

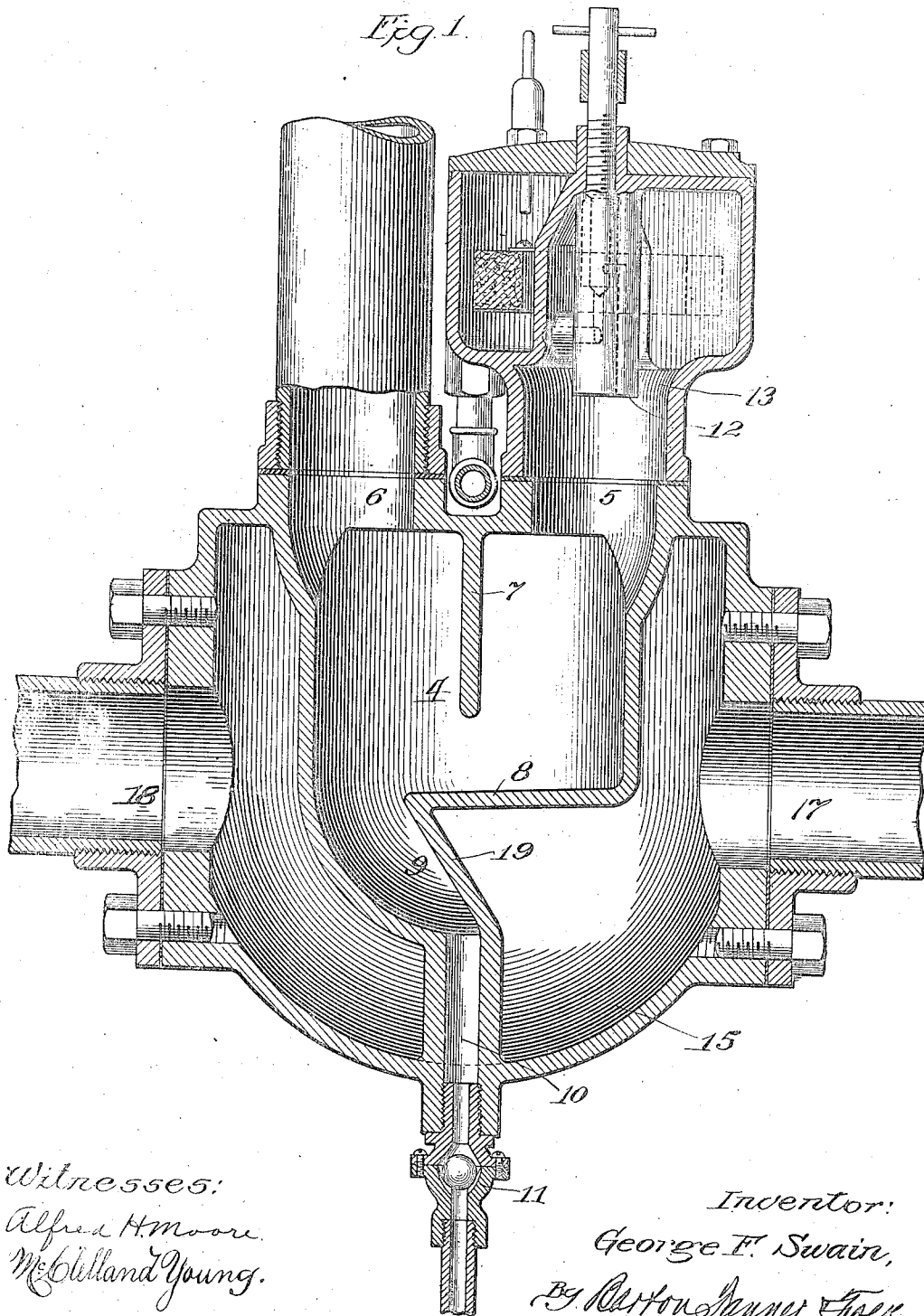
G. F. SWAIN.
VAPORIZER.

APPLICATION FILED AUG. 8, 1908.

952,548.

Patented Mar. 22, 1910.

2 SHEETS—SHEET 1.

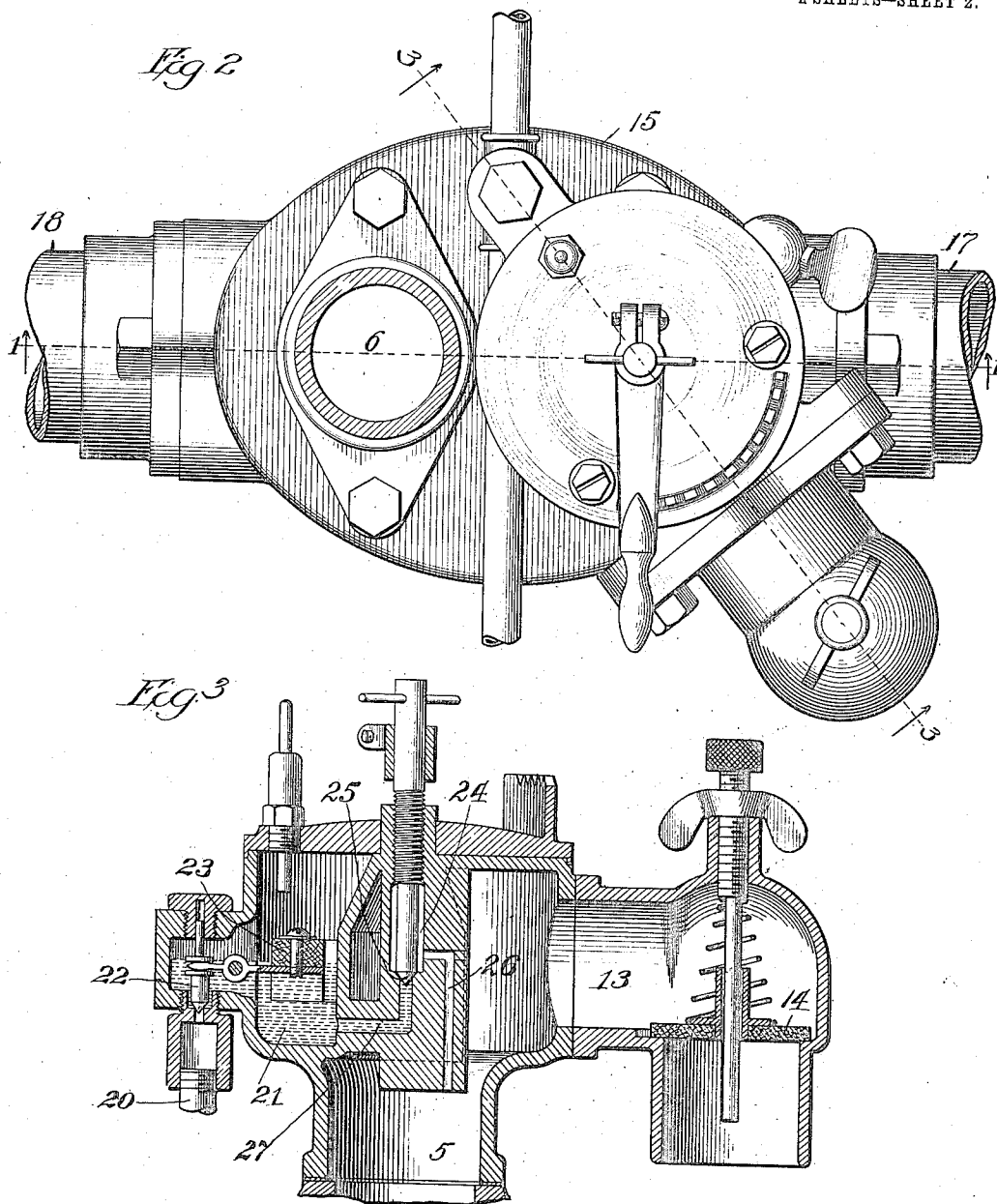


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2 SHEETS—SHEET 2.



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UNITED STATES PATENT OFFICE.

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VAPORIZER.

952,548.

Specification of Letters Patent. Patented Mar. 22, 1910.

Application filed August 8, 1908. Serial No. 447,515.

To all whom it may concern:

Be it known that I, GEORGE F. SWAIN, citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a certain new and useful Improvement in Vaporizers, of which the following is a full, clear, concise, and exact description.

This invention relates to a vaporizer or carbureter adapted to produce a combustible gaseous mixture from liquid hydrocarbon fuel, for use in engines of the explosion or internal combustion type.

The object is in general to provide improved, simple and inexpensive apparatus of this character which will be adapted to make use of a great variety of fuels, with particular reference to heavy oils which cannot be used in carbureters of the ordinary type.

It has heretofore been proposed to make use of the heavier hydrocarbon oils to generate gas for the operation of an explosion engine, but great difficulty has been experienced owing to the collection and solidification of the unvaporized residues, and also the formation of hard carbon deposits in the valves and cylinders of the engine using gas from such fuel.

In accordance with my invention, the liquid hydrocarbon fuel, which may be crude petroleum, kerosene or the like, is fed in very small quantities onto a heated surface in a retort, which will cause the more volatile constituents of the fuel to be instantly vaporized, whereupon the unvaporized residues are immediately drawn off from the vaporizing surface, collected in a pocket or recess below such surface, and finally removed from such pocket automatically by a device such as a check valve, which will permit the discharge of the liquid accumulations without allowing the inrush of air to the retort under the suction of the engine.

The invention also contemplates an improved construction by which the air and fuel vapor is directed into contact with the heated or vaporizing surface of the retort, and also a construction by which the vaporizing surface is efficiently heated to a high degree by the exhaust gases from the engine.

I have found that the gaseous mixture produced by the vaporizer of my invention, when even crude petroleum is used as a fuel, will not form carbon deposits in the valves

and cylinder of the engine, because of the perfect vaporization of the volatile constituents of the fuel, and because the residues are not allowed to accumulate on the vaporizing surface, but are immediately drawn off. My theory is that the hard carbon deposits result from an imperfect vaporization of the fuel, insufficient mixture of air, and from the use of those constituents of the heavy residues which are most slowly vaporized. By bringing the liquid fuel and the current of air and fuel vapor into direct contact with a very hot surface of the retort, instead of merely relying upon the heat retained by the gases in the retort, I am enabled to secure substantially perfect vaporization; and by draining off the residues which are not instantly vaporized by contact with the hot surface, the heavier vapors and over-rich fumes which would otherwise be produced from such residues, and which would result in the formation of carbon deposits in the engine, will be avoided.

My invention will be more particularly described and further features thereof set forth by reference to the accompanying drawings, in which—

Figure 1 is a vertical sectional view of a combined vaporizer and mixer of my invention, together with the fuel feeding apparatus or sprayer; Fig. 2 is a plan view thereof; and Fig. 3 is a detailed sectional view of the fuel feeding attachment and air inlet valve.

The same reference numerals designate the same parts wherever they are shown.

The vaporizer comprises, in its elements, a retort 4 having an inlet 5 for fuel and air, an outlet 6 for the gaseous mixture generated, and a partition 7 extending downward between the inlet and outlet openings and adapted to direct the current of air and fuel into contact with an inclined vaporizing surface or floor 8, which is arranged to be heated, as by the hot exhaust gases from the engine. A pocket 9 is formed at the bottom of the retort, below the lower edge of the inclined floor 8, adapted to receive the liquid fuel residues drained from said floor. A drain pipe 10 is connected with said pocket to discharge the fuel residues collected therein, said drain pipe being provided with means, such as a check valve 11, for permitting the discharge of the liquid without admitting air to the retort under

suction of the engine. The liquid fuel is arranged to be dropped in small quantities from the feeding device 12 onto the hot surface of the inclined floor 8; and air is drawn into the retort from the air passage 13 controlled by a puppet valve 14. The partition 7 causes the current of air and fuel received through the inlet 5 to be directed downwardly into contact with the hot vaporizing surface 8, the generated gases being thoroughly intermingled in the retort and passing under the lower edge of the partition 7, and thence upwardly to the outlet 6, which is connected to the inlet port of the engine.

The retort 4 is preferably inclosed in an outer casing 15, which has inlet and outlet connections 17 and 18, respectively, to receive and discharge the hot exhaust gases from the engine. The side of the wall of the retort opposite the inlet 17 is preferably provided with a reëntrant angle, the upper side of which forms the downwardly inclined floor 8. The retort and casing are so shaped that the exhaust gases pass under the floor or vaporizing surface 8 or the retort; and the wall of the retort below said vaporizing surface being formed at an angle constitutes an inclined baffle plate 19 in front of the inlet 17, adapted to direct the hot exhaust gases upwardly into contact with the under side of the floor 8. Said floor is thus efficiently heated by the exhaust without interfering greatly with the passage of the exhaust through the casing.

Any desired means may be provided for feeding the liquid fuel to the vaporizer. In Figs. 2 and 3 I have illustrated the construction which I prefer to employ. The oil supplied through pipe 20 is kept at a substantially constant level in the container 21 by means of a valve 22 operated by a float 23. A feeding chamber 24 is connected by a duct 27 with the lower part of the container 21, to receive oil therefrom, the admission of oil from the duct 27 into the chamber 24 being regulated by a needle valve 25. A feed duct 26 opens off the feed chamber 24 at a point slightly above the level of the oil in the container 21, said duct 26 leading downward in position to discharge oil through the inlet 5 onto the vaporizing surface 8 of the retort. Normally, while the engine is not working, the oil from the duct 27 will not rise in the chamber 24 to the height of the opening of the feed duct 26; but when the retort is subjected to the suction of the engine the external pressure will force the oil, in small regulated quantities, past the needle valve 25 upward into the chamber 24, and down through the feed duct 26 from which it is dropped through the inlet 5 onto the hot surface of the floor 8 of the retort; air being admitted at the same time through the passage 13, upon a

suction sufficient to raise the puppet valve 14 against the tension of its spring.

In starting the device in operation, gasolene may first be supplied through the pipe 20, and this will be vaporized as in any carbureter, without requiring the application of heat. After the engine has been running long enough so that the exhaust gases have thoroughly heated the retort, the supply of gasolene may be cut off, and the heavier fuel, such as petroleum or kerosene, supplied through the pipe 20, and fed, as described, onto the now heated vaporizing surface of the retort. As the oil does not remain long enough in contact with the hot surface to become baked or carbonized, the residue will be uninjured and will form a fair quality of lubricant.

I claim:—

1. A vaporizer comprising a retort, a casing for said retort having an inlet and outlet adapted to receive and discharge the hot exhaust gases from an explosion engine, whereby said retort is heated, said retort having a floor in front of the inlet in said casing, and an inclined baffle plate below said floor and forming an angular extension thereof adapted to direct the heated exhaust gases upwardly against said floor; said retort having means for dropping liquid fuel in small quantities onto said floor, means for admitting air with such fuel, means for directing the current of air and fuel vapor into contact with said floor, and an outlet for the mixture.
2. A vaporizer comprising a casing inclosing a chamber for the circulation of hot gases, a retort extended from the top wall of said chamber into the interior thereof, said retort being of less cross-sectional area than said chamber whereby space is provided around said retort for the circulation of hot gases in said chamber, said retort having a partition extending vertically from its upper wall to near its floor, whereby the interior of the retort is divided vertically into two compartments which are in communication beneath the lower edge of said partition, the top wall of said retort being provided with an inlet and an outlet upon opposite sides of said partition for supplying liquid fuel to one of said compartments on one side of said partition and for withdrawing gas from the compartment at the other side of said partition, respectively.
3. A vaporizer comprising a casing inclosing a chamber for the circulation of hot gases, a retort extended in and of less cross-sectional area than said chamber whereby space is provided around said retort for the circulation of hot gases in said chamber, said retort having a reëntrant angle formed in one of its side walls near the bottom thereof providing an inclined floor and an oil pocket located below the lower edge of said

inclined floor and adapted to receive oil therefrom, and means for dropping liquid fuel in small quantities upon said floor, the retort having an inlet for air and an outlet
5 for gas, and being constructed to direct the air and fuel downwardly into contact with said floor before passing to said outlet.

4. A vaporizer comprising a retort having a floor slanting downwardly from one of its side walls, the other side wall extending
10 down around and under the lower edge of the slanting floor, to form a pocket adapted to receive oil drained from said floor, means for draining off the oil from said pocket
15 while checking the admission of air thereto, said retort having means for introducing small quantities of fuel oil into the retort at a point permitting the same to fall upon said floor, said retort having an inlet for
20 admitting air, and an outlet for gas near the top of the retort, and a partition between said inlet and outlet extending from the top of the retort downward nearly to said floor.

5. A vaporizer comprising a retort, a casing for said retort having an inlet and outlet adapted to receive and discharge the hot
25 exhaust gases from an explosion-engine, said retort being centrally supported within said casing between the inlet and outlet, and having an inclined floor in front of the inlet, the casing and retort being formed to direct the hot exhaust gas upwardly against the under side of said floor, means for feeding liquid fuel in small quantities onto said
30 floor, said retort being formed with a pocket below the lower edge of said inclined floor adapted to receive liquid fuel residues from said floor, means for admitting air to the retort with the fuel, means for directing the
40 current of air and fuel vapor into contact

with the heated floor of the retort, an outlet for the mixture, and means for draining off the unvaporized liquid fuel from said pocket, such means being constructed to check the admission of air.

6. A vaporizer comprising a casing having inlet and outlet connections on opposite sides thereof adapted to receive and discharge hot exhaust gases from an explosion engine, of inner walls extending downward
50 from the top of said casing and forming a retort centrally located inside said casing between the inlet and outlet openings thereof, said retort having inlet and outlet openings at the top, a partition extending downward from the top between said inlet and
55 outlet openings nearly to the floor of the retort, and means for drawing off unvaporized residues from the bottom of said retort, such means being adapted to check the admission
60 of air to the retort.

7. A vaporizer comprising a retort having a reëntrant angle formed in one of its side walls near the bottom thereof providing a downwardly slanting floor, said retort having means for introducing small quantities
65 of fuel oil into the retort at a point permitting the same to fall upon said floor, said retort having an inlet for admitting air and an outlet for gas near the top of the retort, and a partition between said inlet and outlet extending from the top of the retort downward nearly to said floor.

In witness whereof, I hereunto subscribe my name this 1st day of August, A. D., 1908. 75

GEORGE F. SWAIN.

Witnesses:

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