

July 28, 1925.

E. Y. GRUENEWALD

1,547,384

VAPORIZER

Filed June 20, 1922

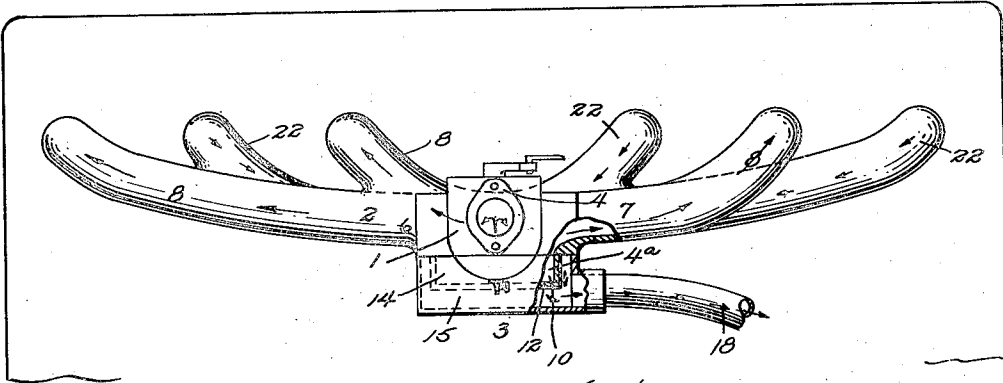


Fig. 1.

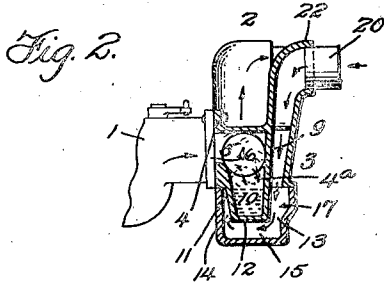


Fig. 2.

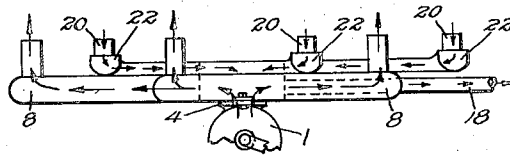


Fig. 3.

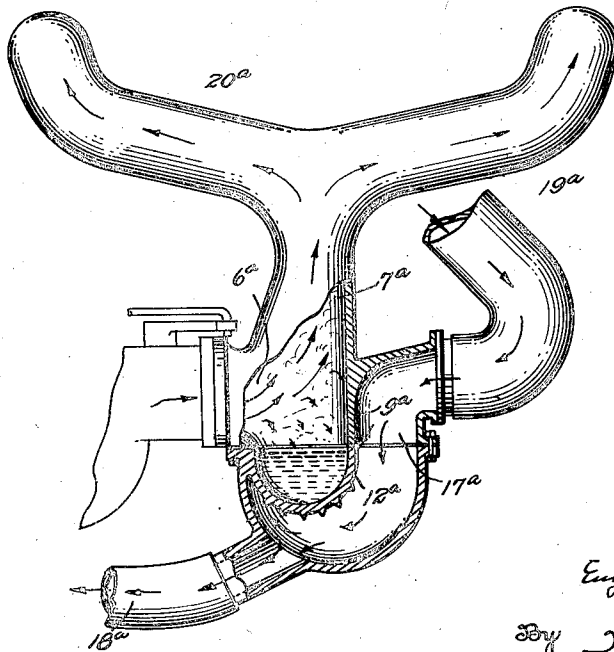


Fig. 4.

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Patented July 28, 1925.

1,547,384

UNITED STATES PATENT OFFICE.

EUGENE Y. GRUENEWALD, OF EAST MOLINE, ILLINOIS.

VAPORIZER.

Application filed June 20, 1922. Serial No. 583,744.

To all whom it may concern:

Be it known that I, EUGENE Y. GRUENEWALD, a citizen of the United States, residing at East Moline, in the county of Rock Island and State of Illinois, have invented certain new and useful Improvements in Vaporizers, of which the following is a specification, reference being had therein to the accompanying drawing.

10 This invention relates to a method of treating fuel liquids to transform them from a liquid state to a gaseous or vaporous condition in order to produce substantially uniform masses of combustible gases, particularly such as are supplied to explosive engines.

20 Much of the fuel liquid found in commerce, particularly that which passes under the general name of gasoline, can be correctly regarded as a mixture of two or three components more or less readily differentiable. These components vary from each other in several respects, and particularly in their susceptibility of being vaporized or gasified. When a body of air is forced across the surface of a body of this composite fluid, as for example, when it is suddenly moved under the action of the vacuum suction caused by an engine piston, it will pick up more or less of each of these varying components of the fuel and, while commingled in suspension, carry them toward the manifold or engine duct.

35 One part of each of the quantities of the liquid which the air thus picks up vaporizes at a relatively low temperature, namely, a temperature approximating that of the normal atmosphere, those portions of the mixture which carry these vapors being frequently referred to as the "light ends." Another part of each of the quantities of the liquid taken up by the air requires a much higher temperature for complete vaporizing or gasifying, some of it demanding a temperature of from 400° F. to 600° F.; the portions of the mixture carrying this heavier fluid being termed the "heavy ends" thereof.

50 It is difficult, in fact practically impossible, to transform all of these varying component parts of the fuel liquid into a uniform gas or vapor body if they are all treated alike; and such uniformity in constitution of the mixture charges is necessary for economical combustion. And there should not only be

such uniformity in the constitution of the mixture, but the uniformity should be maintained while distributing it to the several cylinders, and this difficulty increases with the number of cylinders.

60 If the mixture is not uniform, that is if it suspends and carries to the cylinders particles of fuel liquid commingled with the vapor and air, deposits of carbon on the walls of the cylinders are formed, the lubrication between the pistons and cylinder walls is disturbed, and the lubricating oil in the crank chamber is diluted, all of which result in detrimental effects throughout the engine.

70 Various devices and methods of carbureting have been used or proposed. Gasifiers have been employed including appliances for subjecting to heat the mixture of air and fuel on their way from the carbureter to the engine; but those mechanisms of which I have knowledge have been either designed to initially apply to the mixture, as an entirety, a very high temperature before it reaches the manifold or engine duct, or designed to conduct the mixture including the heavier fluid bodies to the manifold, and to thereafter separate said heavier portions.

85 The object of the present invention is to provide means and a method for vaporizing at a low temperature the parts of the fluid fuel which constitute the "light ends" of the mixture and simultaneously taking from the carbureter in an atomized condition the heavy parts of the fluid and subjecting them to such temperature required for their vaporization or gasification, without permitting the high temperature to affect the "light ends"; and accomplishing all of this before the "heavy ends" of the mixture can enter, or even reach the manifold or engine duct.

100 Fig. 1 is a side view showing more or less conventionally parts of a manifold and parts of a carbureter, together with a vaporizing or gasifying device embodying my improvements.

105 Fig. 2 is a vertical sectional view.

Fig. 3 is a diagrammatic view.

Fig. 4 shows a modified form of the mechanism, part being illustrated in elevation and part being broken away.

110 In the drawings 1 indicates a part of a carbureter, which may be of any of the ordinary forms or of any preferred character.

2 indicates the manifold or system of ducts receiving, from the carbureter and gasifying devices, the mixture and delivering it to the cylinders.

5 Interposed between the carbureter and the manifold is arranged the vaporizing or gasifying device more particularly characterizing my improvement. It is indicated as an entirety by 3, and has a short neck 4, connecting it to the carbureter, and a chambered part 4^a joined to the manifold. It is formed (preferably by casting) so as to have a free passageway from the carbureter through the neck 4 to the duct, or ducts, 8, of the manifold to the cylinders, this passageway having the parts 5, 6, 7. The air, together with the lighter vapors or gases, and also the heavier parts of the fuel fluid taken up by the air, all enter through the part 5 of this passage, the air and its lighter contents passing on freely through the parts 6 and 7 of the passageway. The heavier particles of the fluid tend to separate and move inward on approximately straight paths. A wall 9 is arranged in planes transverse to the lines of the inlet part 5 of the passageway for the mixture.

Below the passageway 5, 6, 7 there is provided a relatively large bowl or receptacle 10 having a low front wall 11 and a bottom part 12 integral with the walls 11 and 9. The rear wall 9 extends to higher points. Around the front and rear walls 9 and 11 and the bottom 12 there is a comparatively large chamber 17 having a rear part 13, a front part 14 and a bottom part 15. This chamber 17 is adapted to be supplied with hot gases, such as the exhaust gases from the engine, and these gases are taken away through duct 18. The lower parts of the walls 9 and 11 and the bottom wall 12 can be heated to a high degree, for example, say from 400° F. to 600° F., but the dimensions of the parts and their relative positions are such that this high heat is maintained below, and at points remote from, the continuous passage 5, 6 and 7.

The walls 9, 11 and 12 are gas-tight with respect to the heating chamber 17 on the outer side and the passageway 5, 6 and 7 extending from the carbureter to the manifold, and the bowl-like cavity 10 formed by these walls is immediately adjacent the carbureter and is in open communication with the passageway mentioned.

The gasifying or vaporizing mechanism shown in Figs. 3 and 4 is substantially similar, in principle of construction and operation to that illustrated in Figs. 1 and 2. In the construction in Figs. 3 and 4 the parts 6^a and 7^a of the passageway for the mixture extend upward to the manifold 20^a, a device of the character here shown being designed for use with an engine having a small number of cylinders. 19^a indicates a

pipe through which part of the exhaust gases from the engine can be passed to the chamber 17^a which extends around the bottom 12^a of the bowl or receptacle, the rear wall of the baffle plate 9^a extending upward from this bottom part 12^a. The gas escapes from the heating chamber 17^a through the pipe 18^a. In the mechanism shown in Figs. 1 and 2 the horizontal inlet part 5 has two diverging ducts 6, 7, one turned toward the righthand part of the manifold and the other toward the lefthand part; this apparatus being intended for use with a large engine having a number of cylinders. In this case the exhaust gases from the engine are brought through pipe 20, which is secured to the inlet tube at 22, the gas passing there-through to the chamber 17. The gas escapes from this chamber through the exhaust duct 18 extending in any preferred direction.

The manner in which a device such as has been described operates, will be readily understood.

When the engine is in operation and is causing a series of quick suction impulses through the carbureter, bodies of air are successively drawn in and each picks up a quantity of fuel fluid. Each charge includes not only the body of air but also, first, a body of hydrocarbon which may be regarded as approximately true gas, and, secondly, particles of fluid, some of which are minute and others of which are relatively large globules. The specific gravities of these several materials vary. The gaseous, or approximately gaseous, bodies remain suspended in the air and are easily carried by it to the manifold through the upper passageway 5, 6, 7. Those particles of the fluid which are exceedingly small and light will also tend to be carried up with the air but rapidly become vaporized as they enter the heated region. But the large globules or particles of the fluid taken up by the air and carried inward by it in suspension tend to immediately gravitate away from it and quickly impinge upon the baffle wall 9 and settle downward and are caught in the bowl at 10. Here they are subjected to the high heat abstracted from the stream of exhaust gases passing through the chamber 17 and imparted to the walls 9, 11 and 12. The design can be such that the body of fluid accumulating in the bowl at 10 becomes a boiling mass and the gases and vapors generated therefrom rapidly rise to the passageway 5, 6, 7, and are commingled with the air and low-temperature vapors and form a substantially uniform and homogenous mixture.

It has been noted that the collecting chamber or bowl is positioned below the normal path 5, 6, 7 of the mixture and catches the heavy particles of the fluid immediately after they leave the carbureter and before they can reach the manifold or engine ducts. The

purpose of positioning this fluid-arresting and retaining region below the normal path of the mixture is to provide for subjecting the fluid caught therein to an exceedingly high temperature but at points where such temperature will not affect that part of the mixture which vaporizes or gasifies at low temperature.

What I claim is:

1. The combination with an explosive engine, a mixture supply manifold and a carburetor, of a device provided with two substantially parallel passages having oppositely directed inlets, one of said passages communicating with the carburetor and the manifold, and the other passage having its inlet connected with the engine exhaust, the supply passage having at an intermediate point in its length a bowl-like section adapted to collect heavier particles of fluid fuel, and the other said passage extending along a substantially vertical wall of said fuel passage and beneath the said bowl-like section, for the purpose described.
2. The combination with an explosive engine, a mixture supply manifold and a carburetor, of a device provided with two substantially parallel passages having oppositely directed inlets, one of said passages communicating with the carburetor and the manifold, and the other passage having its inlet connected with the engine exhaust, the

supply passage having at an intermediate point in its length a bowl-like section adapted to collect heavier particles of fluid fuel, and the other of said passages extending along a substantially vertical wall of said fuel passage and beneath the said bowl-like section, the said bowl-like section and the heating chamber therefor being detachably supported.

3. A device of the class described, comprising a substantially vertical fuel passage, an exhaust passage having a portion thereof arranged substantially parallel with the fuel passage, said passages having oppositely directed inlet openings, one directing fluid fuel against one face of the vertical wall separating the aforesaid fuel and exhaust passages and the other directing exhaust gases against the opposite face of the said wall, and a casting supported below the plane of the inlet openings and having an integral bowl section forming the lower end of the fuel passage, a heating chamber included in the exhaust passage and extending beneath the bowl, whereby the said bowl extends directly into the path of the exhaust gases which will impinge against the surface thereof, for the purpose described.

In testimony whereof, I affix my signature.

EUGENE Y. GRUENEWALD.