of its area, and approximately triangular for the other half of its area; a plurality of vertically disposed liquid fuel jet pipes partly projecting into the air tubes; means for adjusting the jet pipes relatively to the air tubes; a segmental valve having a valve spindle and operating in conjunction with the inlet and

outlet orifices for opening the same differentially, and a porous body arranged in such a manner within the said chamber on the valve spindle, as to leave a space between its outer surface and the inner surface of the chamber.

5. In a liquid fuel combustion engine carbureter, the combination of a chamber having a plurality of inlet orifices, constituted by vertically disposed air tubes, and an outlet orifice circular for one half of its area, and approximately triangular for the other half of its area; a plurality of vertically disposed liquid fuel jet pipes partly projecting into the air tubes; means for adjusting the jet pipes relatively to the air tubes; a segmental valve operating in conjunction with the inlet and outlet orifices for opening the same differentially, and a cylindrical porous body concentrically arranged within the chamber on the valve spindle, between the inlet and outlet orifices, and of less diameter than the chamber so as to leave an annular space between the outer surface of the body and the inner surface of the chamber for the passage of the combustible mixture.

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

ALFRED HUGGINS.
WILLIAM JAMES PARKER.

Witnesses:
ETHEL M. WEBB,
KATHLEEN M. THOMPSON.