N. T. HARRINGTON.

CARBURETER.

APPLICATION FILED FEB. 8, 1909.

983,994.

Patented Feb. 14, 1911.

3 SHEETS-SHEET 1.

Fig. 1.

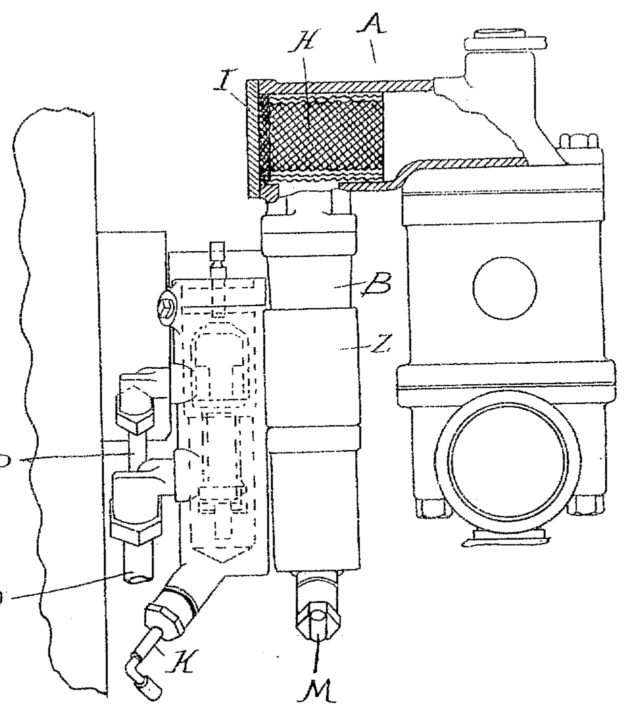
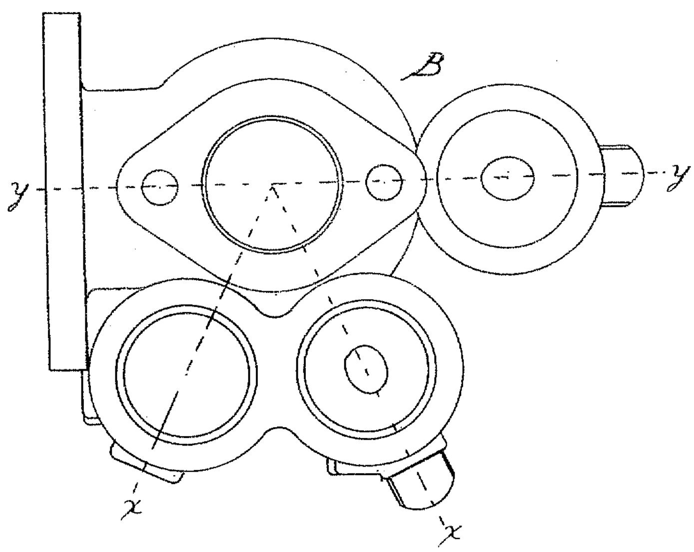


Fig. 2.



Witnesses

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3 SHEETS—SHEET 2.

Fig. 4.

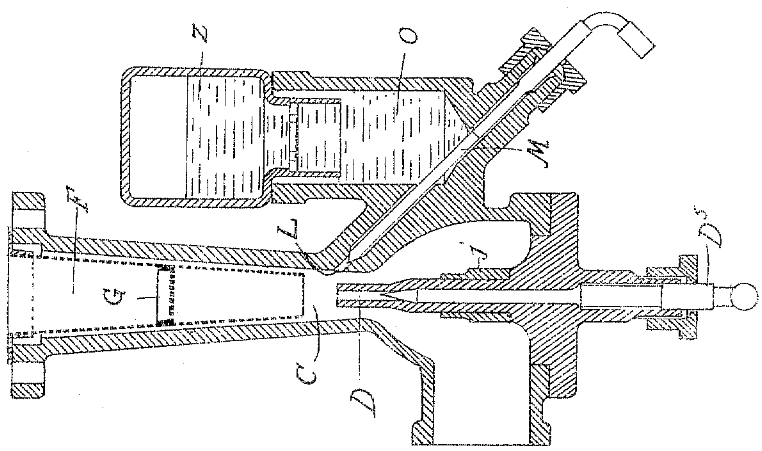
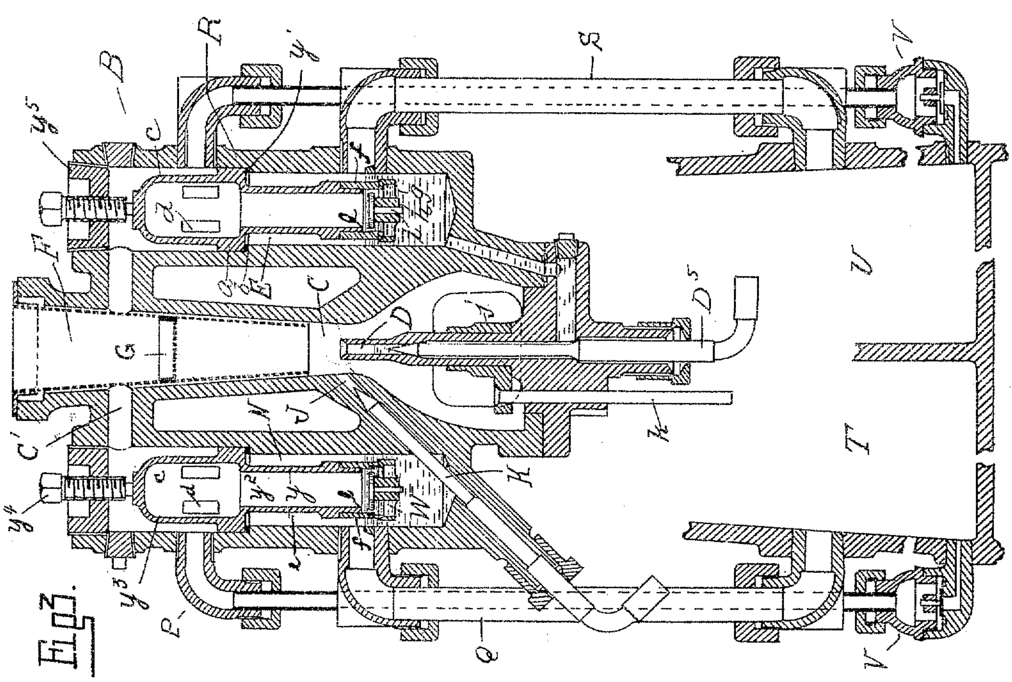


Fig. 3.



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3 SHEETS—SHEET 3.

Fig. 6.

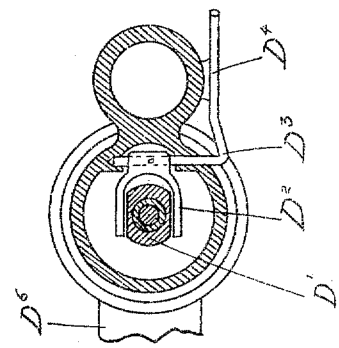
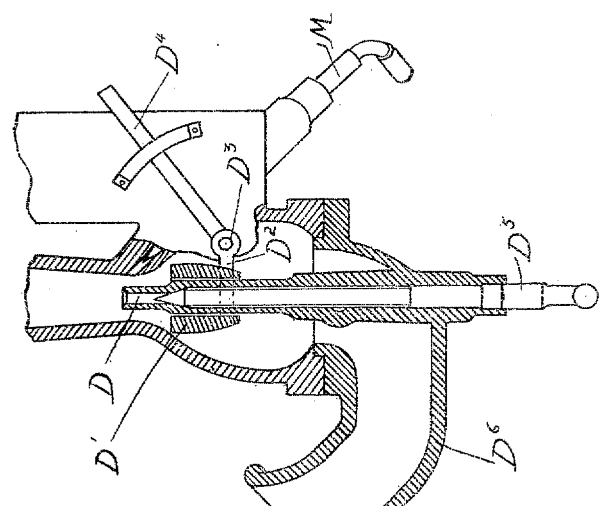


Fig. 5.



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CARBURETER.

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To all whom it may concern:

Be it known that I, NORMAN T. HARRINGTON, a citizen of the United States of America, residing at Lansing, in the county of Ingham and State of Michigan, have invented certain new and useful Improvements in Carbureters, of which the following is a specification, reference being had therein to the accompanying drawings.

The invention relates to carbureters and is more particularly designed for use in the formation of explosive mixtures from relatively heavy liquid fuels, such for instance as kerosene.

The invention consists—first, in the means employed for forming a mechanical mixture of air and the finely divided or atomized liquid fuel held in suspension therein; further, in the means for introducing another liquid and proportioning the same to the air and oil; further, in the means for maintaining the supply of both liquids by the suction operating the carbureter, and, further, in various features of construction as will be hereinafter set forth.

In the drawings—Figure 1 is a sectional elevation of the carbureter as connected with the induction conduit of an explosion engine; Fig. 2 is a plan view of the carbureter; Fig. 3 is a section on line x—x, Fig. 2; Fig. 4 is a section on line Y—Y, Fig. 2; Fig. 5 is a section similar to Fig. 4 showing a slightly modified construction; and Fig. 6 is a horizontal section thereof.

A is the induction conduit leading to the explosion chamber of an explosion engine, B is a carbureter casing containing a double tapered mixing tube C connected with the conduit A.

D is a nozzle for the introduction of the liquid fuel, having its discharge end slightly above the point of greatest restriction of the tube C, and E is an oil reservoir for supplying oil to said nozzle.

With the construction just described, each suction stroke of the engine will cause the drawing of a stream of air through the tube C and a simultaneous introduction into said stream of a jet of liquid fuel from the nozzle D. This jet of oil will be broken up into a spray by the velocity of the air current, but, for the purpose of my invention, it is necessary to more finely divide the oil than is possible by said means alone. I have therefore arranged in the expanded portion of the tube C, and also preferably in the induction conduit A beyond the carbureter, foraminous partitions which divide the larger drops of oil. These partitions are arranged so as to avoid, as far as possible, checking the velocity of the current and to this end a conical foraminous screen F is placed in the expanding portion of the tube C, being separated slightly from the walls of said tube. One or more foraminous partitions G are arranged across this conical screen F, but these are removed some distance from the point of greatest restriction in the tube. In the conduit A, which, as shown, has its axis extending at right angles to that of the tube C, is arranged a foraminous screen H which is preferably simply a coil of screen introduced into the conduit by removal of the cap I at the end thereof. In addition to the oil, it has been found desirable to introduce a certain amount of water, and this is accomplished by arranging a second jet aperture in the restricted portion of the tube C. This jet aperture J is preferably arranged to discharge the water in an upwardly inclined direction into the tube C and the quantity of liquid thus discharged is controlled by a needle valve K. I also provide a third jet opening L controlled by a needle valve M for supplying a lighter or more volatile liquid fuel, such as gasolene, to be used in the starting of the engine.

For the proper operation of the several jets, it is necessary to maintain a constant hydrostatic pressure on each and preferably by maintaining a constant level in their supply reservoirs. It is also desirable to store the bulk of the liquid at a lower level, as for instance, in the base of the engine. This may be accomplished by forming a series of relatively small chambers E, N and O in the casing B, for directly supplying the jets D, J and L, and by maintaining constant levels in said chambers by means constructed as follows: The chambers E and N, as shown, are arranged adjacent to each other on one side of the casing B, and are connected by conduits P, Q, R and S with chambers T and U in the engine casing respectively for water and oil. The conduits Q and S are overflow connections which return the surplus oil and water from the chambers E and N, while the conduits P and R are supply connections and contain check valves V. The liquid is elevated through these conduits by a connection with the suction conduit, preferably located in the expanding portion of the tube C, as indicated at C′, and the check valves V prevent the fall of the liquid column during the interval between suction strokes.

As the discharge of the liquid from the several jets must be effected during the suction stroke by differential pressure, it is obvious that the pressure on the surface of the liquid in the reservoir must be in excess of that in the carbureter at the discharging point. The increased velocity of air at the restricted part of the tube C will cause such a differential pressure, but the interposition of the foraminous screens will partially or wholly destroy the differential so as to prevent discharge of the liquid at the jets. This difficulty I have avoided by dividing the chambers N and E into two compartments, and by placing check valves between the compartments, so that during the suction stroke the pressure is not reduced on the surface of the liquid.

As illustrated, y are casings inserted in the chambers N and E. Each of the casings has a large annular flange a seated upon a circular shoulder y' formed on the casing, washers b preferably being interposed between the annular flange a and the shoulder y' so as to seal the joint therebetween. The portion c of the casing above the annular flange is provided with a plurality of slots d forming a communication between the casing Y above the shoulder Y′ and the portion of the chamber within which it is arranged. The portion e of the casing extending below the shoulder Y′ is of lesser diameter than the portion c and has sleeved upon the lower end thereof, a valve casing f fixedly secured thereto in any suitable manner. g is a spider having a bore h with which the stem i of the check valve W has a sliding engagement, the valve being of sufficient size to set against the end l of the portion e of the casing. This valve will permit liquid entering the chamber through the conduit P to pass downward through the tubular portion y^2, but during each suction stroke the valve will be seated, while the liquid in the lower portion of the chamber is under atmospheric pressure. Thus the lowered pressure in the conduit C will cause the discharge of the liquid from the jets. The liquid elevated into the chamber during the suction stroke will accumulate in the depending tubular portion y^2, and when atmospheric pressure is restored will pass by the valve, raising the level of the liquid to the proper point, while the surplus liquid is returned through the return conduit. The casings y are preferably held in position by being provided with upward extensions y^3 which are clamped down by set screws y^4 and caps y^5 to the casing.

As has been above stated, the carbureter is also provided with a jet L for the introduction of the gasolene to be used in the starting of the engine, and this is supplied with liquid from the chamber O. As a comparatively small quantity of gasolene will be sufficient for a long period for this limited use, the suction operating means for supplying the liquid may be dispensed with. In place of this a small reservoir Z is filled with the gasolene and is inserted in inverted position into the upper end of the chamber O. The depending neck from this reservoir extends to the place at which it is desired to maintain the level of the liquid in the chamber O and thus whenever the liquid in said chamber falls below this level it will unseal the neck of the receptacle and permit the air to enter and displace a portion of the liquid. This will continue until the entire reservoir is empty, and at all times a level within the chamber O will be constant.

The carbureter is preferably provided with a throttle valve for the air which, as shown in Figs. 3 and 4 consists of a member j sleeved upon the nozzle D and adapted to be moved by a push rod k to variably restrict the opening of the contracted portion of the tube C, or as shown in Figs. 5 and 6, consists of a member D′ sleeved upon the nozzle D and adjustable thereon to variably restrict the opening of the contracted portion of the tube C. This valve is operated by a rock arm D^2 connected to a rock shaft D^3 which has an actuating lever D^4 on the outside of the case adjustable to different positions.

In the operation of the carbureter, the valve K controlling the water jet and the valve D^5 controlling the kerosene jet may be adjusted to give the proper proportion of oil and water. When thus adjusted, each suction stroke of the engine will cause the introduction and commingling of both oil and water with the air current passing through the tube C and during the passage through foraminous partitions the liquid will be divided into minute particles, which will be carried and maintained in suspension by the air current. Some of the oil, which is first introduced into the air current by the nozzle D will collect upon the foraminous screen F and will drop from the lower end thereof into the air current. To return this oil I have arranged a trap in the air conduit, preferably formed by a return bent tube D^6 and this, as shown, is cast integral with the nozzle D. Whenever any oil drops into the tube D^6, the sweep of air through said tube in the next suction stroke will be sufficient to force up the oil and carry it onward.

What I claim as my invention is:

1. In a carbureter, the combination with

a double tapered suction conduit, of a reservoir adjacent to said conduit, a jet conduit connecting said reservoir to the point of restriction in said air conduit, a conduit connecting the said reservoir to said suction conduit above the point of restriction, a tank at a lower level for supplying liquid to said reservoir, supply and return conduits between said reservoir and said tank, a check valve in said supply conduit and a check valve in said reservoir between the point of supply and the point of overflow.

2. A carbureter comprising a double tapered tube forming an air suction conduit, a nozzle for discharging liquid into said conduit, a foraminous screen in said conduit beyond the point of discharge of said nozzle, and a laterally-extending inlet conduit for said double tapered tube having a trap or pocket formed therein for receiving the drippings from said screen.

3. A carbureter comprising a casing having a tapered suction air conduit therein, a plurality of liquid-holding chambers having discharge connections with said air conduit, an overflow conduit connected to each of said chambers, a supply conduit arranged at a higher level, an inner casing seated in said chamber between said supply and overflow connections, and a check valve mounted in said inner casing.

4. A carbureter comprising a suction air conduit, a liquid jet nozzle discharging thereinto, a reservoir connected with said jet nozzle, having an overflow for maintaining a level, a liquid supply conduit leading from a point at lower level to a point at higher level than said reservoir, said supply conduit being in air communication with said suction conduit, a downward extension of said liquid supply conduit into said reservoir, a check valve in said downward extension arranged to be closed by suction, and a check valve in said supply conduit arranged to be opened by suction, for the purpose described.

5. In a carbureter, the combination with a double tapered suction air conduit, of a jet nozzle for introducing liquid thereinto, a conical foraminous screen, having a plurality of transverse foraminous partitions within the conduit, for finely dividing the liquid during its passage therethrough.

6. In a carbureter, the combination with a double tapered suction air conduit, of a jet nozzle for introducing liquid thereinto, a conical foraminous screen within said conduit provided with a transverse foraminous partition, a tube connected with the outer end of the suction conduit and a foraminous screen within said tube, whereby the liquid during its passage through said screens is finely divided thereby.

7. The combination with a double tapered suction air conduit, of a needle valve positioned centrally of said conduit and having its discharge end opening into the restricted portion of the conduit, a plurality of jet connections opening into the restricted portion of the conduit and positioned at an oblique angle to the needle valve, a corresponding number of reservoirs for supplying liquid to their respective jets arranged about the air conduit, and means for relatively adjusting the quantities of liquid discharged.

8. In a carbureter, the combination with a reservoir, of a supply conduit for said reservoir, means for feeding the liquid to the reservoir through the supply conduit by the suction of the suction-producing means of the carbureter, and means for maintaining a substantially constant pressure upon the liquid within the chamber.

9. In a carbureter, the combination with a reservoir, of a supply conduit therefor, means for feeding the liquid to said reservoir through the supply conduit by the suction of the suction-producing means of the carbureter, and means for preventing the reduction of the pressure upon the liquid within the chamber during the operation of the suction means.

10. In a carbureter, the combination with a reservoir, means for feeding the liquid to said reservoir by the suction of the suction-producing means of the carbureter comprising a supply conduit opening into said reservoir, and a suction connection between the suction-producing means of the carbureter and the reservoir, and means within the reservoir for maintaining a substantially constant pressure upon the liquid within the latter.

11. In a carbureter, the combination with a reservoir, of a supply conduit for said reservoir, means for feeding the liquid to the reservoir through the supply conduit by the suction of the suction-producing means of the carbureter, and means within the reservoir dividing the latter into two chambers, and a check valve in said means controlling communication between the chambers, for the purpose described.

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

NORMAN T. HARRINGTON.

Witnesses:

NELLIE KINSELLA,

W. J. BELKNAP.