

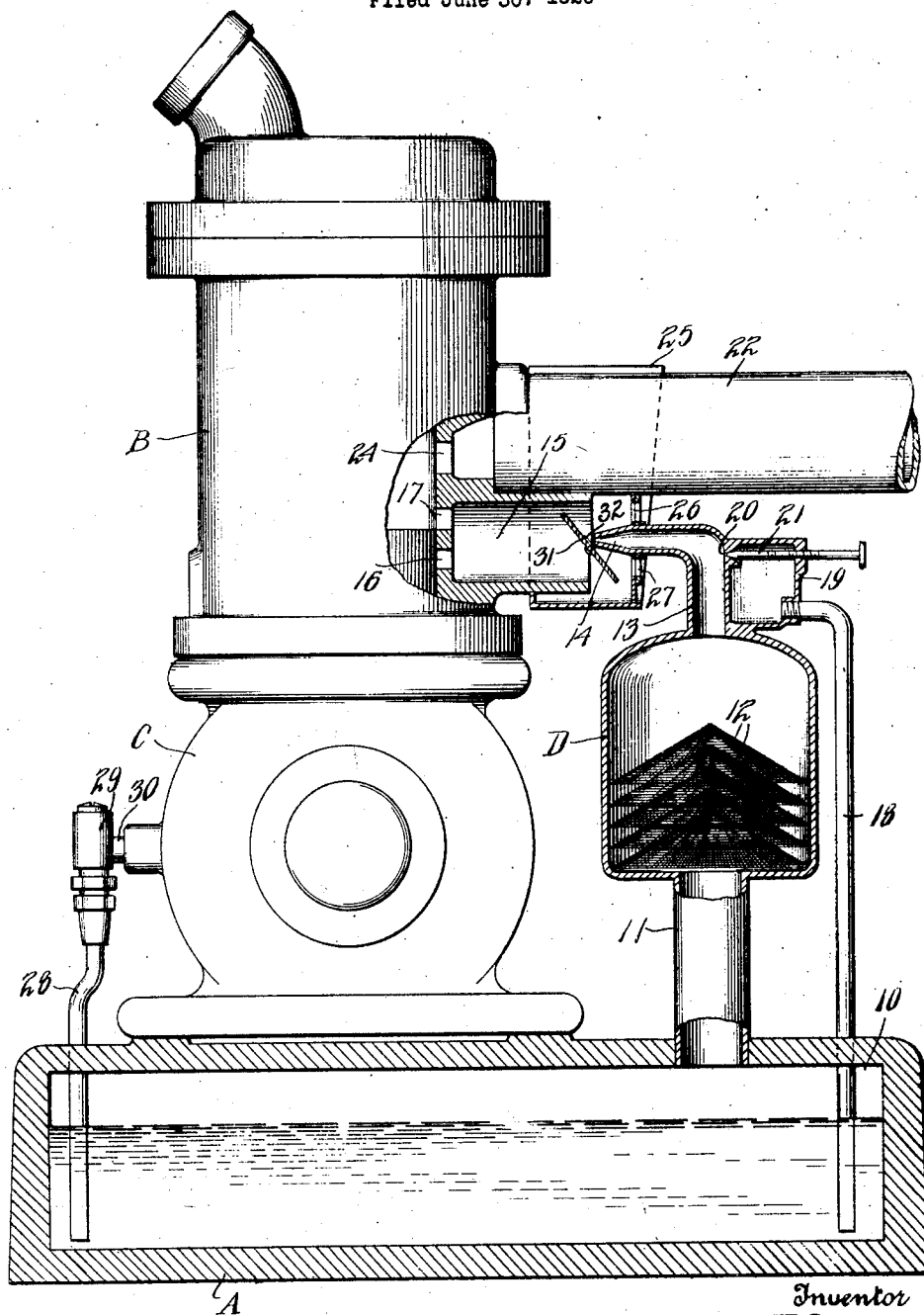
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I. T. SWARTZ

CHARGE FORMING DEVICE

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UNITED STATES PATENT OFFICE.

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CHARGE-FORMING DEVICE.

Application filed June 30, 1920. Serial No. 393,116.

My said invention relates to the formation of combustible gas by the mixing of air with the vapor and spray derived from hydrocarbon liquids by forcing air through said liquids and combining the vapor or spray with air in appropriate proportions.

Referring to the accompanying drawing, which is made a part hereof and on which similar reference characters indicate similar parts,

The figure is a view, partly in side elevation and partly in section showing a unit power plant embodying my said invention.

In said drawing, the portions marked A represent the base which also forms the liquid fuel supply tank, B the motor, C the crank casing, and D a gas dome.

The base A is preferably a hollow casting, or is made in any other appropriate manner, formed hollow and constituting a liquid supply tank which may be filled or fed from any appropriate reserve supply through an opening 10, or in any other desired manner. The motor B, as shown, is a two-cycle gasoline engine of an ordinary type. The crank casing C is mounted upon the base A and supports the motor B and is of an air-tight construction.

The gas dome D is mounted above the base or tank A and communicates therewith through a pipe 11 and has a series of cones 12 mounted therein one above another preferably formed of fine wire gauze. The upper end of dome D has a discharge pipe 13 terminating in a nozzle 14 arranged to discharge into a mixing chamber 15 formed or mounted on the side of the motor B and from which ports 16 and 17 lead into the cylinder of said motor. Another pipe 18 leads from a point within the bottom of tank A and communicates with a small auxiliary reservoir 19 above dome D and preferably formed with or attached to the outlet pipe 13. Said reservoir has a small opening 20 arranged to discharge into the nozzle pipe 14 surrounded by a valve seat and controlled by a needle valve 21. An exhaust pipe 22 connects with the cylinder of the motor by an opening 24 and a jacket 25 surrounds said exhaust pipe and also the mixing chamber 15, having openings at the top for the admission of air and other openings 26 controlled by a valve or damper 27 for regulating the supply of air to the mixing chamber.

A check valve casing 29 with a pipe 30 leading into the crank casing C.

In operation, the tank A is filled with gasoline to a point substantially as indicated in Figure 1 but leaving a space between the top of the liquid and the top of the chamber in which it is contained. The motor being set in motion, operates to draw air through the openings 26 regulated by the valve or damper 27 through the jacket 25 which, after the engine is in operation, is heated by the heat of the exhaust pipe which said jacket surrounds. The gas, vapor, or fumes from the liquid fuel, will also be drawn by the suction through nozzle 14 and mixed in chamber 15 with said air and will then be drawn into the cylinder beneath the piston and compressed by the downward stroke of the piston in crank casing C. As the engine or motor operates, its suction also draws through pipe 18 from the bottom of tank A the residue or heavier portion of the liquid fuel. At each downward stroke of the piston a certain quantity of air is forced from crank casing C by the check valve, at the top of pipe 28, down through said pipe 28 into the dome or tank and up through the liquid fuel in said tank causing a violent agitation of said fuel and the more volatile portion thereof to vaporize and pass up through pipe 11 into dome D, the vapor particles being caught and expanded over the meshes of the screens 12 and as the operation of the engine creates a suction as well as compression it serves to draw through said dome and create a vacuum therein, and said vapor particles are thoroughly broken up and forced through the nozzle 14 into the mixing chamber 15 where they commingle and combine with the air to form a combustible gas and pass on into the engine cylinder for use in the well known manner.

The chamber 19 serves to collect a certain part of the heavier liquid fuel and retain the same, while the engine is at rest, in position for ready atomization as soon as the engine begins operation. It will be noted that the atoms of fuel passing through the fine needle valve opening are drawn across tube 13 so that the particles thereof are subjected to the agitation of the currents passing through said tube and heavier particles falling down are caught in the screens 12 where they are expanded, broken up, and reduced to the fineness required for combina-

A pipe 28 connects through the medium of

tion with the air in the mixing chamber to make a perfect combustible fuel.

Mounted in the mixing chamber is a butterfly valve 31 connected by any approved means (not shown) to be manually operated and controlled from a position which will be convenient for the operator. In an automobile engine this would be at the wheel, in a stationary engine plant, it would be alongside the other controlling devices. Said butterfly valve performs a two-fold function, first, it serves to regulate the amount of air passing to the mixing chamber and, second, when it is closed, to shut off not only air, but to fit over the end of nozzle 14 completely closing said nozzle and preventing the waste of fuel and holding the generated gas in the dome D so that it will be available for starting purposes. The face of said butterfly valve at the point adapted to cover the end of nozzle 14 is preferably faced with some soft material 32, such as, leather, felt, rubber or the like, which will furnish a cushion-like seat and secure a perfect fit.

It will be understood that while I have shown this "gasser" as incorporated in a stationary plant, designed particularly as a unit power plant, yet it is adapted for all characters of engines where combustible fuel is used as the motive power.

It will also be understood that the arrangement of the apparatus as shown is only for the purpose of illustrating an arrangement which will disclose the purpose and operation of my invention and that many modifications may be made therein to adapt it for power plants of other types or for the manufacture of combustible gas in connection with other apparatus and I therefore do not wish to be understood as limiting myself to the construction or arrangement shown, except in so far as may be required by the claims, the invention consisting broadly in using air under pressure for vaporizing or "gassing" the volatile portions of liquid fuel by forcing the same through said liquid fuel and also in mixing with the products thus obtained air from the outside and then continuing to mix and force the complete mixture over and over again through the liquid fuel and at the same time draw from the bottom of the liquid fuel chamber the heavier parts of said fuel, reduce the same to spray or atoms and combine with the other portions and air, thus producing a combustible fuel that will prove most efficient in use as well as economical in production.

Having thus fully described my said invention, what I claim as new and desire to secure by Letters Patent is:

1. An apparatus for forming combustible gas comprising a liquid fuel tank, a crank-case and a motor disposed one above the other, means of communication between the

cylinder of said motor and said crank-case and between said crank-case and said fuel tank, a gas-dome connected with the top of said tank, a nozzle leading from said gas-dome to a mixing chamber, a pipe leading to said nozzle from within the bottom of said fuel tank, and means for varying simultaneously the supply of fuel from said nozzle and the supply of air from the outside to said mixing chamber, substantially as set forth.

2. An apparatus for forming combustible gas comprising a liquid fuel tank, means for forcing air through the fuel in said tank, a dome connected with said tank, a mixing chamber, a nozzle adapted to discharge from said dome into said mixing chamber, and a butterfly valve mounted adjacent to the nozzle and at the entrance to said mixing chamber, said valve being arranged to open or close both the outlet from said nozzle and the inlet to said mixing chamber simultaneously, substantially as set forth.

3. An apparatus for forming combustible gas comprising a liquid fuel tank, means for forcing air through the liquid fuel in said tank, a gas chamber above and communicating with said liquid fuel tank, means for creating a vacuum in said gas chamber, a pipe leading from the lower portion of said liquid fuel tank to an auxiliary tank above said gas chamber, communication from said auxiliary tank to the nozzle of said chamber, a mixing chamber, and means for controlling the flow of fuel and air from said nozzle and the outside respectively to said mixing chamber, substantially as set forth.

4. A charge-forming device for internal combustion engines comprising a fuel tank, means to force air through the fuel in the tank, a mixing chamber, a nozzle arranged to feed the carbureted air to the mixing chamber, a normally open air intake for the mixing chamber and a throttle valve arranged to close simultaneously the intake for the mixing chamber and the outlet of said nozzle, substantially as set forth.

5. A charge-forming device for internal combustion engines comprising a fuel tank, means to force air through the fuel in the tank, a mixing chamber, a horizontal nozzle arranged to feed the carbureted air to the mixing chamber, a vertical tube leading to the nozzle, a spray nozzle at the opposite side of the tube from the first-named nozzle and connected to the fuel tank, and means in said tube to catch falling spray for subsequent vaporization, substantially as set forth.

6. A charge-forming device for internal combustion engines comprising a fuel tank, means to force air through the fuel in the tank, a mixing chamber, a horizontal nozzle arranged to feed the carbureted air to the mixing chamber, a vertical tube leading to

the nozzle, a spray nozzle at the opposite side of the tube from the first-named nozzle and connected to the fuel tank below the normal fuel level whereby unatomized drops of fuel fall back toward the fuel tank, substantially as set forth.

7. A charge-forming device for internal combustion engines comprising a fuel tank, means to force air through the fuel in the tank, a mixing chamber, a nozzle arranged to feed the carbureted air to the mixing chamber, and a throttle valve having a resilient facing adapted to engage the nozzle and close the aperture thereof, substantially as set forth.

8. A charge-forming device for internal

combustion engines comprising a fuel tank, means to force air through the fuel in the tank, a mixing chamber, means arranged to feed the carbureted air to the mixing chamber including a nozzle, a vertical tube leading to the nozzle, a spray nozzle at the opposite side of the tube from the first-named nozzle, and one or more screens in said tube to catch falling drops of liquid fuel for subsequent vaporization, substantially as set forth.

In witness whereof, I have hereunto set my hand at Indianapolis, Indiana, this 24th day of June, A. D. nineteen hundred and twenty.

IRA T. SWARTZ.