July 14, 1931. E. R. GODWARD 1,814,686

VAPORIZER

Filed Oct. 1, 1930

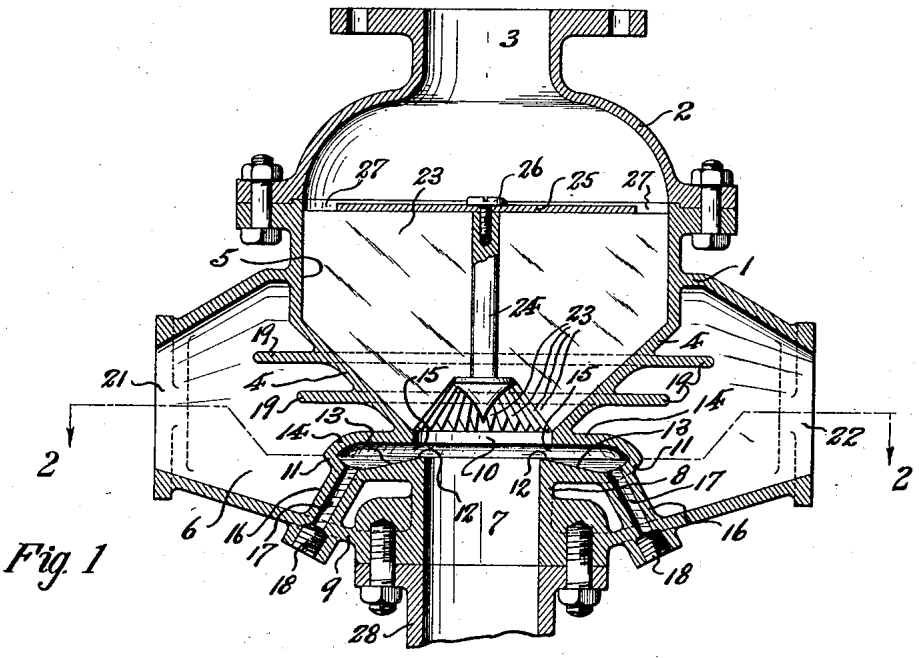

Fig. 1

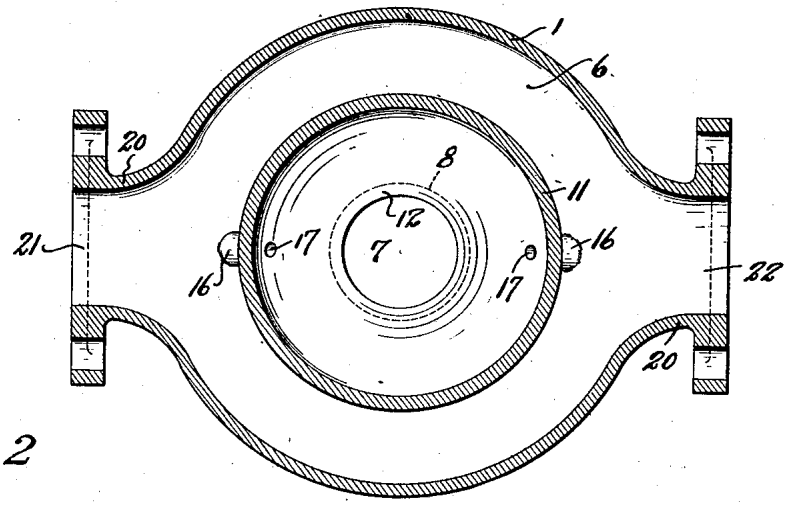

Fig. 2

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UNITED STATES PATENT OFFICE

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VAPORIZER

Application filed October 1, 1930. Serial No. 485,705.

This invention relates to improvements in apparatus for vaporizing fuel mixtures such e. g. as are supplied to internal combustion engines; and the invention has reference, more particularly, to improvements in vaporizers of the kind shown and described in my United States Letters Patent No. 1,686,609, dated October 9th, 1928.

The present invention has for its principal object to provide, in a plate surface vaporizer, an improved means for collecting unvaporized liquid fuel particles, separated by gravity from the vaporized fuel mixture produced in the main vaporizing chamber of the apparatus, and subjecting the same to the boiling effects of heat of relatively high degree, whereby vaporization thereof is expedited, and the additional vapor thus obtained is automatically returned to the main vaporizing chamber to join the output thereof.

Other objects of this invention, not at this time more particularly enumerated, will be understood from the following description of the same.

An illustrative embodiment of an apparatus made according to the principles of the present invention is shown in the accompanying drawings, in which:—

Figure 1 is a vertical longitudinal section of the improved vaporizing apparatus; and Figure 2 is a horizontal section of the same, taken on line 2—2 in Figure 1.

Similar characters of reference are employed in said views to indicate corresponding parts.

Referring to said drawings, the reference character 1 indicates a casing or pot having an open upper end normally closed by a dismountable cover member 2. Said cover member 2 is provided with an outlet portion 3, which may be suitably connected in communication with the intake manifold (not shown) of an internal combustion engine to be served by the vaporizer apparatus.

The interior of the casing or pot 1 is subdivided by an inverted conical bottom plate or partition 4, to provide a main vaporizing chamber 5 above the same, and a heater chamber 6 below the same. The fuel mixture intake 7, which leads centrally into the lower end of the vaporizing chamber 5, is formed by a centrally located throat member 8 which rises through the interior of the heater chamber 6 to extend intermediate the outer bottom wall 9 of the latter toward the intake opening 10 of the vaporizing chamber 5. Formed between said intake opening 10 and said throat member 8 is a substantially horizontal annular collecting basin 11, which projects within the interior of said heating chamber 6. The diameter of said intake opening 10 exceeds the diameter of the fuel mixture intake 7, whereby an annular catch lip 12 is formed to underlie the margins of said intake opening 10. The floor 13 of said basin 11 slopes downwardly and outwardly from said catch lip 12 to the bottom of said basin 11, and said basin is provided with a cover wall 14 extending between its outer periphery and the bottom plate or partition 4, so as to segregate the interior of the basin 11 from the interior of said heating chamber 6, leaving, however, an annular opening 15 affording communication between the interior of the basin 11 and the interior of the vaporizing chamber 5. Extending between the basin 11 to the bottom wall 9 are one or more necks 16 having passages 17 therethrough leading downwardly and outwardly from the interior of said basin. Normally the lower ends of said passages 17 are closed by removable plugs 18 engaged in enlarged internally threaded sockets provided at the lower ends of said passages 17. These passages 17 provide clean-out passages which may be opened at will, by removal of the plugs 18, for the purpose of draining out and cleaning the basin interior, when it is so desired to do. These plugs 18 may be provided with a small hole or holes to admit a limited amount of air to the interior of the basin during operation of the device, if desired.

Formed in connection with the conical bottom plate or partition 4, preferably as integral parts thereof, are a plurality of annular fins 19 projecting from the outer side thereof into the interior of the heating chamber 6. The casing or pot 1 is provided at opposite sides with laterally extending necks 20, respectively forming inlet and outlet passages 21 and 22 leading into and out of the

heating chamber 6, and through which, in connection with suitable delivering and discharging conduits (not shown) a heating medium (such e. g. as the exhaust gases from an internal combustion engine) may be introduced into and circulated through the heating chamber 6, so as to transfer heat to said bottom wall or partition 4, and so as to envelop and transfer heat to the basin 11. The fins 19 provide the wall or partition 4 with an increased area of surface for contact with the heating medium circulated through the heating chamber 6, and consequently the heat absorption capacity and conduction efficiency of said partition or wall is increased thereby.

Arranged within the interior of said vaporizing chamber 5 is a nest of radial up-standing plates 23 which extend between a central supporting core 24 to the walls of said chamber 5, the same being separated to form intermediate passages communicating at their lower ends with the intake opening 10 of the vaporizing chamber 5. Extending over the upper end of this nest of plates 23, so as to close the major portion of the upper ends of the passages between the plates is a top-plate 25, preferably secured to the upper end of the supporting core 24 by suitable fastening means, such as screws 26. Said top-plate 25 is of less diameter than the inside diameter of the vaporizing chamber 5, thus leaving the outer portions of the upper ends of said passages between the plates open, and thereby providing discharge mouths or exits 27, which communicate through the interior of the cover member 2 with the outlet portion 3. The lower margins of the plates 23 are inclined at an angle corresponding to the angle of slope of said bottom plate or partition 4 so as to contact therewith.

The delivery end 28 of any suitable form of liquid fuel atomizing carbureter is connected with the fuel mixture intake 7 so as to deliver the fuel mixture output of said carburetor into the vaporizer apparatus.

In the apparatus the fuel mixture delivered into the vaporizing chamber 5 is subjected to vaporizing effects according to the general principles disclosed in my prior United States Patent No. 1,686,610, dated October 9th, 1928. During the vaporizing process wet fuel particles accumulating on the surfaces of the plates 23 will gravitate thereon toward the downwardly inclined bottom or partition 4, and such wet fuel particles, particularly including heavy or less volatile ends of the fuel, which are not volatilized by the hotter portions of the lower ends of the plates, will continue to flow down the incline of the bottom or partition 4 to the periphery of the opening 10, from which the same will fall to the catch lip 12 of the basin 11, being thereupon carried by the sloping floor 13 into the interior of the basin 11. Owing to the fact that said basin 11 is entirely enveloped in hot exhaust gases circulated through the heating chamber 6, a maximum heat is applied to the liquid fuel thus accumulated in said basin 11, with the result that said accumulated fuel is boiled off or vaporized. The resultant vapor rises toward the cover wall 14 of the basin, whereupon the same is sucked through the annular opening 15 by the inrushing stream of fuel mixture entering the vaporizing chamber 5 through the intake 7, so that the same is carried back into the passages between the plates 23, to there join vaporized fuel mixture discharged through the discharge mouths 27 and cover outlet 3 to the engine cylinders, or other place of use.

The novel form and arrangement of catch-basin for back-drained liquid fuel, as disclosed in the drawings and above described, is a very desirable improved feature of the vaporizer apparatus, since it provides means for subjecting unvaporized liquid fuel to high heat, especially during engine starting from cold condition; even under normal running conditions heavy ends of the liquid fuel employed may escape vaporization in the plate chamber, but are nevertheless caught in the more intensely heated basin 11 and quickly boiled off and returned in vapor form to join the gaseous output of the apparatus. While I prefer the form and arrangement of basin shown and described, I am nevertheless aware that some changes could be made therein without departing from the scope of this invention, and it is therefore intended that all matter contained in the above description or shown in the accompanying drawings shall be interpreted as illustrative and not in a limiting sense.

I claim:—

1. In a vaporizing apparatus of the kind described, a vaporizing chamber having a central carburetted fuel mixture intake leading upwardly thereinto and a downwardly and centrally sloping bottom heating plate heated by exhaust gases terminating in an opening above and exceeding the diameter of said intake, and an annular catch-basin also heated by exhaust gases intermediate said sloping chamber bottom and said intake, said basin having a catch-lip beneath the periphery of said opening and an annular opening above said intake and communicating with said heating plate opening.

2. In a vaporizing apparatus of the kind described, a vaporizing chamber having a central carburetted fuel mixture intake leading upwardly thereinto and a downwardly and centrally sloping bottom heating plate heated by exhaust gases terminating in an opening above and exceeding the diameter of said intake, an annular catch-basin also heated by exhaust gases intermediate said sloping chamber bottom and said intake, said basin having a catch-lip beneath the periph-

ery of said opening and an annular opening above said intake and communicating with said heating plate opening, means to provide clean-out passages leading from said basin interior, and means to normally close said clean-out passages.

3. In a vaporizing apparatus of the kind described, a casing, a partition means to subdivide said casing interior to form an upper vaporizing chamber and a lower heating chamber, a fuel mixture intake means leading upwardly through said heating chamber, said partition means having a downwardly and centrally sloping portion converging toward said intake means and terminating in an opening above and exceeding the diameter of said intake means, an annular arch-basin intermediate said sloping partition portion and said intake means arranged to extend into the interior of said heating chamber, said basin having a catch-lip spaced beneath the periphery of said partition opening and extending around the upper end of said intake means, a cover member extending between the outer margins of said basin and the periphery of said partition opening, and means to enter and discharge exhaust gases into and from said heating chamber.

4. In a vaporizing apparatus of the kind described, a casing, a partition means to subdivide said casing interior to form an upper vaporizing chamber and a lower heating chamber, a fuel mixture intake means leading upwardly through said heating chamber, said partition means having a downwardly and centrally sloping portion converging toward said intake means and terminating in an opening above and exceeding the diameter of said intake means, an annular catch-basin intermediate said sloping partition portion and said intake means arranged to extend into the interior of said heating chamber, said basin having a catch-lip spaced beneath the periphery of said partition opening and extending around the upper end of said intake means, a cover member extending between the outer margins of said basin and the periphery of said partition opening, means to provide clean-out passages leading from said basin interior through a wall of said casing, means to normally close said clean-out passages, and means to enter and discharge exhaust gases into and from said heating chamber.

In testimony that I claim the invention set forth above I have hereunto set my hand this 24th day of September, 1930.

ERNEST R. GODWARD.