J. A. PAULL.

CARBURETER.

APPLICATION FILED JULY 20, 1909.

980,668. Patented Jan. 3, 1911.

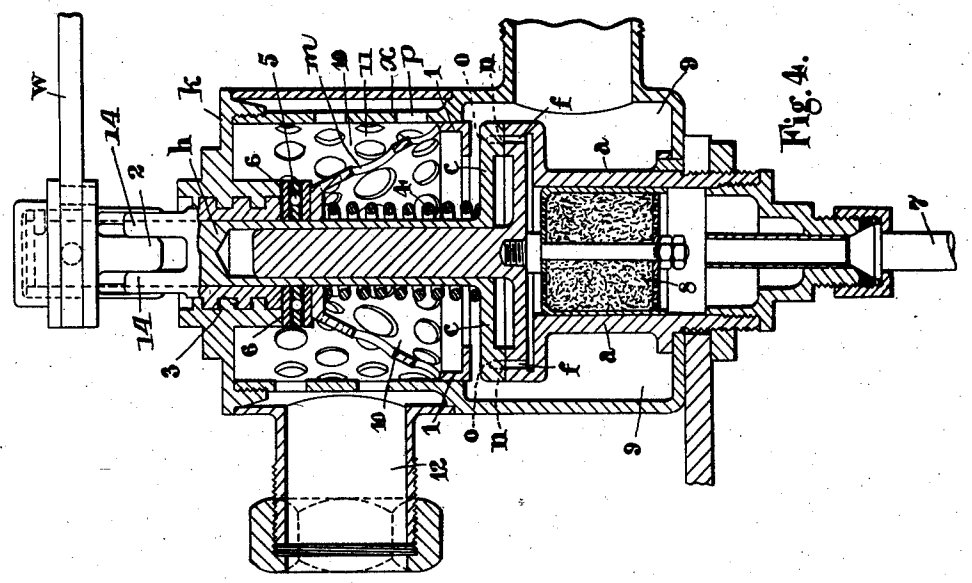

Fig. 4.

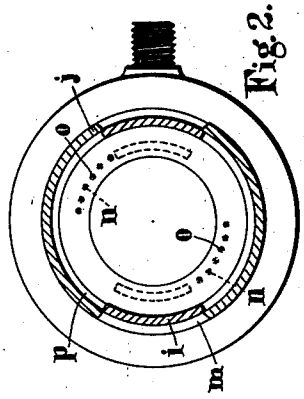

Fig. 2.

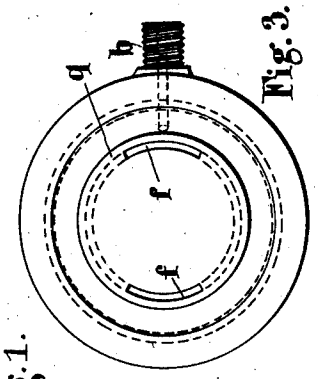

Fig. 3.

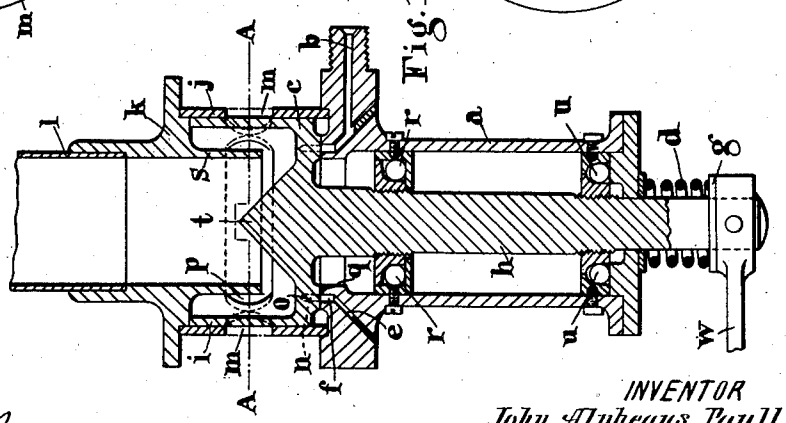

Fig. 1.

WITNESSES

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# UNITED STATES PATENT OFFICE.

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## CARBURETER.

980,668. Specification of Letters Patent. Patented Jan. 3, 1911.

Application filed July 20, 1909. Serial No. 508,606.

*To all whom it may concern:*

Be it known that I, JOHN ALPHEAUS PAULL, a subject of the King of Great Britain and Ireland, and residing at 745 Woodbridge road, Ipswich, in the county of Suffolk, England, have invented certain new and useful Improvements in Carbureters for Internal-Combustion Engines, of which the following is a specification.

This invention relates to improvements in carbureters, its object being to provide a carbureter adapted for use with pressure feed either from an elevated tank by gravity or by spring means.

A further object of the invention is to arrange the device so that it may operate in any position—inverted if desired.

The invention consists in a carbureter in which a body portion is provided with an oil retaining chamber fed directly by oil under pressure, said chamber communicating with curved grooves in the face of the body portion and in which a rotary valve is provided with very fine perforations adapted to be moved successively over the grooves so that oil lodged in the grooves may be sprayed directly into the interior of the carbureter and with air ports adapted to open correspondingly with the oil perforations.

Referring now to the accompanying drawings, Figure 1 is a sectional elevation of a carbureter according to one form of my invention; Fig. 2 is a section on the line A—A of Fig. 1; Fig. 3 is a plan of the top of the body portion with the valve and other parts removed in order that the curved grooves may be clearly seen. Fig. 4 represents another construction of carbureter embodying my invention.

In carrying the invention into effect according to the form illustrated in the Figs. 1, 2 and 3, I provide a body portion, *a*, in which I form an oil retaining chamber, *e*. To this chamber oil is led through a hole, *b*, from a petrol tank situated at a convenient height above the level of the carbureter so as to provide a pressure head for feeding fuel to the chamber, *e*. The oil chamber, *e*, communicates with two curved grooves, *f*, extending to the turned face on the body part. Each curved groove extends less than a quarter of a circle. Against the face of the body part a correspondingly turned face of a valve, *c*, is held by suitable means such for example as a spring, *d*, acting on a collar, *g*, on the valve stem, *h*. This spring must be of sufficient strength to hold the valve against the face notwithstanding the suction of the engine. At the circumference of the valve there is provided an upwardly extending flange, *i*, which fits within a sleeve, *j*, secured between the fixed body portion, *a*, and the cap, *k*, to which the induction pipe, *l*, is connected. The parts, *k*, *j* and *a*, may be secured together by any suitable means such for example as two or more long studs (not shown) extending from the top of the body, *a*, through holes in the flange of the cap, *k*, and having nuts whereby the cap is firmly clamped to the body part, the sleeve, *j*, acting as a distance piece. In the valve face adjacent to the body portion a number of holes, *n*, of a diameter corresponding to the width of the grooves, *f*, are drilled, these holes being arranged on arcs of a circle corresponding to the curved grooves. The holes, *n*, however are only extended about half way through the valve of the same diameter as at the under face, the remaining part of the metal being perforated by a very fine hole, *o*, say about 1/80th of an inch in diameter. The sleeve, *j*, has formed in it two ports, *m*, *m*, the positions of which correspond with those of the grooves, *f*. In the flange, *i*, similar ports, *p*, are formed. In the normal inoperative or closed position of the carbureter the valve is situated so that its holes, *n*, *o*, are opposite a plain portion of the turned face, *q*, so that no oil can pass through them into the carbureter, similarly the air ports, *p*, are closed. If now the valve be given a slight rotary movement one of the oil holes will come opposite one of the grooves, *f*, and the air port, *p*, will open slightly. The effect of this is to produce a small quantity of combustible mixture the oil being forced by gravity and by the suction of the engine as a fine spray into the incoming air. If the valve be moved slightly farther still another jet will come into play by the passage of a hole over the other oil groove and the air port will open a little more. This operation may be repeated until the maximum delivery of oil and the maximum admission of air takes place. It will be understood that there are as many intermediate

positions of the rotary valve between the maximum and minimum as there are holes through the valve so that the operator may vary the quantity of mixture passing to the engine with great precision. The cap, *k*, is preferably provided with an inwardly extending tubular part, *s*, against which the incoming air is deflected across the path of the jets the whole mixture being then preferably guided toward the induction pipe by a conical head, *t*, on the valve. The air port, *p*, is preferably of such a length (see Fig. 2) that after all the jets have been put into operation further movement of the spindle shall gradually close off the jets in succession without reducing the area of the air port. By this arrangement the whole of the jets may be cut off but the maximum area of air inlet will still be maintained. This enables the richness of the mixture to be varied. The spindle is preferably supported in ball bearings, *r* and *u*, mounted in any convenient manner. The carbureter may be situated in any position or at any angle, the spindle of the valve being supported in a manner which prevents it from tilting and the joint at the rotary valve face may be kept petrol tight without undue spring pressure being employed. The rotary movements of the valve may be given by a lever, *w*, or any other suitable device.

In the modification of the invention shown in Fig. 4 of the drawings the liquid fuel, such as oil, is drawn through the eduction pipe, 7, by the suction of the engine and passes preferably through a strainer, 8, of cotton wool or the like placed within the body member, *a*. The oil then passes to the grooves, *f*, in the body member to the holes, *n*, and perforations, *o*, in the rotary valve, *c*, which is similar to that already described with reference to Fig. 1. On emerging from the perforations *o* as a fine spray the oil is carried into the chamber 10 formed within the shell, 1, by the air admitted from the air inlet chamber, 9, through the space between the shell, 1, and the upper surface of the rotary valve, *c*. The air and fuel being then thoroughly mixed in the chamber, 10, pass through openings *m* in the shell, 1, to an outer chamber, 11, from whence the mixture passes through holes *p* in the carbureter casing, *x*, to the pipe, 12, which leads to the combustion engine. The amount of air passing from the chamber, 9, to the mixing chamber, 10, is regulated by the perforated shell, 1, which moves vertically within the cylindrical part, *x*, of the carbureter casing, so as to vary the annular opening between the shell, 1, and the upper surface of the rotary valve, *c*, and thus cause the air to flow directly over the fuel or oil inlets, *o*, at a high velocity. By this means the sprayed fuel is thoroughly mixed with air and all possibility of fuel in the solid state being carried over to the engine is eliminated. The vertical movements of the shell, 1, are effected simultaneously with the rotation of the rotary valve, *c*, by operating, preferably, a single lever, *w*. This lever is provided on its under side with several tongue pieces, 2, which engage between similar pieces, 14, carried by a sleeve, 3, which is concentric with the spindle, *h*, by which the rotary valve *c* is connected to the lever, *w*. The outer surface of the sleeve, 3, is formed with a square threaded screw of large pitch engaging with a corresponding screw formed internally in the cover, *k*, of the carbureter casing, this cover being screwed on to the casing part, *x*. By moving the lever *w* in a horizontal plane when in engagement with the spindle *h*, and sleeve, 3, the latter is caused to move vertically and when descending pushes the shell, 1, downward and thus shuts off the air supply. A spring, 4, placed between the valve, *c*, and shell, 1, presses the former on the valve face of the body member, *a*, and at the same time holds the shell in contact with the sleeve, 3, or cover, *k*, or preferably in contact with a number of rings 6 separated by ball bearings, 5, and placed between the part, *k*, and the shell, 1, so as to reduce the friction. It will thus be seen that when the sleeve, 3, is moved upward by rotation of the lever, *w*, the spring 4, will cause the shell, 1, to follow the sleeve and increase the air inlet opening. On a further rotation of the sleeve, 3, and valve, *c*, the maximum number of fuel inlets, *o*, are opened, the shell, 1, being then at the upper limit of its movement *i. e.* the air inlet opening is at its maximum, and on further rotating the lever, *w*, the valve *c* only is moved to reduce the number of fuel inlets open while the air admission remains at its maximum. This continues as the sleeve, 3, is withdrawn from the cover, *k*, until the tongue pieces, 14, come into contact with the under side of the lever, *w*, when any further rotation of the valve, *c*, is prevented. It will be seen that the incoming air in the chamber, 9, warms the petrol in the strainer, 8, and thus assists the vaporization. The rate of flow of petrol through the strainer can be regulated by the amount of compression put on the cotton wool or other substance of which the strainer is made. The details of the construction are evident from the illustration and need not be further described in detail.

Although in the drawings two series of fine perforations are shown, three or more series equidistantly spaced may be used if desired according to the rate of spraying required.

An important feature of the invention is that a mixture is obtained independently of a float feed chamber, air floats, balancing levers or needle valves, the supply of petrol

taking place directly from a tank by gravity or by pressure produced by a spring, compressed air or the like.

It will be seen that by the invention not only may the operator regulate accurately the quantity of mixture passing to the engine but he may also vary the proportion of fuel to air and if desired may stop the oil flow entirely although permitting a maximum flow of air to the engine at each of its suction strokes.

Having now described my invention what I claim as new and desire to secure by Letters Patent is:—

1. Carbureter comprising in combination a body member, having one face thereof grooved, means for feeding oil under pressure to said grooved face, a valve in contact with said face, fine perforations through said valve arranged to be brought successively over the grooved part of said body member as the valve is moved whereby a definite quantity of oil is sprayed directly into the carbureter and means for admitting air into the carbureter, these means being controlled by the movements of said valve to open correspondingly with the oil perforations.

2. Carbureter comprising in combination a body member, having one face thereof grooved, means for feeding oil under pressure to said grooved face, a rotary valve in contact with said face, fine perforations through said valve arranged to be brought successively over the grooved part of said body member as the valve is moved whereby a definite quantity of oil is sprayed directly into the carbureter and means for admitting air into the carbureter, these means being controlled by the movements of said valve to open correspondingly with the oil perforations, said controlling means after the maximum number of oil perforations have been opened allowing said perforations to be closed successively while maintaining maximum flow of air.

3. A carbureter comprising in combination a body member having an oil retaining chamber therein fed directly with oil under pressure, grooves in a face of said body member communicating with said oil retaining chamber, a rotary valve in contact with said face said valve having fine perforations therein arranged to be brought successively over the grooves in the face of said body member as the valve is rotated whereby a definite quantity of oil is sprayed directly into the carbureter, air admission means and operating means controlling both the air admission means and rotary valve, whereby on actuating said operating means the air admission means are caused to open correspondingly with the oil perforations.

4. A carbureter comprising in combination a body member having an oil retaining chamber therein fed directly with oil under pressure, grooves in a face of said body member communicating with said oil retaining chamber, a rotary valve in contact with said face, an operating spindle therefor, fine perforations through said valve arranged so as to be brought successively over the grooves on the face of said body member as the valve is moved by means of said valve operating spindle, whereby a definite quantity of oil is sprayed directly into the carbureter, air admission means and means for controlling and giving said air admission means a vertical movement simultaneously with the rotation of said rotary valve whereby said air admission means open correspondingly with the oil perforations, and means whereby on the maximum number of oil perforations being opened, said air admission means remain stationary with a maximum opening and allow a further rotation of the valve spindle to close only the oil perforations.

5. A carbureter comprising in combination a body member having an oil retaining chamber therein fed directly with oil under pressure and grooves in a face of said body member communicating with said oil retaining chamber, a rotary valve in contact with said face and a valve operating spindle for said rotary valve, said valve having holes therein of a width substantially equal to that of the grooves in the body member and opening into the carbureter in fine perforations, the holes being arranged to be brought successively over the grooves in the body member as the valve is moved whereby a definite quantity of oil is sprayed into the carbureter, and means moving vertically on said spindle to admit air to the carbureter and change the velocity of the air as it passes over the fine oil perforations in said rotary valve, whereby on rotating said valve the air admission means move vertically on said spindle to admit an amount of air corresponding to the number of oil perforations open and on the maximum number of the latter being open said air admission means allow a maximum flow of air while a further movement of the rotary valve reduces only the number of oil perforations open.

6. A carbureter comprising in combination a body member, an oil retaining chamber in said body member fed directly by oil under pressure, a strainer in said chamber, grooves in a face of said body member communicating with said oil retaining chamber, a rotary valve in contact with said face, fine perforations through said valve arranged so as to be brought successively over the grooves in the face of said body member as the valve is moved whereby the quantity of oil sprayed can be controlled, an air chamber surrounding said oil retaining chamber, a chamber in said body member into which

the oil is sprayed, a spindle for operating said rotary valve, means admitting air to the carbureter comprising an externally screw threaded spindle concentric with said rotary valve spindle and a valve part normally moving with said screwed spindle, lever means adapted to engage with both of said spindles whereby on rotating said spindles by means of the lever means said valve part is moved vertically to admit an amount of air corresponding to the number of oil perforations open and on the maximum number of the latter being open said valve part no longer moves with said concentric spindle whereby a maximum air admission with a decreasing number of oil perforations open is maintained.

In testimony whereof I have hereunto signed my name in the presence of two witnesses.

JOHN ALPHEAUS PAULL.

Witnesses:

SIDNEY B. W. VINNELL,

D. GARLAND.