L. P. MOOERS.

CARBURETER.

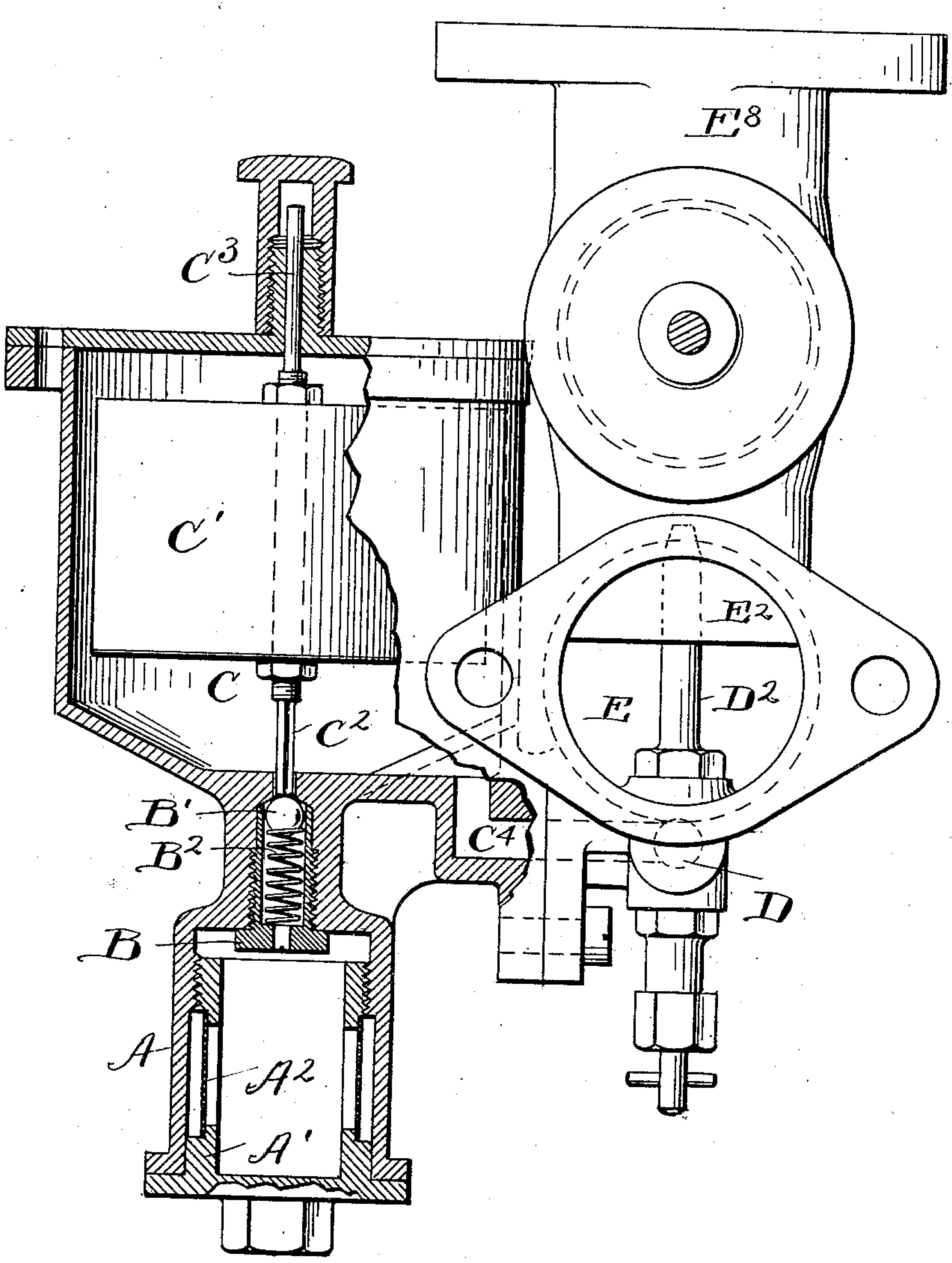
APPLICATION FILED JUNE 30, 1905.

898,495.

Patented Sept. 15, 1908.

2 SHEETS—SHEET 1.

Fig. 1.



Witnesses.
E. B. Gilchrist
J. M. Woodward

Inventor
Louis P. Mooers
by
Thurston & Bates
Attys.

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2 SHEETS—SHEET 2.

Fig. 2.

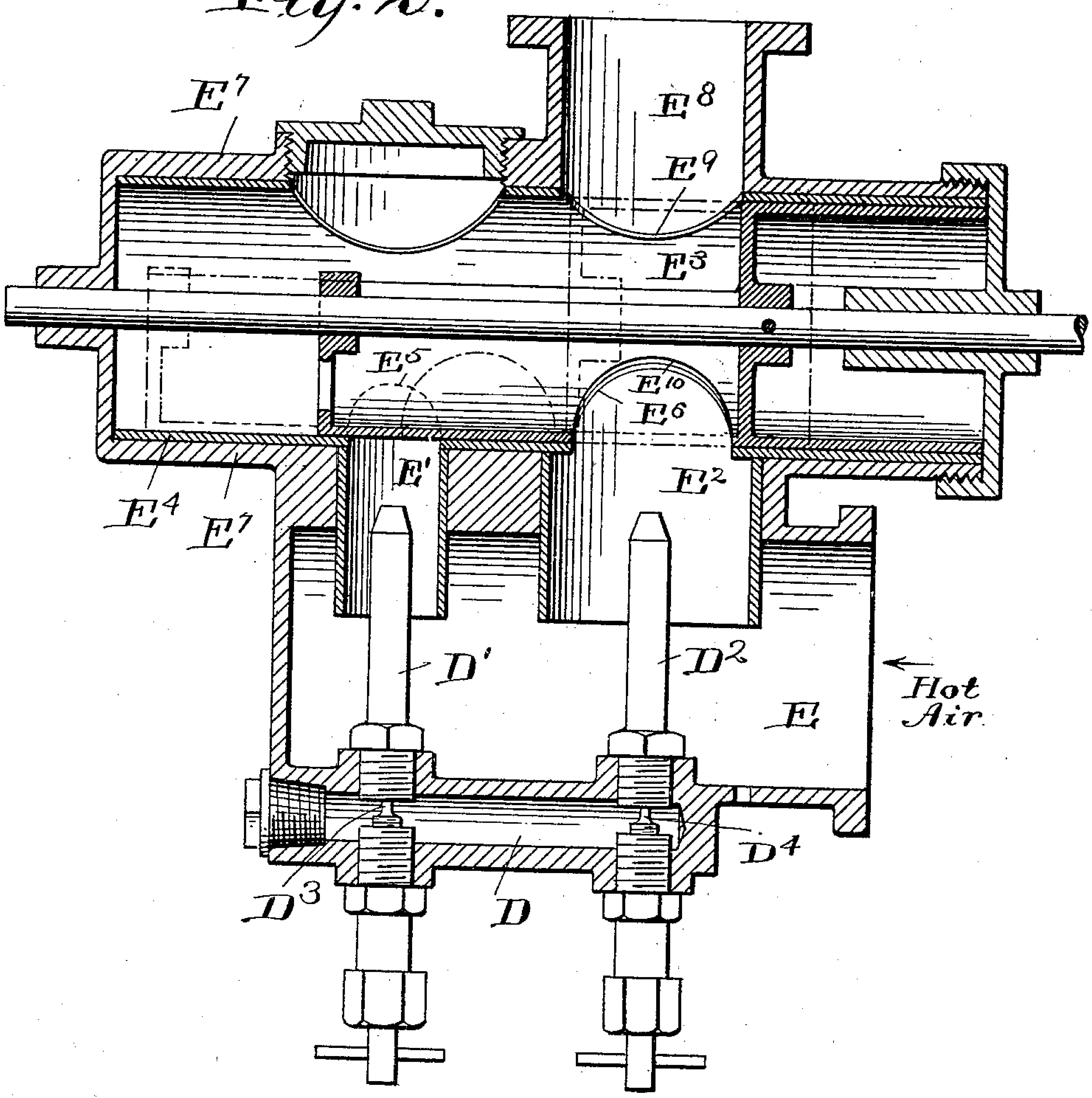
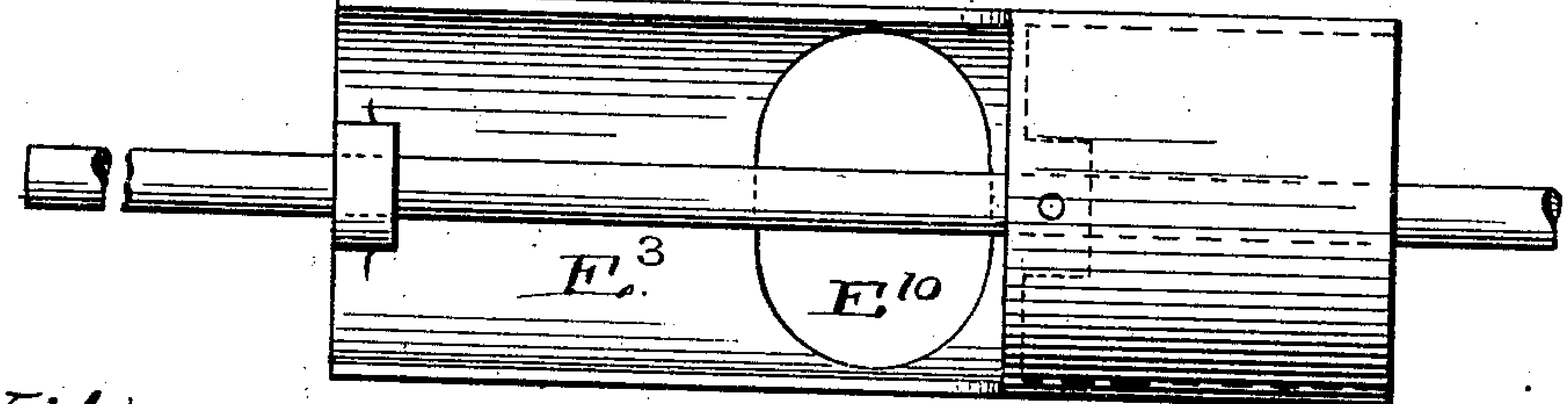


Fig. 3.



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Att'ys.

UNITED STATES PATENT OFFICE.

LOUIS P. MOOERS, OF CLEVELAND, OHIO.

CARBURETER.

No. 898,495. Specification of Letters Patent. Patented Sept. 15, 1908.

Application filed June 30, 1905. Serial No. 267,680.

To all whom it may concern:

Be it known that I, LOUIS P. MOOERS, a citizen of the United States, residing at Cleveland, in the county of Cuyahoga and State of Ohio, have invented a certain new and useful Improvement in Carbureters, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings.

The invention which forms the subject of this application relates to carbureters for gasolene engines, and has for its object the provision of a structure adapted to efficiently carburet the air and maintain a properly proportioned mixture regardless of the fluctuation in the motor speed and the position of the throttle valve.

Heretofore in that type of carbureter wherein the injecting action of the air, rushing past the gasolene spray nozzles, is utilized for effecting a proper explosive mixture, difficulty has always been found in securing efficient action when the engine was throttled to a low speed. This difficulty arises from the fact that the injecting action is dependent on the rate of flow immediately past the spray nozzles, which rate is, under the conditions obtaining, the resultant of two factors, viz., the volume of air drawn into the engine per unit of time and the cross sectional area of the injecting tube. The latter factor being ordinarily unalterable in practical work under operating conditions, a decrease in the volume factor will, at a certain point, so reduce the rate of flow that the injection will cease entirely or no longer be proportionate to the volume of air passing. Thus, the carbureting effect is in fact the resultant of certain factors, variation in one of which without compensating change in another will cause deviation from the constant degree of saturation which it is desired to maintain at the point of greatest efficiency. It is to provide a practical solution of this problem that I have devised the structure below described wherein are embodied principles insuring a proper control of the carbureting action so that the explosive mixture is maintained at the desired point. Further, it has hitherto been found that when the speed was quickly raised the sudden rush of air through the strangle tubes sucked the gasolene out of the spray nozzles to such an extent that the immediately succeeding quantity of air was insufficiently supplied with gasolene and the mixture consequently not effective.

The structure which has been invented by me is so designed that the disturbing effect due to an increase in the volume of air drawn in by the engine is entirely suppressed and no material fluctuation in the carbureting resultant permitted.

A specific form of the means which I have found effective for this purpose is hereinafter described and claimed.

Referring to the drawings, Figure 1 is an end elevation partly in section showing the gasolene inlet and float chambers and the connection of the latter with the carbureting or mixing chambers. Fig. 2 is a vertical section through the air inlet and mixing chambers. Fig. 3 is a plan view of the throttle controlling the flow through the carbureting tubes and the outlet to the engine.

In the drawings, A is an inlet chamber having free communication with the main gasolene reservoir. Suitably secured in the inlet chamber is a hollow perforated sediment plug A′ having its perforations covered with gauze A^2. Leading from the inlet chamber is a valve chamber into which is fitted a valve housing B containing a ball valve B′ held normally against its seat by a spring B^2 in such manner as to check the flow from the inlet chamber into the float chamber above. The float chamber C contains any suitable form of float C′ provided at its upper side with a guiding rod C^3 and on its lower side with a rod C^2 of such cross section as to float within the passage leading from the valve chamber to the float chamber without filling the same.

The lower rod C^2 not only guides the float in rising and falling, but is adapted to bear the valve B′ away from its seat whenever the gasolene in the float chamber is diminished to such an extent as to allow the float to fall to any definite point. This point may be regulated by adjusting the float rod C^2 in any suitable manner. The rods C^2 and C^3 may be either separate rods or one continuous rod, as desired.

Leading from the float chamber is an outlet passage C^4 which conducts the gasolene to the passage D, from whence it rises in the spray nozzles D′, D^2, the orifices of which are controlled respectively by the needle valves D^3, D^4. The height of the gasolene in the spray nozzles is determined by the level in the float chamber, but it usually approaches very close to the mouth of the spray nozzles. It will be seen by reference to Fig. 2 that I have shown two of these spray nozzles, but in conformance with the spirit of my invention I may obviously provide more.

The air is drawn in through the inlet con duit E, and up past the spray nozzles D′, D², through their respective strangle tubes E′, E² when the passages thereabove are freely open. These passages or tubes open into a common mixing chamber or horizontal conduit E⁷ from which leads a single outlet E⁸ to the engine. As shown, the passage E′ is of less diameter than the passage E², thus having the capacity of maintaining a greater injecting action for a small volume of air than could be maintained by the passage E².

The horizontal chamber is controlled by the combined throttle and valve structure E³, which is constructed to serve as an engine throttle controlling the outlet passage E⁸, and as a cut off valve for the flow through the carbureting tubes, and moves, as shown in Fig. 2, in a hollow cylindrical casing E⁴, lining the chamber E⁷ and extending across the ports E, E² and E⁸, but suitably cut away so as to provide free communication for these passages. The ports E⁵ and E⁶ on the lower side of the lining are so positioned and proportioned as to properly receive the flow from the strangle tubes while the port E⁹ on the upper side is coincident with the outlet E⁸, which latter opening is of such size and location as to be left partially open after the port E⁶ has been entirely closed by the valve E³.

Referring to Figs. 2 and 3 it will be seen that the valve E³ is so shaped and constructed that it may be operated to throttle the outlet to the engine and simultaneously reduce the flow from the strangle tube E² through the port E⁶. This valve consists of a cylindrical portion, the opposite sides of which are adapted to slide over the ports E⁶ and E⁹, and a semi-cylindrical portion, the side of which is provided with a port E¹⁰ constructed to coincide with the port E⁶ when the port E⁹ is uncovered.

The ports E⁵ and E⁶ are so spaced that as the port E¹⁰ passes from over the port E⁶ and approaches E⁵ it will reach the latter before passing entirely out of communication with the former. This insures a continuous flow of air through the carbureter. The dotted lines in Fig. 2 indicate the position of the valve after the port E⁶ has been entirely cut off and the entire flow takes place through the port E⁵. In the position shown it will be noted that the port E⁸ is still somewhat open so as to permit a restricted flow therethrough. Should I employ more and successively smaller strangle tubes it is obvious that the valve structure would be altered in conformance therewith and the port E⁹ and the passage E⁸ so positioned that they would not be entirely cut off until the smallest of the carbureting tubes would be brought into action.

In the operation of the device at high speed when the throttle is in its retracted position, as shown in Fig. 2, the larger strangle tube is uncovered and in communication with the outlet to the cylinder, thus allowing a free flow of air which can be fully and properly carbureted by suitably setting needle valve D⁴. When the speed of the engine is diminished and the throttle is moved so as to check the flow to the engine through the passage E⁸, the passage E² is likewise throttled; and the ports are so constructed as to make the throttling of the latter passage proportionate to that of the first named passage until the lower limits are approached.

It will be seen that if there were but one strangle tube of unalterable diameter the result of this throttling action would be to diminish the rate of flow past the single spray nozzle, since the total volume allowed to pass is the product of the two controlling factors, namely, the rate of flow and the cross sectional area of the passage. The effect of such a condition is to disproportionately diminish the injecting action toward the lower limits and produce an inefficiently carbureted mixture in the conduit beyond. But it will be seen that, in my apparatus, as the throttle moves across the port leading from the strangle tube E² and throws the latter out of action the carbureting action is not impaired, for the reason that the port E¹⁰ will move over the port E⁵ and allow the flow of air to the engine to be supplied through the strangle tube E′, which, being of comparatively small diameter, will maintain the proper rate of flow for the purpose of securing an adequate injection of gasolene. By this action it will be seen that notwithstanding the variation in the volume drawn into the engine per unit of time that I have placed the determining factors under control so that the resultant is not varied. The smaller strangle tube is cut in toward the latter part of the throttle valve's movement, at a point where the volume drawn in would diminish the rate of flow through the larger tube to a degree where the injecting action would become insufficient; and the larger tube is entirely cut off by the continued movement of the throttle valve device before the volume of flow is so decreased that the product of the larger tube would be so inefficiently carbureted as to dominate or influence the character of the explosive mixture, as a whole, causing a substantial deviation from the constant. The rate of flow through the smaller tube will obviously still be sufficient to secure a proper injection and carbureting action, even when a far less volume of air is drawn in by the engine, since its cross sectional area is comparatively small. Supposing now, the throttle valve to have been thrown toward the extreme limit of its movement, short of entirely throttling the engine passage and only the smallest of the carbureting or strangle tubes remaining in action, it will be seen that a sudden opening of the throttle will allow an immediate in-flow of a large volume of air without causing an abnormal rush past the spray nozzles, since each stage of the opening movement of the throttle uncovers a larger tube of sufficient capacity to take care of or allow a free flow for the volume of air admitted by the engine, and there is consequently no sudden elevation in the rate of flow such as to create the abnormal injecting action referred to above. Thus, it will be seen that, although the volume drawn in by the engine per unit time is a fluctuating factor of the carbureting resultant I am enabled to so vary the ratio of the several factors that the resultant is a constant.

There are, of course, quite a number of variations possible in the style and form of throttling valves and the disposition of the ports and I do not desire to be understood as limiting myself to one form.

Having described my invention, I claim:

1. In an explosive engine, a plurality of independent sets of carbureting means having different permanent carbureting factors, an engine throttle, and means operating simultaneously with the throttle for throwing any individual one of said carburetting sets out of operation, and bringing a second set having a different permanent factor into action.

2. In an explosive engine, a plurality of independent sets of carbureting means, having different permanent factors for carbureting the inflowing air, a mixing chamber and a throttle valve and means operating simultaneously with the throttle valve for throwing any single one of said sets into operation and simultaneously cutting off another of said sets.

3. In a carbureter for explosive engines, independent means for carbureting the inflowing gas, one of said means being of greater carbureting capacity per volume of air passed than the other means, an engine throttle, and means operating simultaneously with the engine throttle for throwing the means having the greater capacity alone into operation.

4. In an explosive engine, a throttle, a carbureter having separate spray nozzles in separate strangle conduits, one of said strangle conduits being of relatively larger feeding capacity, and means operating simultaneously with the throttle for opening the conduit having the larger capacity and closing the conduit of smaller capacity.

5. In an explosive engine, a throttle, a carbureter having separate spray nozzles in separate strangle tubes, one of said strangle conduits being of relatively larger feeding capacity, and means operating simultaneously with the throttle for closing the conduit having the larger capacity and at the same time opening the conduit of smaller capacity.

6. In a carbureter for explosive engines, independent means for carbureting the inflowing gas, one of said means being of greater carbureting capacity per volume of air passed than other means, an engine throttle, and means operating simultaneously with the engine throttle for throwing the means having the greater capacity out of operation and at the same time throwing the means of less capacity into operation.

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

L. P. MOOERS.

Witnesses:
E. B. Gilchrist,
J. M. Woodward.