J. STUBBERS.

HYDROCARBON GENERATOR.

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1,042,987.

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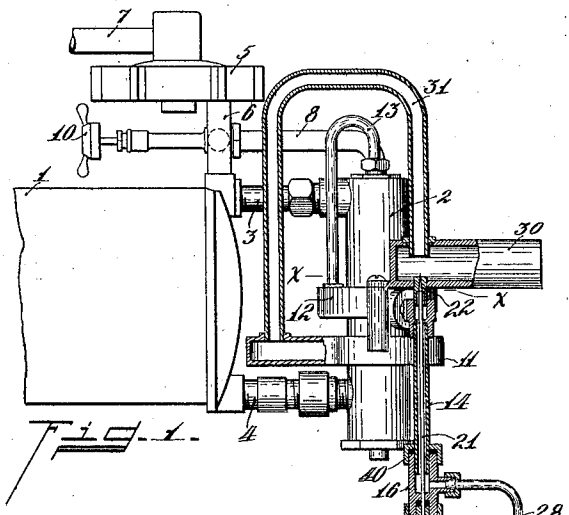

Fig. 1.

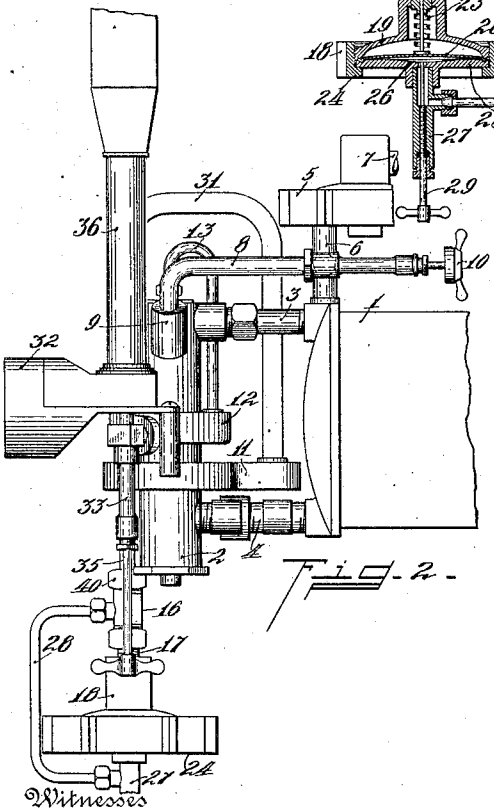

Fig. 2.

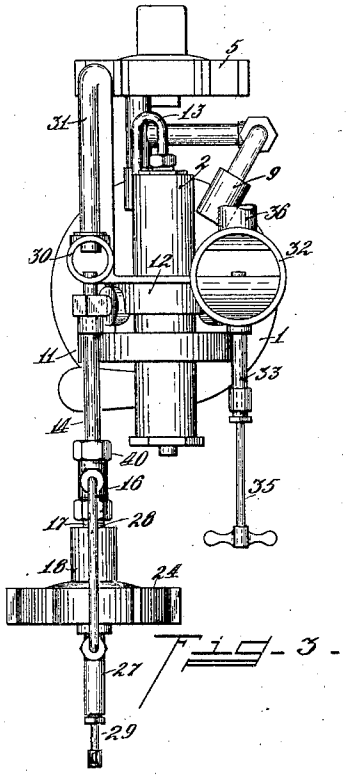

Fig. 3.

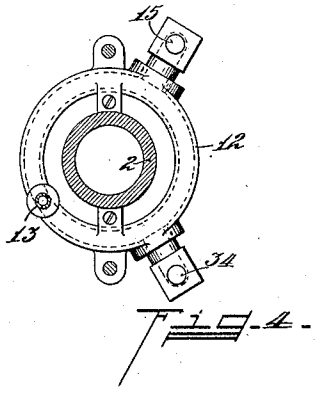

Fig. 4.

Witnesses

Oliver B. Kaiser

C. Yates

Inventor

Joseph Stubbers

By Wood & Wood.

Attorneys

COLUMBIA PLANOGRAPH CO., WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

JOSEPH STUBBERS, OF COVINGTON, KENTUCKY, ASSIGNOR TO THE INCANDESCENT LIGHT & STOVE COMPANY, OF CINCINNATI, OHIO, A CORPORATION OF OHIO.

HYDROCARBON-GENERATOR.

1,042,987. Specification of Letters Patent. Patented Oct. 29, 1912.

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To all whom it may concern:

Be it known that I, JOSEPH STUBBERS, a citizen of the United States, residing at Covington, in the county of Kenton and State of Kentucky, have invented certain new and useful Improvements in Hydrocarbon-Generators, of which the following is a specification.

My invention relates to an improvement in an apparatus for generating hydro-carbon vapor, suitably mixing it with air and delivering the mixture to a service-pipe.

The apparatus is an improvement in that type of older machines in which a tank and generator are connected at the top and bottom, so as to generate an equal pressure in both of said chambers, there being a pipe from the service-pipe communicating with the sub-burner for operating the generator, and a valve in this sub-burner pipe automatically controlled by a pressure device actuated under the influence of the varying vapor pressures in the gasolene tank.

In the herein described apparatus, instead of supplying the sub-burner with fuel taken from the service-pipe, a portion of the vapor from the super-heating chamber is delivered into an independent mixer and conveyed to the sub-burner, and the volume of vapor delivered to this mixer is automatically controlled by a pressure actuating device located between the super-heating chamber and the sub-burner mixer, and the remainder of the vapor from the super-heating chamber is delivered into a second mixer for supplying the service system.

The result of the improvement is a direct, positive and sensitive pressure regulated control of the volume of the mixture supplied to the sub-burner independent of the service system supply.

The features of the invention will be more fully set forth in the description of the accompanying drawings, forming a part of this specification, in which:—

Figure 1 is a side elevation of my improvement, partly in section, with the service elements and control therefor omitted. Fig. 2 is an elevation of the other side, parts being omitted for clearness. Fig. 3 is an end elevation. Fig. 4 is a section on line x, x, Fig. 1, these section lines being inclined to the horizontal so as to omit from the view any portion of the mixer.

1 is the gasolene tank, 2 the generator connected at the top and bottom by the pipes 3, 4.

5 is a safety pressure device communicating through pipe 6 with the top of the tank 1, there being a diaphragm, not shown, in the member 5, which will rupture under a predetermined excess of pressure, allowing the gas to escape through pipe 7 to a point of safety outside of the building. Communicating with pipe 6 is a pipe 8, having the initial sub-burner 9 on its other end positioned adjacently to the generator and controlled by the valve 10. This initial sub-burner is only employed in starting the apparatus and is disconnected when sufficient vapor has been generated to meet the requirements of the service system.

11 represents a main sub-burner surrounding the lower end of the generator and used for the normal purposes of the apparatus.

12 is an annular super-heating chamber surrounding the generator at a point in the heating zone of the sub-burner 11.

13 represents a pipe connecting the upper end of the generator 2 with the super-heating chamber 12, the upper or U-end of the pipe 13 extending above the liquid level in the tank and generator.

14 represents a tube forming a vapor conduit communicating with the super-heating chamber 12, through the orifice 15, and extending vertically downward below the lower end of the generator.

16 represents a coupling screw threaded on the lower end of the tube 14.

17 represents a hollow stem secured to the lower end of the coupling 16.

18 represents the pressure actuated automatic control for the main sub-burner, and it consists of a shell 19, in which is mounted a sensitive diaphragm 20.

21 represents a rod extending through the tube 11 and shell 19, the lower end resting on the center of the diaphragm 20. The upper end of said rod 21 has a needle point 22 engaging the nozzle of the tube 14.

23 represents a spring surrounding the rod 21, within the shell 19, and forcing the diaphragm normally downward.

24 represents a sleeve screw threaded on the lower end of the shell 19.

25 represents a plate supported by the sleeve 24, under the shell 19, the diaphragm

20 resting upon the plate 25, but being separated therefrom in the center by the space 26, forming a pocket for the vapor, so that its pressure will influence the diaphragm and raise or lower the rod 21.

27 represents a tube secured centrally to the under side of the plate 25, this tube communicating by means of the pipe 28 with the coupling 16, whereby the vapor from the super-heating chamber 12 flows under the diaphragm 20, raising or lowering the needle point 22, so that the volume of vapor delivered from the nozzle of the tube 14 is controlled by the pressure actuated movements in the diaphragm 20.

29 is a screw threaded rod in tube 27, which may be manually manipulated to move the diaphragm 20 to shut the nozzle of the tube 14.

30 is a horizontal mixer open at its outer end, through the lower wall of which the nozzle of the tube 14 projects.

31 represents a pipe forming a fuel or mixed vapor and air conduit, the upper end of which passes through the upper wall of the mixer 30 in alinement with the nozzle of the tube 14, whereby vapor and air are entrained through the pipe 31, the other end of said pipe 31 communicating with the main sub-burner 11. The fuel conduit 31 is functionally a fuel inlet conduit for the sub-burner 11.

32 represents a horizontal mixer for the service system open at its outer end.

33 represents a tube forming the second vapor conduit communicating through orifice 34 with the super-heating chamber 12, and the upper end of said tube 33 projects through the lower wall of the mixer at its lower end.

35 represents an adjustable needle valve in the tube 33 for controlling the volume of vapor delivered into the mixer 32.

36 represents the service-pipe or fuel conduit for the service system, containing the mixed vapor and air, said pipe leading upwardly from the upper side of the mixer 32, said pipe 36 being alined vertically with the tube 33, whereby mixed vapor and air are entrained into the service-pipe.

The pipes 21, 27, and 28, all communicating, so that the vapor under generator pressure is brought into operative contact with the diaphragm 20, may be regarded as the unitary vapor conduit in which the needle valve and needle controller are disposed, and this term is used in contradistinction to the term fuel conduit, applied to the pipe 31 which forms the sub-burner inlet member for the mixed vapor and air or fuel proper. So also, the tube 33 communicating through orifice 34 with the vapor super-heating chamber 11, is a second vapor conduit receiving vapor under generator pressure, while the service-pipe or fuel conduit 36 receiving the mixed vapor and air for the service system is functionally the fuel conduit of the service system.

Mode of Operation.—The main sub-burner 11 is started as soon as sufficient vapor has been generated to maintain combustion. The vapor generated will accumulate above the liquid level in tank 1 and generator 2 and maintain a predetermined pressure, say normally twenty pounds to the square inch. A portion of the vapor from the super-heating chamber 12 will pass into the tube 14, thence the vapor will entrain air into the pipe 31 for supplying the sub-burner 11. Assume that six lights are in service, the volume of vapor delivered into the mixer 30 will be in direct ratio to the vapor pressure on the liquid in the tank and generator, such given pressure influencing the diaphragm 20 to control the size of the opening controlled by the needle 22. Assume that six more lights are started, then the pressure will be lowered, the diaphragm 20 will be deflected downwardly and a greater volume of vapor will be delivered into the sub-burner, producing a greater sub-flame and hence increasing the generation of vapor to the requisite degree to supply the requirements of the number of lights in the service system that are in commission. The service system is also independently supplied with vapor from the super-heating chamber 12 and the valve 35 is regulated to deliver to the mixer 32 a volume of vapor proportionate to supply whatever number of lights may be in commission. For adjusting the diaphragm 20 relative to the needle valve 22 the coupling 16 may be screwed up or down on the pipe 14. To prevent leakage at this point a packing is provided intermediate the top of the coupling 16 and a stuffing cap 40 screwed on the top thereof. This positive and direct control of the volume of vapor for the sub-burner independent of the supply of vapor for the service system constitutes a very marked improvement and makes the system much more reliable and uniform in its operation, and much more automatic in character.

It is important to supply the sub-burner with vapor taken directly from the generator instead of from the service system, as the regulation of the needle valve for the sub-burner determines not only the quantity of the fuel but the quality of the fuel mixture.

It will be noted that the diaphragm for controlling the sub-burner needle valve is located in a vapor conduit directly communicating with the upper portion of the generator so as to be sensitively influenced by the degree of vapor pressure in the upper portions of the tank and generator. Through this organization the size of the sub-burner flame, and hence the volume of vapor generated, is automatically controlled

and proportionately regulated by the withdrawal of varying quantities of fuel from the service system which influence determines the vapor pressure in the tank and generator, so as to effect this sensitive and reliable control.

Having described my invention, I claim:—

1. In a device of the class described, a generator, a service system supplied therefrom, a vapor generating sub-burner having a fuel inlet member, a vapor conduit communicating with the generator, a needle valve therein adjacent to said fuel inlet member adapted to deliver vapor and entrain air into said fuel inlet member for supplying fuel to the sub-burner, and a generator pressure actuated device connected to the needle valve, whereby the withdrawal of varying quantities of fuel for service automatically adjusts the needle valve to control the quantity and quality of the fuel mixture supplied to the sub-burner.

2. In a device of the class described, a generator, a service system supplied therefrom, a sub-burner having a fuel inlet member, a vapor conduit communicating with the generator, a diaphragm pressure actuated device, a needle valve adjacent the fuel inlet of the sub-burner, the stem of said valve engaging one side of the diaphragm and controlling the outlet of said vapor conduit, to deliver vapor and entrain air into the fuel inlet for supplying the sub-burner, and a fluid conduit affording communication between the other side of said diaphragm and the generator, whereby the withdrawal of varying quantities of fuel for service automatically adjusts the needle valve to control the quantity and the quality of the fuel mixture supplied to the sub-burner.

3. In a device of the class described, a generator and liquid hydro-carbon tank connected at the top and bottom, a sub-burner for the generator having a fuel inlet member, a vapor conduit communicating with the generator, a needle valve therein arranged adjacent the inlet member for delivering vapor and entraining air into said inlet for supplying fuel to the sub-burner, a pressure actuated device operatively arranged in connection with said vapor conduit and connected to said needle for moving the same, a second vapor conduit communicating with the generator and having a needle valve therein, and a fuel service conduit adjacent said needle valve for receiving mixed vapor and air, whereby the size of the sub-burner flame, as well as the volume of vapor and quality of the fuel mixture supplied to the sub-burner are automatically controlled and proportionately regulated by the withdrawal of varying quantities of fuel for service, which determines the vapor pressure in the tank and generator.

In testimony whereof, I have hereunto set my hand.

JOSEPH STUBBERS.

Witnesses:
OLIVER B. KAISER,
EMMA SPEUER.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."