P. C. CANNON.

CARBURETER.

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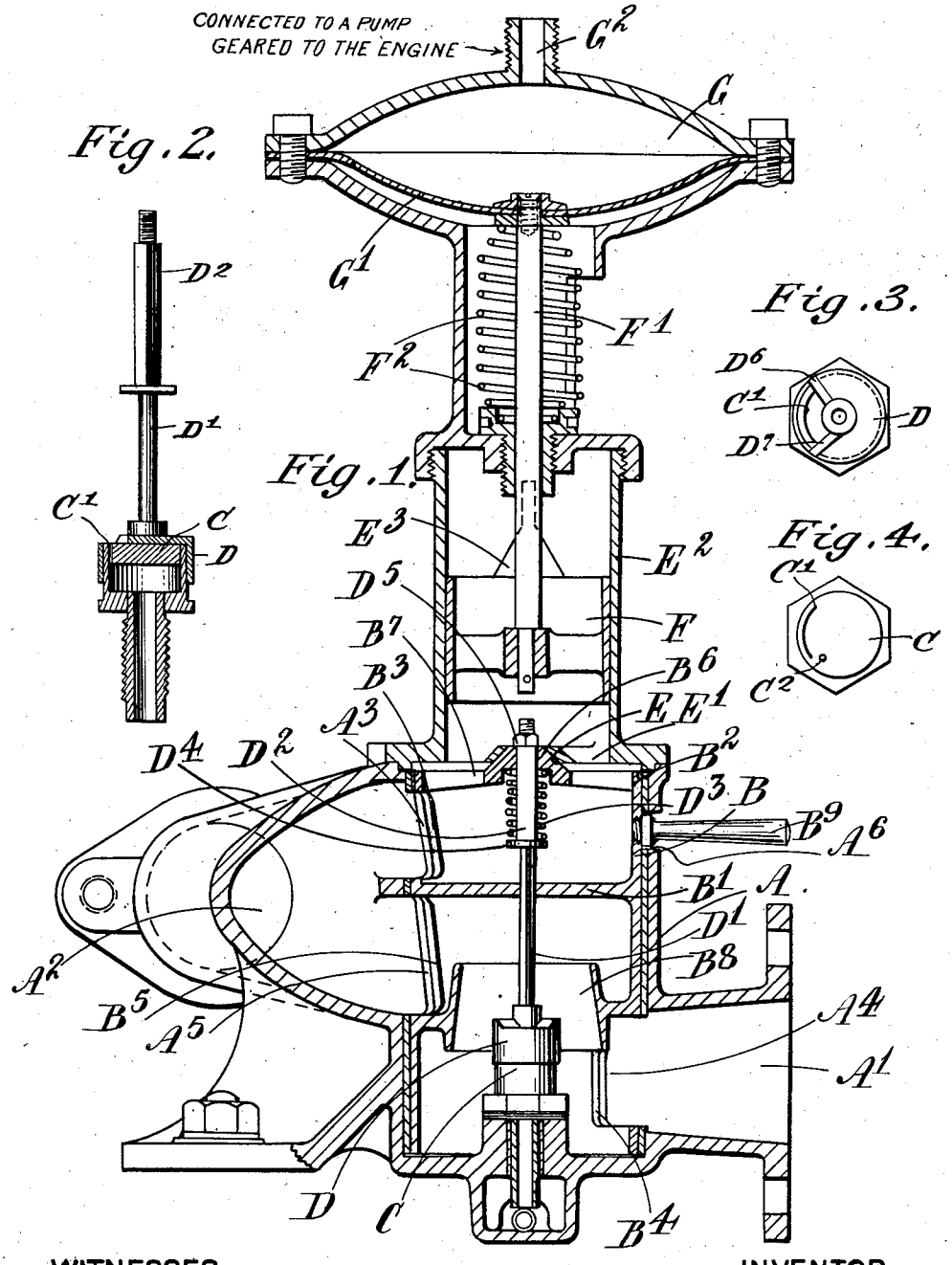

Fig. 2.

Fig. 1.

Fig. 3.

Fig. 4.

WITNESSES:

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CARBURETER.

973,855. Specification of Letters Patent. Patented Oct. 25, 1910.

Application filed October 25, 1907. Serial No. 399,092.

To all whom it may concern:

Be it known that I, PERCIVAL CHARLES CANNON, a subject of the King of England, residing in London, England, have invented certain new and useful Improvements in Carbureters, of which the following is a specification.

This invention is for improvements in or relating to carbureters for internal combustion engines and has for its main object to provide a carbureter wherein the capacity of the fuel nozzle shall be automatically varied in direct proportion to the degree of displacement of the throttle for the air or mixture.

According to this invention the fuel nozzle is provided with a discharge orifice that takes the form of a continuous slot and a "cut-off" is operatively connected to the movable member of the throttle so that as the throttle is moved to increase or decrease the effective area of the ports for the air or mixture, a larger or smaller portion of the slot is closed. The movable member of the throttle valve conveniently takes the form of a sleeve that is free to rotate in the carbureting chamber and it is preferably divided transversely by a diaphragm. When so arranged the member has the inlet and outlet ports for the auxiliary air supply disposed on one side of the diaphragm while the inlet and outlet ports for the main air supply are situated on the other side of the diaphragm. The fuel nozzle may be concentric with the throttling sleeve and in the sleeve an annular baffle or chimney is carried that surrounds the nozzle and is concentric therewith.

The auxiliary air valve may be operatively connected to a movable wall of a chamber and a pump is provided for continuously circulating a liquid through the chamber. The wall or valve member is spring-controlled in such a manner that the valve tends to close the auxiliary air inlet and the pump is geared to the engine so that as the speed of the engine increases, that of the pump will also increase. The liquid is consequently circulated through the chamber at a higher or lower speed according to the speed of the engine and thus increases or decreases the pressure in the chamber and thereby displaces the valve to uncover the air inlet or it allows the valve to come into position to cover the air inlet.

In the accompanying drawings which illustrate one method of carrying out this invention, Figure 1 is a central vertical section through a carbureter; Fig. 2 is a central vertical section through a detail of a carbureter and showing the detail on a larger scale; Fig. 3 is a plan of the detail shown in Fig. 2 with the upper portion of the stem removed; and Fig. 4 is a plan of the fuel nozzle with the "cut-off" removed.

The carbureting chamber A has a main air inlet A^1 and an outlet A^2 that communicates with the engine. Free to rotate in the carbureting chamber is a throttling sleeve B. This is divided transversely by a diaphragm B^1. The upper end B^2 of the sleeve is open and constitutes the inlet for the auxiliary air supply as hereinafter described, and in the wall of the sleeve and also above the diaphragm B^1 is an outlet orifice or port B^3. Below the diaphragm B^1 an inlet port B^4 is provided for the main air supply and an outlet B^5 permits the escape of this air into the conduit A^2. The casing A has ports A^3 A^4 A^5 corresponding to the ports B^3 B^4 B^5 in the sleeve and these are suitably shaped so that the increase or decrease of the gas permitted to pass them may be suitably varied according to the angular position of the sleeve B.

In the base of the carbureting chamber A and concentric with the sleeve B a fuel nozzle C is mounted. The upper face of this nozzle is flat and the discharge outlet takes the form of a continuous slot C^1 (Figs. 3 and 4). Over the nozzle a cap D is fitted and this is connected by a stem D^1 having a squared end D^2 with a conical boss B^6. This boss is carried by arms B^7 on the end B^2 of the sleeve B and on the boss B^6 the sleeve B turns. The conical boss B^6 fits into a conical seating E formed in an arm E^1 which is carried on the inner wall of a cylindrical extension E^2 that is secured to the upper end of the carbureter casing A; this end of the casing is open. A spring D^3 surrounds the squared portion D^2 of the stem D^1 and bears at one end against a collar D^4 of the stem and at the other end against the underside of the boss B^6 of the sleeve B. The spring D^3 thus keeps the cap D down upon the fuel nozzle C and presses the sleeve B home upon the conical seating E. At the end of the stem D^2 a nut D^5 may be provided to prevent the stem and cap from becoming

detached from the sleeve when the latter is lifted out from the chamber.

A portion of the top of the cap D is cut away so that radial edges D^6 D^7 are provided whereby a greater or smaller portion of the discharge slot C^1 may be rendered operative. Beyond the end of the slot C^1 an orifice C^2 is provided in the nozzle in order that when the slot C^1 is covered the orifice C^2 will constitute a small constant fuel inlet.

Situated between the inlet port B^4 of the sleeve and outlet port B^5 thereof is a conical baffle or chimney B^8. This is carried by the sleeve B and being concentric with the nozzle it concentrates the incoming air about the nozzle so that the required degree of suction upon the latter is obtained.

The sleeve B may be controlled by any suitable means as by an arm B^9 projecting through a slot A^6 in the casing.

In the cylindrical extension E^2 a piston valve F is mounted. This covers or uncovers an air inlet port E^3 in the wall of the extension E^2 and thereby controls the auxiliary air supply. The stem F^1 of the piston valve is connected to a flexible wall G^1 of a chamber G. A spring F^2 bears at one end against the cover of the extension E^2 and at the other end against the flexible wall G^1 of the chamber G. The interior of the chamber communicates by a conduit G^2 with a pump not shown in the drawings. This pump is geared to the engine with which the carbureter is intended to be employed and circulates liquid through the chamber G or any part communicating with the conduit G^2 at an increased or decreased speed according to the speed of the engine.

The operation of this device is as follows:—The throttling sleeve B is operated by hand and may be moved through any given angle to throttle the inlet port A^4 and outlet ports A^3 A^5 to a greater or smaller degree according to requirements. Any angular movement of the sleeve B however imparts a corresponding angular movement to the stem D^1 and consequently to the cap D, so that the opening in the top of the cap provided between the "cut-off" edges D^6 D^7 will be brought into position to cover or uncover a greater or less portion of the discharge slot C^1. The cut-off D is so disposed relatively to the sleeve that when the latter is set to provide a full opening for the ports A^3 A^4 A^5 the discharge slot C^1 of the nozzle will also be fully uncovered. It should be noted that as the slot C^1 is continuous, the discharge aperture is uniformly increased or decreased as the sleeve B is rotated.

When the throttling sleeve B is turned in such position as to close the whole of the slot C^1 in the fuel nozzle the pilot orifice C^2 is uncovered so that the fuel is not entirely cut off.

The in-rush of air through the sleeve B from the main inlet A^1 would tend to drive that side of the sleeve which is on the left of Fig. 1 against the side of the carbureting chamber A and thus cause friction, but the conical boss B^6 at the upper end of the sleeve B and the corresponding conical seating E in the extension E^2 positions the sleeve centrally in the chamber and thus undue friction against the side walls of the chamber is prevented.

The position of the auxiliary air-supply valve F is controlled by the pump aforesaid. Although this pump only circulates the liquid through the chamber G, it is found in practice that the pressure in the chamber rises or falls according to the rate at which the pump is working, and thus the flexible wall G^1 will be moved forward against the action of the spring F^2 when the pressure increases and will be moved back by the spring as the pressure decreases, corresponding movement being imparted to the valve F.

Obviously the details of this carbureter may be modified without departing from the spirit of the invention. For instance, the slot C^1 of the nozzle could be provided in the side of the nozzle instead of at the top of the same, and the side of the cap could be correspondingly cut away for the purpose of covering or uncovering the same. This arrangement, however, would be less convenient in practice as it would necessitate a nice fit being provided between the interior curved portion of the cap and the exterior curved wall of the nozzle, whereas with the present arrangement it is only required that the coöperating faces shall be flat.

If desired the auxiliary air-supply to the carbureter may be automatically regulated in accordance with the varying pressure of the exhaust gases from the engine. For this purpose a pipe G^2, Fig. 1, may be connected with the exhaust of the engine, or the movements of the valve F may be controlled according to any known method.

What I claim as my invention and desire to secure by Letters Patent is:—

1. In a carbureter for an internal combustion engine the combination of a central chamber having a main air inlet in the side of the chamber at the bottom an auxiliary air inlet at the top of the chamber a main mixture outlet and an auxiliary outlet both in the side of the chamber, a rotatable throttling sleeve open at the top and having apertures corresponding to the main air inlet and the mixture and auxiliary air outlets, a division in the sleeve between the mixture and auxiliary outlets, a fuel nozzle situated at the main air inlet end of the sleeve having a discharge orifice in the form of a circular slot and a rotatable cut-off on said nozzle operatively connected to the

throttling sleeve whereby the capacity of the fuel nozzle is varied according to the position of the throttling sleeve.

2. In a carbureter for an internal combustion engine the combination of a central chamber having a main air inlet in the side of the chamber at the bottom an auxiliary air inlet at the top of the chamber a main mixture outlet and an auxiliary outlet both in the side of the chamber, a rotatable throttling sleeve open at the top and having apertures corresponding to the main air inlet and the mixture and auxiliary air outlets, a division in the sleeve between the mixture and auxiliary outlets, a central conical boss in the sleeve and a central conical bearing in the carbureting chamber, a fuel nozzle situated at the main air inlet end of the sleeve having a discharge orifice in the form of a circular slot and a rotatable cut-off on said nozzle operatively connected to the throttling sleeve whereby the capacity of the fuel nozzle is varied according to the position of the throttling sleeve.

3. In a carbureter for an internal combustion engine the combination of a central chamber having a main air inlet in the side of the chamber at the bottom an auxiliary air inlet at the top of the chamber a main mixture outlet and an auxiliary outlet both in the side of the chamber, a rotatable throttling sleeve open at the top and having apertures corresponding to the main air inlet and the mixture and auxiliary air outlets, a division in the sleeve between the mixture and auxiliary outlets, a central conical boss in the sleeve and a central conical bearing in the carbureting chamber, a fuel nozzle situated at the main air inlet end of the sleeve having a discharge orifice in the form of a circular slot and a permanently open auxiliary orifice and a rotatable cut-off on said nozzle operatively connected to the throttling sleeve whereby the capacity of the fuel nozzle is varied according to the position of the throttling sleeve.

4. In a carbureter for an internal combustion engine the combination of a central chamber having a main air inlet in the side of the chamber at the bottom an auxiliary air inlet at the top of the chamber a main mixture outlet and an auxiliary outlet both in the side of the chamber a rotatable throttling sleeve open at the top and having apertures corresponding to the main air inlet and the mixture and auxiliary air outlets, a division in the sleeve between the mixture and auxiliary outlets, a central conical boss in the sleeve and a central conical bearing in the carbureting chamber, a fuel nozzle situated at the main air inlet end of the sleeve having a discharge orifice in the form of a circular slot and a permanently open auxiliary orifice and a rotatable cut-off on said nozzle operatively connected to the throttling sleeve whereby the capacity of the fuel nozzle is varied according to the position of the throttling sleeve and an annular conical chimney carried by the throttling sleeve and surrounding said nozzle.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

PERCIVAL CHARLES CANNON.

Witnesses:
HARRY B. BRIDGES,
HERBERT BURRAGE.