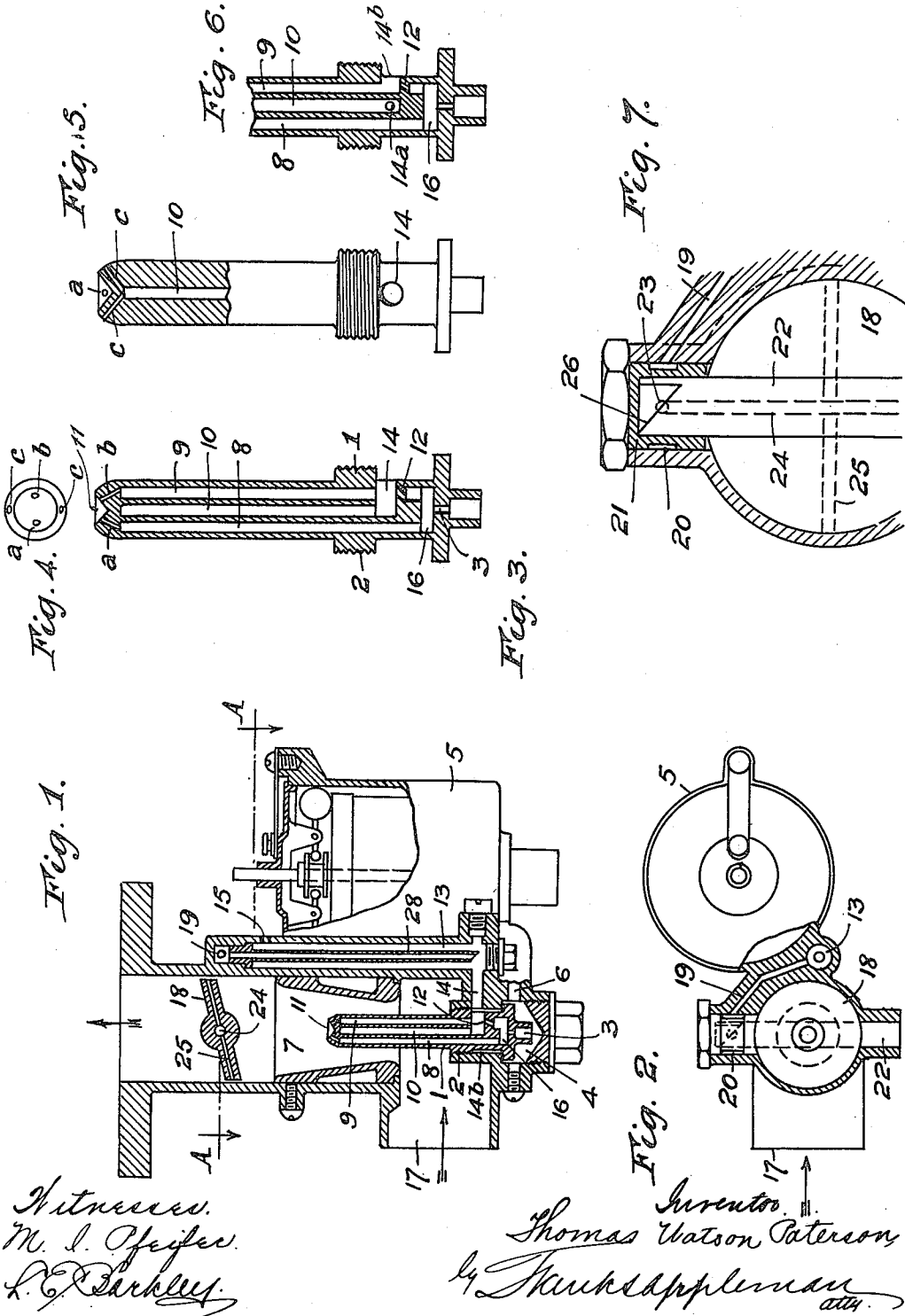


1,262,243.

Patented Apr. 9, 1918.



UNITED STATES PATENT OFFICE.

THOMAS WATSON PATERSON, OF LIVERPOOL, ENGLAND.

CARBURETER.

1,262,243.

Specification of Letters Patent.

Patented Apr. 9, 1918.

Application filed February 2, 1916. Serial No. 75,744.

To all whom it may concern:

Be it known that I, THOMAS WATSON PATERSON, a subject of the King of Great Britain, and a resident of Liverpool, 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 for internal combustion engines of that type in which the rate of fuel delivery is proportioned to the engine speed and the amount of air passing through the carbureter. The invention is applicable to carbureters of that type in which the main air inlet aperture is always fully open and of constant area, and in which the carbureter is provided with a constant level device, such as the usual float chamber. The invention is directed to improvements in that type of carbureter which is provided with several fuel jets.

A carbureter in accordance with this invention is illustrated in the accompanying drawings, in which Figure 1. is a sectional elevation of the carbureter, Fig. 2. being a plan view of Fig. 1. in section on the line A—A. Fig. 3. is a vertical detail section, to a larger scale, of the nozzle element, and Fig. 4. is a plan of the nozzle element showing the jet apertures. Fig. 5. is side elevational view partly in section of the nozzle shown in Fig. 3., the upper part being in section on a plane at right angles to the plane of section of Fig. 3. Fig. 6. is a fragmentary section of the lower part of a modified construction of the nozzle element, and Fig. 7. is an enlarged fragmentary sectional plan showing the means for feeding the fuel to, and proportioning its delivery to the opening of, the throttle valve.

In carrying out the invention, an element 1 containing the several nozzles is screwed or otherwise fastened at 2 into the floor or casing of the carbureter, and is provided at its base with a restricted main fuel orifice 3 communicating with a well or duct 4 fed from the constant level or float chamber 5 by way of the passage 6. The upper end of the nozzle element 1 in which are the fuel jet apertures *a*, *b*, *c*, is in the mixing chamber 7 and open to the engine suction. In the preferred construction the jet aperture *a* of the primary nozzle 8 converges toward the aperture *b* of the first auxiliary nozzle 9

and is of smaller area than the aperture of this auxiliary nozzle, twin divergent apertures *c* opening from the second auxiliary nozzle 10 which apertures have a greater aggregate area than the jet aperture of either the primary or first auxiliary nozzles. The upper part of the nozzle element is provided, preferably, with a concavity 11 or recess into which the convergent primary and first auxiliary jet apertures *a*, *b*, open. With this arrangement, as the fuel issues from these apertures the two streams impinge and the fuel is thoroughly atomized and diffused. The aperture of the primary nozzle 8 receives its supply directly from a sump 16, but the aperture of the first auxiliary nozzle receives its supply indirectly from the sump 16—which is fed from the orifice 3—through a second restricted orifice 12 which, in the form illustrated in Figs. 1. to 5., also supplies the second auxiliary nozzle 10 and a reservoir 13. Both first and second auxiliary nozzles are fully open at their bases to the reservoir 13 by way of a passage 14. The reservoir is open at 15 to the atmosphere. With such an arrangement of jets, the regulation of fuel delivery is automatic and proportionate to the amount of air entering the mixing chamber, and consequently to the engine requirements.

The action of the jets is as follows:—The fuel enters the sump 16 through the restricted main orifice 3, filling the sump and the lower parts of the jet ducts 8, 9, 10. When the engine is at rest, the reservoir 13 fills up with fuel to the level in the float chamber 5. At high speeds the supply of fuel issues from the jet aperture *a* of the primary nozzle 8, being at the same time diffused by a stream of air issuing from the first auxiliary aperture *b*, the supply of fuel from the reservoir to the aperture *b* having been exhausted, this stream of air effecting the dual purpose of atomizing the fuel issuing from the primary nozzle and relieving the vacuum in the immediate vicinity of the primary jet aperture *a*, thereby preventing excessive discharge of fuel from the latter. At normal speeds of the engine, fuel issues from the jets *a* and *b* of the primary and first auxiliary nozzles, but the rate of fuel discharge of the primary nozzle 8 is diminished in proportion to the increase of discharge of the auxiliary nozzle 9. At still lower engine speeds, the flow through the

primary jet practically ceases owing to the restricted size of its aperture *a*, and fuel issues from the larger divergent jets *c* of the second auxiliary nozzle 10, the object of these latter jets being to supply fuel readily at low rates of speed, this being effected by determining the bore of the nozzle 10 and its apertures *c*, which latter are divergent for the purpose of bringing their fuel delivery into contact with the peripheral strata of air passing from the air inlet 17 through the throat 7 of the carbureter, such outer air strata being usually ineffectively carbureted at low engine speeds.

The delivery of fuel into the nozzle element is governed by the size of the restricted main orifice 3 in its base, which being remote from the action of the engine suction may effect its discharge into any of the ducts 8, 9, 10 and also into the reservoir 13.

While the engine is running slowly, fuel accumulates in the reservoir 13, and on the throttle valve 18 being opened this accumulation of fuel is exhausted into the mixing chamber 7 by way of the apertures *b*, *c*, in the first and second auxiliary nozzles, thus causing a rich mixture, the object of which action is to overcome the lag in the fuel delivery which would otherwise take place in the mixing chamber, which lag would cause uneven running and poor acceleration. When the vacuum is insufficient to cause delivery of fuel from the primary nozzle 8, owing to the restricted size of the aperture *a* of this primary nozzle, the fuel will deliver from the first auxiliary jet aperture *b*, due to its greater area. A further reduction in vacuum at lower speeds causes the fuel to deliver at the apertures *c* of the second auxiliary nozzle 10, which apertures are of suitably larger area, thus insuring a ready discharge from the second auxiliary nozzle apertures when the fuel is not finding a ready outlet from the primary nozzle 8, while this latter, being the only one in direct communication with the sump 16, will be the only nozzle delivering fuel when the vacuum in the mixing chamber is very great, the other nozzle 9 being open then to the atmosphere, taking in air which is delivered to its jet and effects a reduction in the vacuum in the vicinity of the primary jet, preventing excessive discharge.

In the modified construction of the nozzle element shown in Fig. 6, instead of both the first and second auxiliary nozzles 9 and 10 communicating directly at their bases with the restricted orifice 12, only the first auxiliary nozzle 9 is so arranged, the second auxiliary nozzle 10 being inclosed at its base except for a small aperture 14^a which, when the nozzle element is screwed in place, communicates with an annular space 14^b communicating with the passage 14 from the reservoir 13. In this arrangement the aux-

iliary nozzle 10 only receives fuel at starting of the engine, and when there is an accumulation of fuel in the reservoir 13.

A fuel duct or tube 19 is led from the reservoir through the carbureter casing to an annulus 20 formed by a circular channel cut in the exterior of a bushing 21, Fig. 7, which forms a bearing for the throttle valve spindle 22. The duct 19 communicates with the lower part of the reservoir by means of a tube 28 depending therein. A port 23 in the bushing 21 communicates with the bore 24 of the valve spindle, and is led thence to ducts 25 at opposite points of the peripheral edge of the valve 18, the end of the spindle being beveled at 26 so that by adjusting the bushing 21 the position of the beveled edge 26 of the spindle may be adjusted with reference to the aperture 23 in the bushing, and consequently control the flow of fuel through said port 23, a pinching screw or other device being provided for securely positioning the bushing after adjustment. In this way any opening of the aperture 23 may be arranged as desired when the throttle valve is closed, opening movements of the throttle valve effecting a further uncovering or opening of the aperture in the bushing, and, consequently, the delivery of fuel therethrough to the periphery of the throttle valve, the aperture 23 being cut off at a predetermined opening of the throttle. In this way, a discharge of fuel proportionate to the air passing the throttle valve at small throttle openings is effected, the arrangement providing a means for easy starting of the engine, and for continued slow and even running.

I claim:—

1. In a multiple jet carbureter, in combination: a sump supplying fuel to all the jets; a constant level chamber feeding said sump; a main restricted orifice through which the sump is supplied; a primary jet nozzle communicating directly with the sump; a reservoir open to the atmosphere; auxiliary jet nozzles communicating with the reservoir; and a secondary restricted orifice through which the reservoir and the auxiliary jets are supplied from the sump, and a butterfly outlet valve having a passage extending therethrough and adapted to supply fuel through said passage from said reservoir and above the auxiliary jet nozzles.

2. In a multiple jet carbureter, in combination: a sump supplying fuel to all the jets; a constant level chamber feeding said sump; a main restricted orifice through which the sump is supplied; a primary jet nozzle communicating directly with the sump; a reservoir open to the atmosphere; an auxiliary jet nozzle communicating with the reservoir, the auxiliary jet converging with respect to the jet of the primary nozzle; a secondary auxiliary nozzle having twin divergent jets; and a secondary re-

stricted orifice through which the reservoir and the auxiliary jets are supplied from the sump.

3. In a multiple jet carbureter, in combination: a sump supplying fuel to all the jets; a constant level chamber feeding said sump; a main restricted orifice through which the sump is supplied; a primary jet nozzle communicating directly with the sump; a reservoir open to the atmosphere; auxiliary jet nozzles communicating with the reservoir; a second restricted orifice through which the reservoir and the auxiliary jets are supplied from the sump; a throttle valve; a duct delivering fuel from the reservoir to the throttle valve periphery; and means for varying the fuel delivery to the valve proportionately to the valve opening.

4. In a multiple jet carbureter, in combination: a sump supplying fuel to all the jets; a constant level chamber feeding said sump; a main restricted orifice through which the sump is supplied; a primary jet nozzle communicating directly with the sump; a reservoir open to the atmosphere; auxiliary jet nozzles communicating with the reservoir; a secondary restricted orifice through which the reservoir and the auxiliary jets are supplied from the sump; a throttle valve; a duct delivering fuel from

the reservoir to the throttle valve periphery; a bearing for the throttle valve spindle; an aperture in said bearing through which fuel passes to the valve periphery; and a bevel face on the spindle co-acting with the aperture.

5. In a multiple jet carbureter, in combination: a sump supplying fuel to all the jets; a constant level chamber feeding said sump; a main restricted orifice through which the sump is supplied; a primary jet nozzle communicating directly with the sump; a reservoir open to the atmosphere; auxiliary jet nozzles communicating with the reservoir; a secondary restricted orifice through which the reservoir and the auxiliary jets are supplied from the sump; a throttle valve; a duct delivering fuel from the reservoir to the throttle valve periphery; a bearing for the throttle valve spindle; an aperture in said bearing through which fuel passes to the valve periphery; a bevel face on the spindle co-acting with the aperture; and means for angularly adjusting the bearing relatively to the bevel face.

In testimony whereof I affix my signature in presence of two witnesses.

THOMAS WATSON PATERSON.

Witnesses:

A. J. DAVIES,
WM. PIERCE.